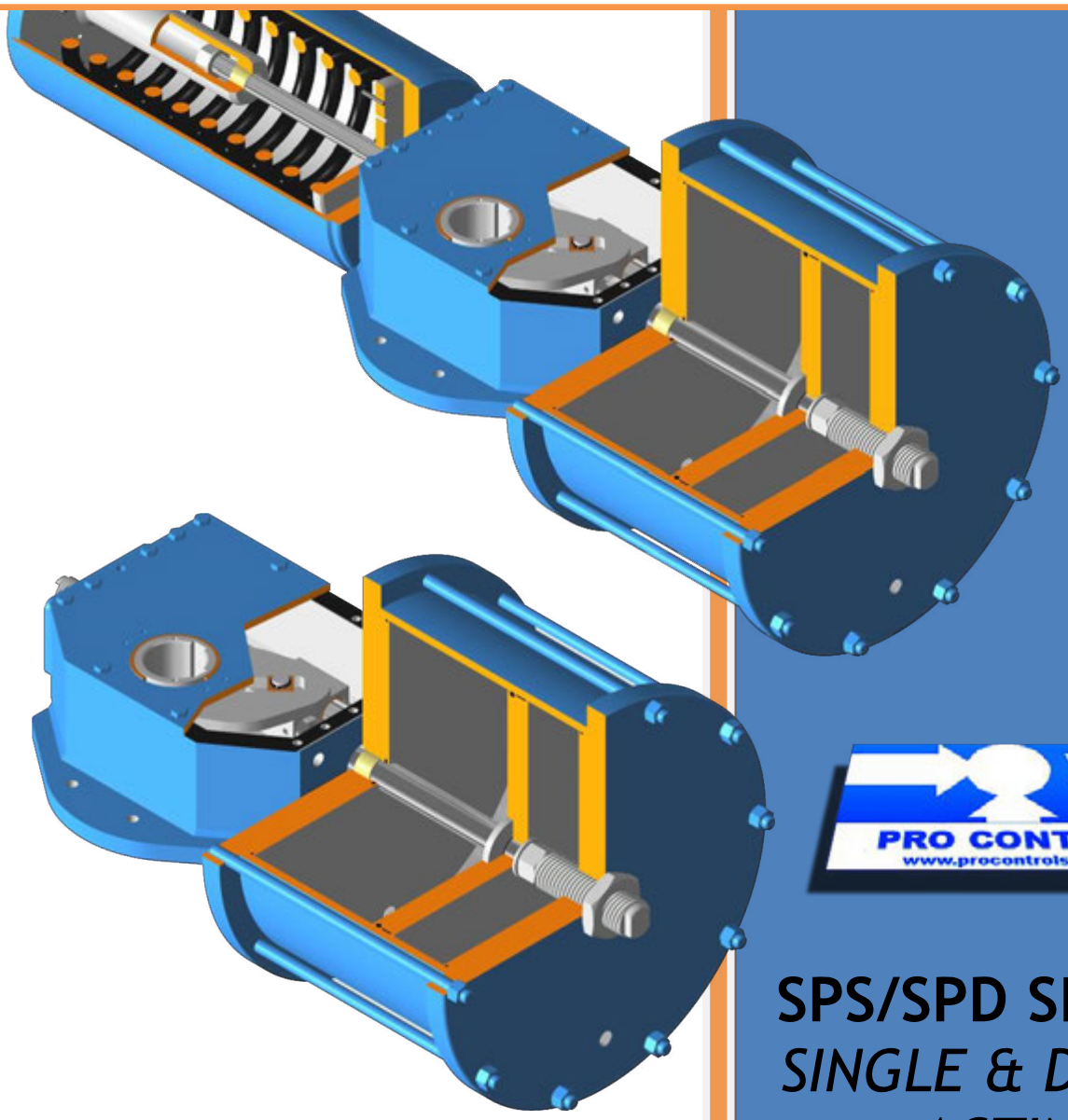
MM-SPS-SPD-E-2

2013

INSTALLATION, COMMISSIONING AND MAINTENANCE USER MANUAL



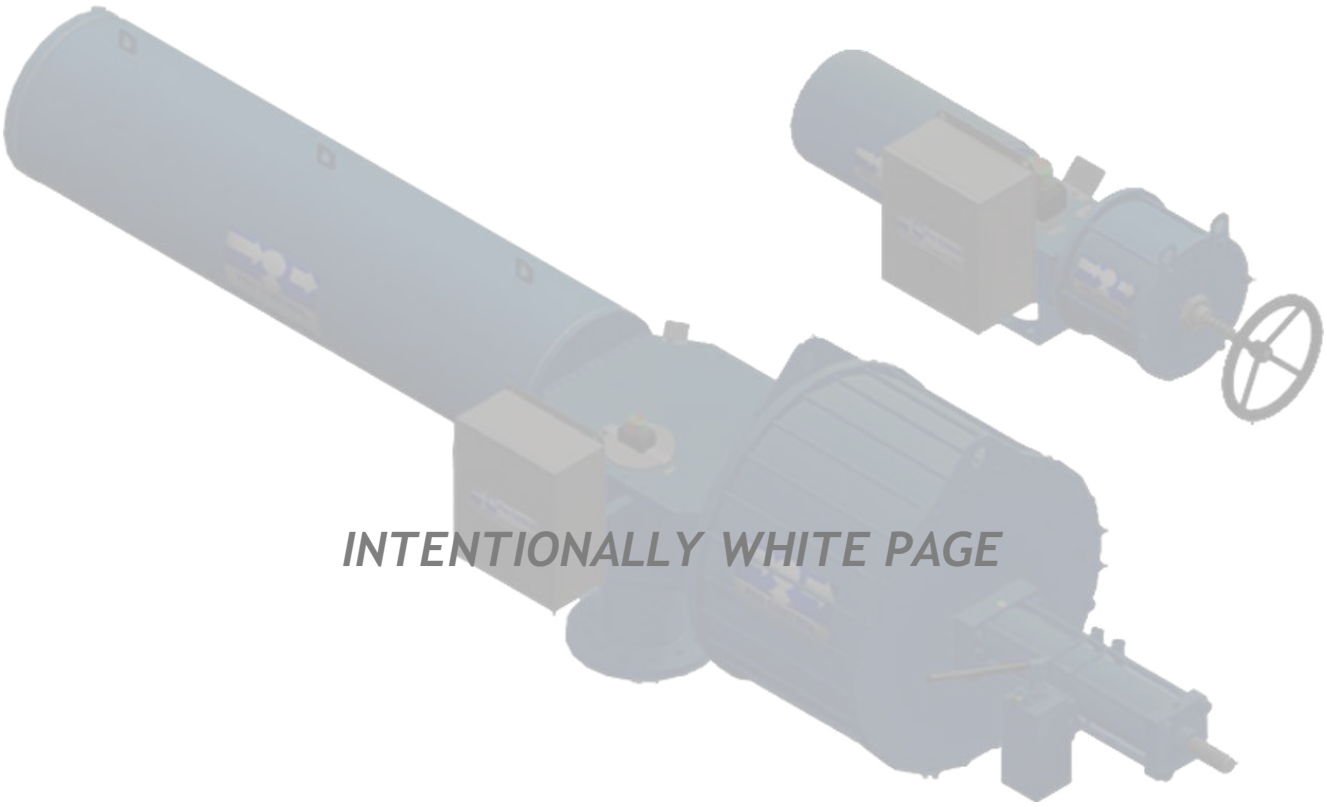
EN USE AND MAINTENANCE
Translation of the original instructions

PRO CONTROL
www.procontrolsrl.com

SPS/SPD SERIES

SINGLE & DOUBLE ACTING FAIL TO OPEN/CLOSE ACTUATORS

V&A



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SUMMARY TABLE

1.1 - USE AND STORAGE OF THE INSTRUCTIONS AND MAINTENANCE MANUAL

This user manual has to be considered as an integral part of the pressure equipment supplied and must be kept until final disposal of the equipment.

The manual must be always available for consulting in the vicinity where the equipment is located and conserved in a dry dust free environment.

In case of loss of this manual the customer can request a copy of this manual by specifying the actuators serial number, actuator type, date, version and year of supply, as indicated on the actuators name plate.

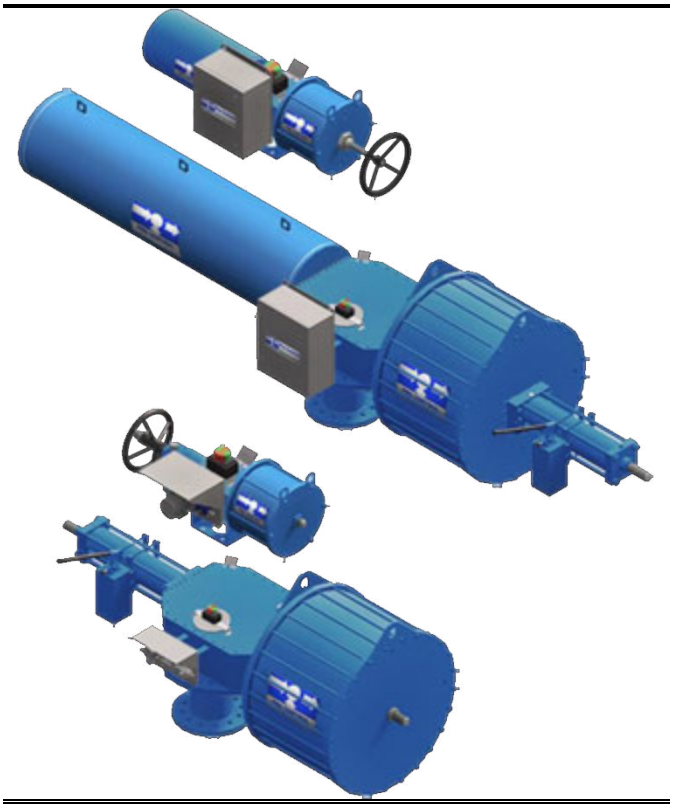
1.2.0 - PRESENTATION

1.2.1- DESCRIPTION OF SPS SERIES ACTUATORS

The SPS series actuators are pneumatic single acting-spring return actuators specifically designed to guarantee efficiency and reliability in heavy duty services.

These actuators can be assembled both as 'spring to open' and as 'spring to close' version and can be fitted with a emergency manual override suitable to operate the actuator in the event of process supply failure. The manual override can be a mechanical screw type, operated by means of an hand wheel or it can be a hydraulic type, with an hydraulic cylinder operated by means of an hydraulic hand pump.

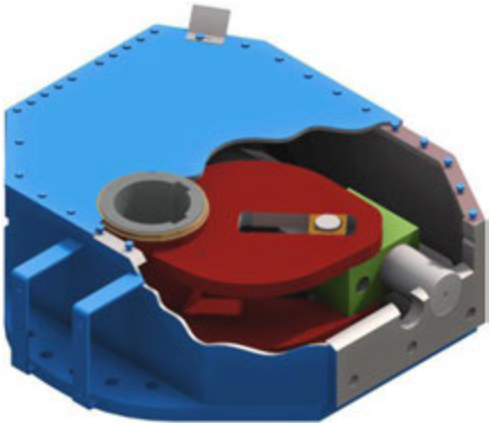
The SPD series actuators are pneumatic double acting actuators specifically designed to guarantee efficiency and reliability in heavy duty services.



The main components of these units are the following:

A-A scotch-yoke mechanism *which transforms the linear movement of the pneumatic cylinder and of the spring into a rotary movement suitable to operate quarter turn valves, such as ball valves, butterfly valves or plug valves.*

The scotch-yoke mechanism is positioned inside a perfectly sealed housing, made of welded heat treated carbon steel, which protects it against corrosion and guarantees personnel safety during operation. It is also fitted with a reinforcement guide bar suitable to support the transverse forces and to ensure the proper alignment of the piston rod, and with sliding blocks and yoke bushings, made of bronze, in order to reduce the friction and to guarantee a long working life.

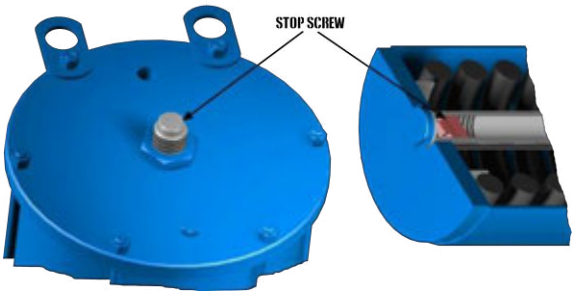


The guide bar is chromium plated in order to guarantee its protection against corrosion.

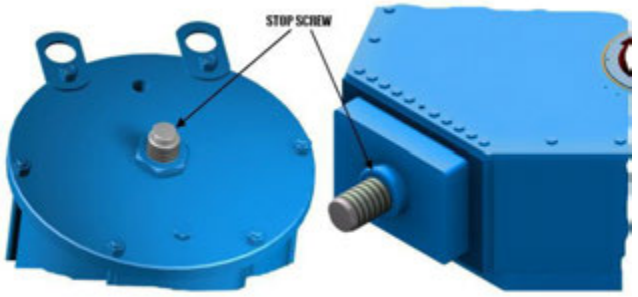
B-The pneumatic cylinder*, is manufactured from carbon steel.*
The cylinder tube is machine polished and electroless nickel plated internally, in order to reduce surface roughness to a minimum value and to provide highest protection against corrosion and low maintenance. The piston is made of carbon steel and sealing is performed by means of a floating o-ring design and guided internally by a sliding ring in Teflon graphite. The dynamic seals of the pneumatic cylinder are specifically designed to allow the use of the actuator without additional lubrication.

***C*-The spring container(only SPS)**, *consists of a welded container, which encloses the spring assembly in a safety frame arrangement that does not allow it to extend beyond a given value and ensures personnel safety.*

***D*-Two adjustable mechanical travel stops(for SPS)** *to allow the fine adjustment of the valve angular stroke by means of stop screws which are located, one into the end flange of the spring container and the other into the end flange of the pneumatic cylinder, or on the mechanical manual hand wheel override or on the end flange of the hydraulic manual override cylinder, depending on the actuator version (see next paragraphs of this Section for more details)*



***E*_- Two adjustable mechanical travel stops(for SPD)** *to allow the adjustment of the valve angular stroke by means of the stop screws, which are screwed into end flange of the pneumatic cylinder and into the housing closing flange, or into the manual override or into the end flange of the hydraulic cylinder for manual override, depending on the actuator version (see next paragraphs of this Section for more details).*



***F*-stainless steel mechanical visual position indicator**, *directly connected to the actuators yoke and therefore valve stem that permanently reflects the position of the valve during the whole stroke of the actuator. It is provided with a namur slot to allow remote position monitoring device drive*

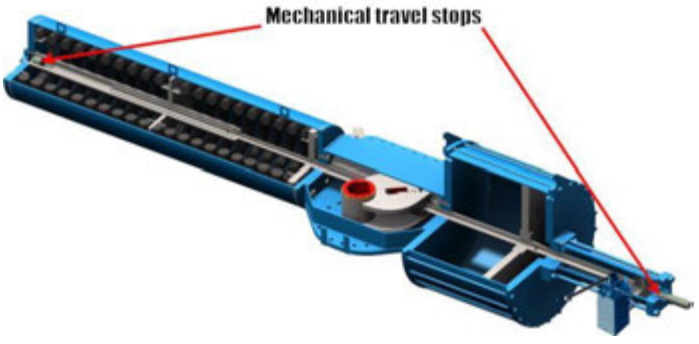
If required, SPS/SPD series actuators may also be supplied complete with accessories such as positioner, signalling limit switches, position transmitters, and control panels etc.

1.2.2-PNEUMATIC SINGLE ACTING ACTUATOR WITH HYDRAULIC HAND PUMP

*The scotch yoke mechanism transforms the linear movement of the pneumatic cylinder (on opening or closing) and of the spring into the rotary movement described under point **A**.*

The hydraulic manual override for single acting actuators consists of an additional hydraulic cylinder bolted onto the end flange of the pneumatic cylinder. The hydraulic piston is totally independent from the pneumatic piston and when engaged drives the actuator to its required position (open for fail close actuators & closed for fail open actuators).

The mechanical travel stops are located, one in the spring container (to adjust the opposite end stroke of the pneumatic cylinder), and one on the hydraulic manual override cylinder (to adjust the opposite end stroke of the spring container).



IMPORTANT NOTICE :

MANUAL OVERRIDE OF THE ACTUATORS MUST BE PERFORMED ONLY WHEN THERE IS NO PNEUMATIC AIR SUPPLY / PNEUMATIC PRESSURE TO THE ACTUATORS PNEUMATIC CYLINDER . OPERATION OF THE MANUAL OVERRIDE IN THE PRESENCE OF PNEUMATIC AIR SUPPLY/ PNEUMATIC PRESSURE MAY RESULT IN DAMAGE TO THE ACTUATORS MANUAL OVERRIDE ASSEMBLY.

In order to perform the manual operation proceed as follows:

1 *Ensure that the oil tank plug supplied for transportation has been removed and substituted with the breather/vent valve(please refer to figures 1 & 2 at page 14, failing this procedure, during actuator and manual override operation the oil tank will pressurize , inflate and oil will leak from the gasket between the pump mechanism and the oil tank.*

2 *Insert the hand pump lever into the hydraulic piston pump slot (see drawing "2-HPS" item 7 in section "DRAWINGS").*

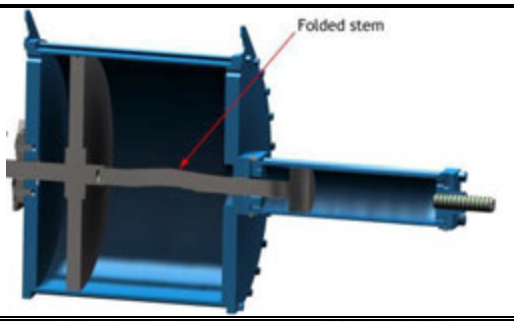
3 *Ensure that the lever operated isolation valve is open (see "2-HPS" item 2)*

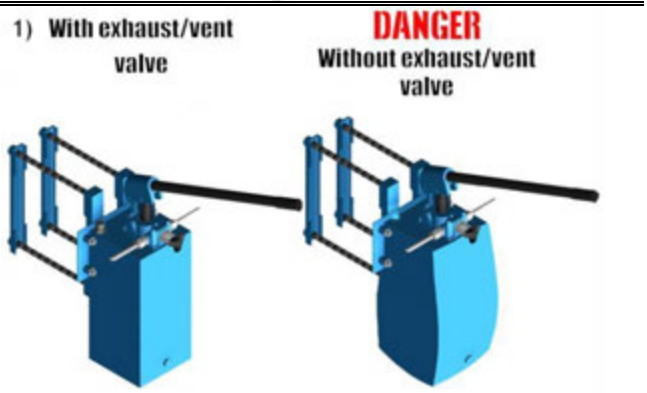
4 *Perform the manual operation by acting on the hand pump lever (see drawing "2-HPS" item 7 in section "DRAWINGS"). The hydraulic piston shaft engages the pneumatic piston thus also compressing the springs during its stroke.*

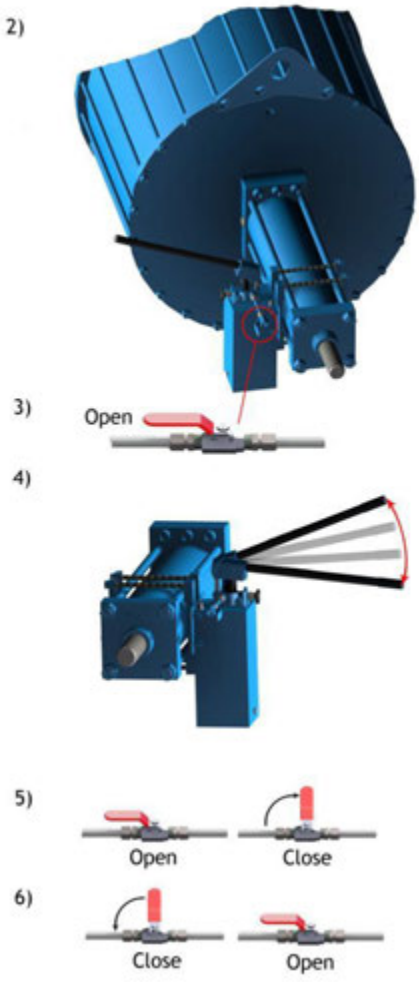
5 *Once the desired position is reached, close the manual isolation valve in order to maintain the actuator in its required position. (see "2-HPS" item 2)*

6 *Prior to restarting pneumatic operation , the manual isolation valve (item 2) MUST be re-opened , the actuator manual override disengaged and the actuator must be returned to its fail safe position.*

Follow the steps shown in the drawing below to stock and operate actuators with hydraulic manual override.







1.2.3-DOUBLE ACTING PNEUMATIC ACTUATOR WITH HYDRAULIC MANUAL OVERRIDE

*The scotch yoke mechanism transforms the linear movement of the pneumatic cylinder (on opening and closing) into the rotary movement described under point **A**.*

The hydraulic manual override for double acting actuators consists of an additional hydraulic cylinder bolted onto the scotch yoke mechanism housing opposite (at 180°) of the pneumatic cylinder and a by-pass valve (see item 5 of drawing 2-HPD) which in the open position allows the hydraulic oil to move freely between the hydraulic piston chambers. The hydraulic piston is integrally connected to the pneumatic piston by means of the guide block located within the actuators scotch yoke mechanism housing. When engaged the hydraulic manual override drives the actuator to both the open and the closed position.

The mechanical travel stops for adjustment of the closed position of the valve, is located on the end flange of the pneumatic cylinder, while the mechanical travel stops for adjustment of the open position of the valve, is located on the end flange of the hydraulic cylinder (hydraulic manual override).

During normal operation the distributor lever located on the hydraulic hand pump mechanism MUST always be in the central position (see drawing "2-HPD" item 7 in section "DRAWINGS") .

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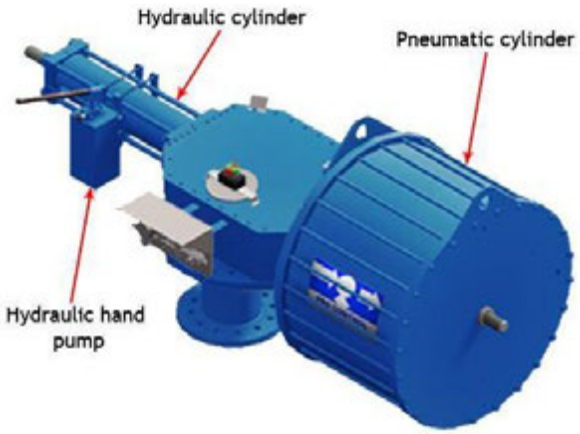
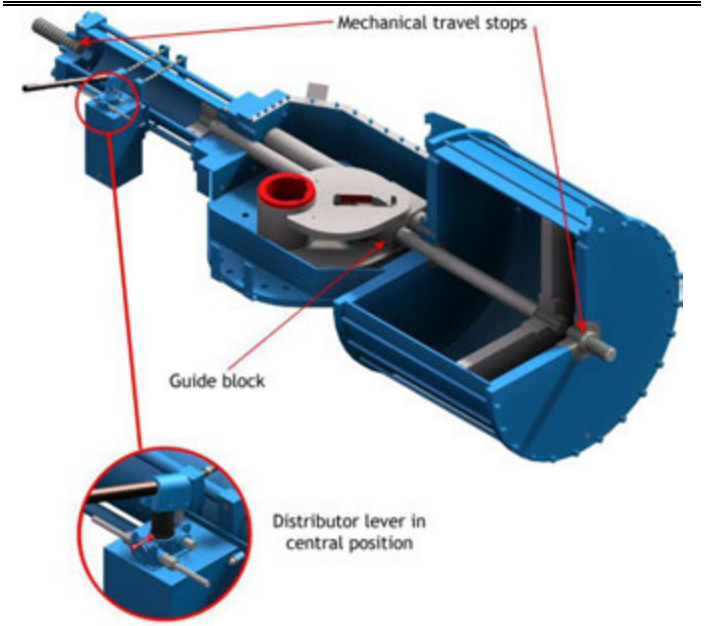
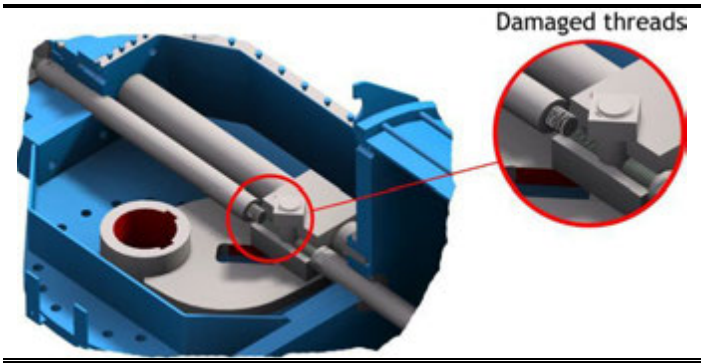
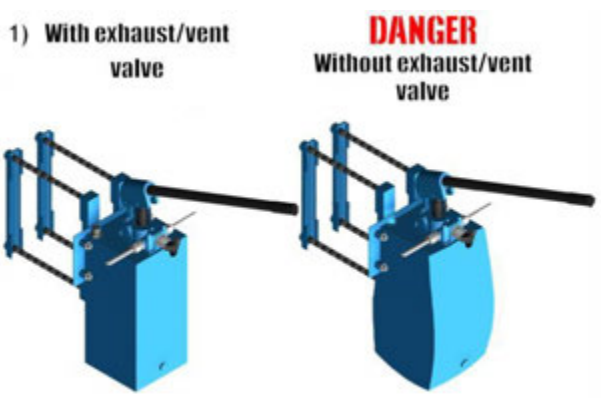
In order to perform the manual operation proceed as follows:

***1** Ensure that the oil tank plug supplied for transportation has been removed and substituted with the breather/vent valve(please refer to figures 1 & 2 at page 14, failing this procedure, during actuator and manual override operation the oil tank will pressurize , inflate and oil will leak from the gasket between the pump mechanism and the oil tank.*









2 Close the hydraulic by-pass valve (see item 5 of drawing 2-HPD) ,ensure the pneumatic by-pass valve is open.

3 Move the distributor lever to the left or to the right depending on whether you require the actuator to open or to close (follow the indication shown on the operation plate on the oil tank to achieve the desired stroke direction).

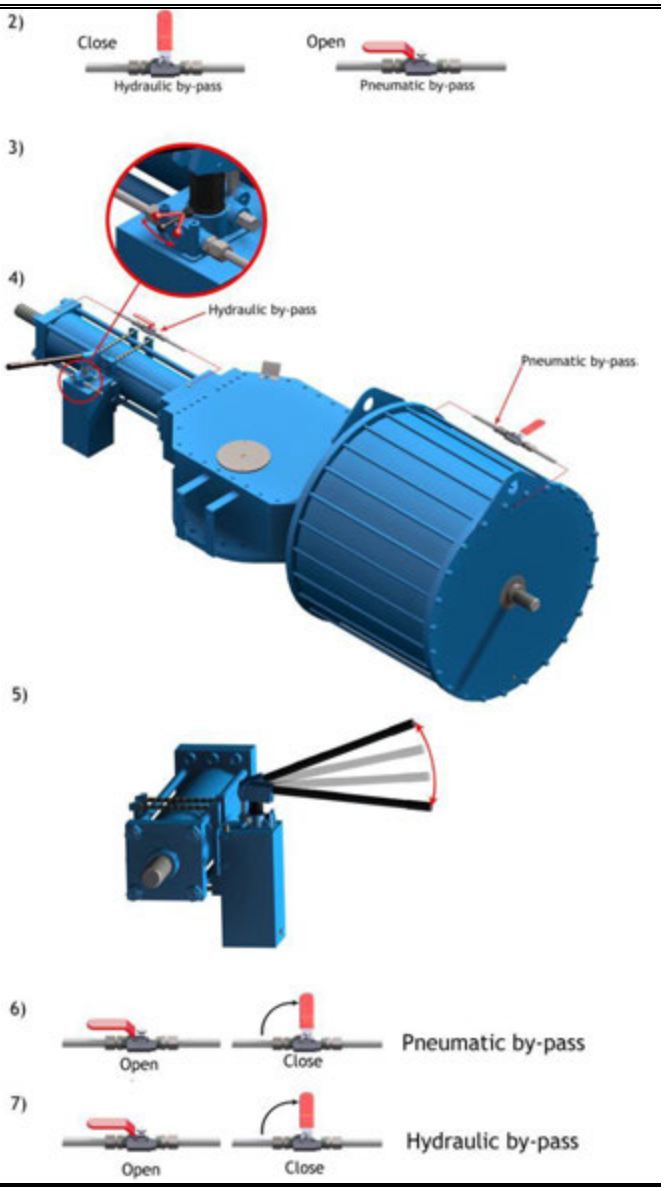
4 Insert the hand pump lever into the hydraulic piston pump slot (see drawing "2-HPD" item 10 in section "DRAWINGS").

5 Perform the manual operation by acting on the hand pump lever (see drawing "2-HPD" item 10 in section "DRAWINGS").

6 Once the desired position is reached, close the pneumatic by-pass valve in order to maintain the actuator in required position.

7 Prior to restarting pneumatic operation, the hydraulic by-pass valve MUST be opened, the actuator manual override distributor lever must be returned to its central position, the pneumatic by-pass valve must be closed.

Follow the steps shown in the drawing below (pag.10) to stock and operate actuators with hydraulic manual override.



Vertical hand pump stem

Transport configuration

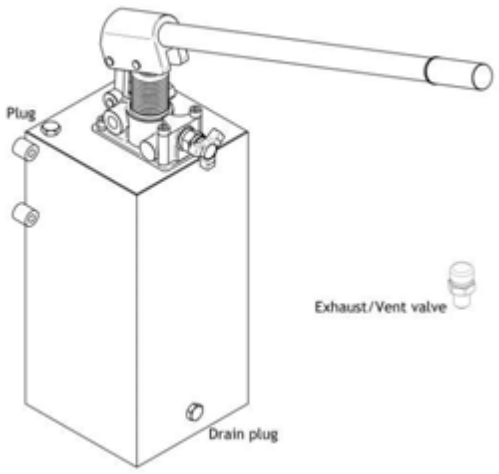


Fig.1

Operating configuration

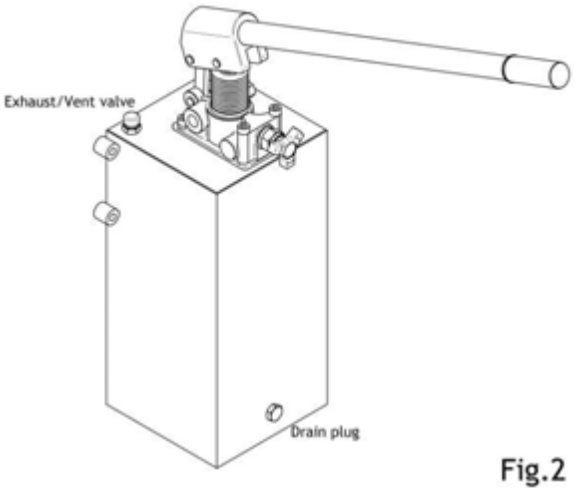


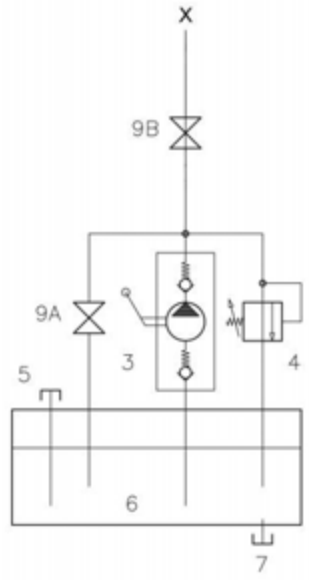
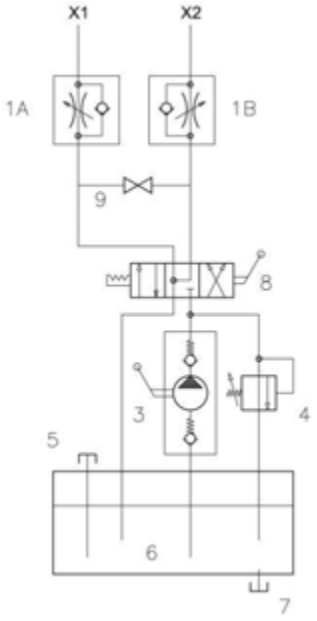
Fig.2

***IMPORTANT!!** : Before operating the actuator make sure to remove the oil plug and assemble the exhaust/breather valve on the hand pump oil tank vessel which is supplied with the actuators,.*

NEVER TRY TO OPERATE THE ACTUATOR UNLESS THIS OPERATION HAS BEEN PERFORMED.

Prior to actuator operation, commissioning, and plant start-up the above reference drawing is used purely to indicate the importance of removing the oil plug supplied for transportation located on the oil tank as shown above Fig. 1, and substituting it with breather/vent valve as shown above Fig.2 - failure to do so ,will result in the oil tank pressurizing, and thus inflate causing oil to leak from the gasket located between the pump mechanism and the oil tank.

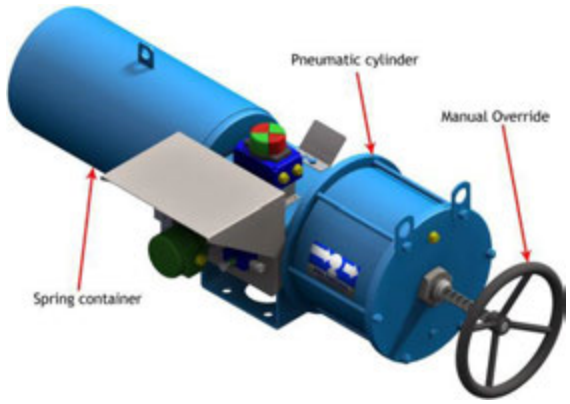
Operating diagram hand pump

SPS Actuators	*SPD Actuators*
	

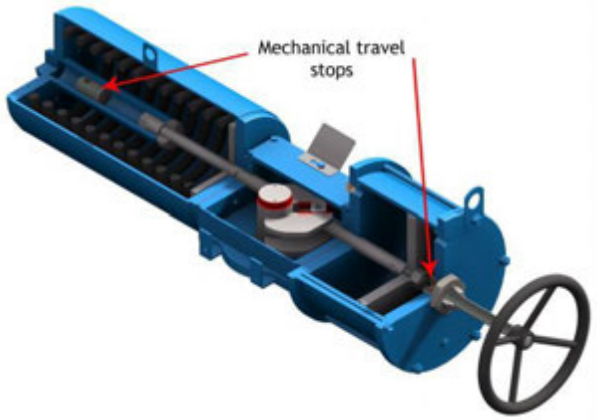
1A/1B-*Flow regulator*
3-*Hand pump*
4-*Relief valve*
5-*Load plug*
6-*Oil tank*
7-*Drain plug*
8- *Manual piloted valve 4/3*
9A/9B- Stop valve
X/X1/X2-*Hydraulic connection to the cylinder*

1.2.4- SPRING TO CLOSE/OPEN PNEUMATIC ACTUATOR WITH MANUAL HAND WHEEL OVERRIDE

*X-**The scotch yoke mechanism** transforms the linear movement of the pneumatic cylinder (**on opening** for fail close, **on closing** for fail open) and of the spring (**on closing** for fail close, **on opening** for fail open) into the rotary movement described under point **A**.*



*Y-**The mechanical travel stop** for adjustment of the closed position**(for fail close actuator/open for fail open)** of the valve is an integral component of the manual override located on the end flange of the pneumatic cylinder and it consists of a bronze screw within which the hand wheel jack screw rotates (see drawing "2-HW" item 4 in section "DRAWINGS").*
*While the stop screw for adjustment of the open position**(for fail close actuator/open for fail open)** of the valve is located into the end flange of the spring container (see drawing "2-SC" item 12 in section "DRAWINGS").*



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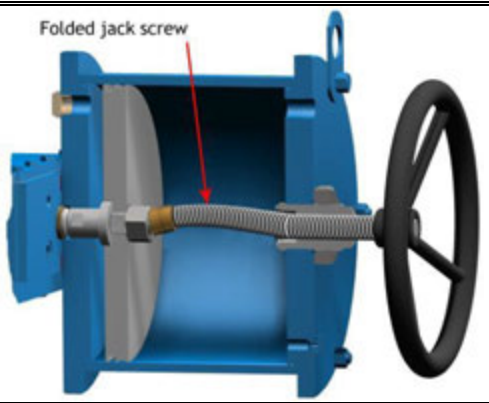


In order to perform the manual operation proceed as follows :

Since the manual override jack screw is exposed to the local environment, and although it is corrosion protected by means of electroless nickel plating, prior to manual operation, it is mandatory to clean the jack screw (see drawing "2-HW" item 2 in section "DRAWINGS"). and remove any dirt, dust or other foreign matter which may have deposited on it during assembly and or normal plant operation and weathering, by means of blowing compressed air and wash using suitable biodegradable degreasing agents, this will ensure that no foreign matter may enter the pneumatic cylinder during manual operation which may result in o-ring failure and consequential leakages.

-The pneumatic cylinder end flange shall have an arrow located on it in proximity of the hand wheel (see drawing "2-HW" item 1 in section "DRAWINGS"). which clearly indicates the anticlockwise sense of rotation required to perform the open stroke, the operator shall rotate the hand wheel anticlockwise to open the actuator/valve, all Pro Control actuators are clockwise to close configuration.

-Please note that the hand wheel operation may gradually become stiffer than the initial forces required to open since the manual override must overcome the valve required torque to open , but it also acts on the springs, compressing them during the open stroke .

-Once the operator has reached the desired open/close position (this can be verified also by the local visual position indicator), the hand wheel and jack screw will be noticeably shorter since it is now almost fully within the actuators pneumatic cylinder.

When the actuator can be returned to its normal remote operating status, the operator must rotate the hand wheel in the clockwise direction until it has reached its full repositioned stroke and cannot rotate any further.

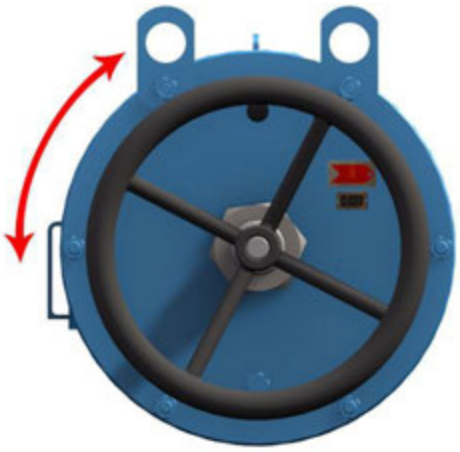
Once the manual override is fully repositioned, the back bushing ((see drawing "2-HW" item 5 in section "DRAWINGS") shall have reseated within the bronze mechanical end stopper (see drawing "2-HW" item 4 in section "DRAWINGS"), and the back bushing primary o-ring, item 7 of the afore mentioned drawing shall seal completely within its seating arrangement.

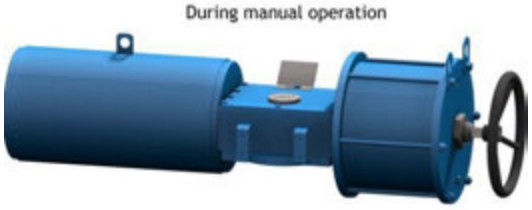
If the hand wheel is not completely returned to its fully extended position and the o-ring seal (item 7) of the back bushing (item 5) is not fully seated within the mechanical end stopper (item 4), then upon air supply to the actuators cylinder, air will leak through the jack screw.
Please note that the thrust values generated by the manual override hand wheel and jack screw assembly is designed to meet the actuators maximum output torque with an input torque of XX Nm .

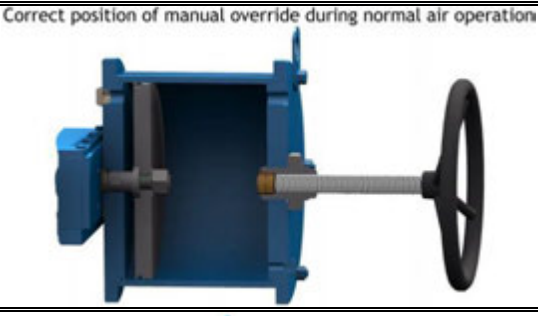
WARNING

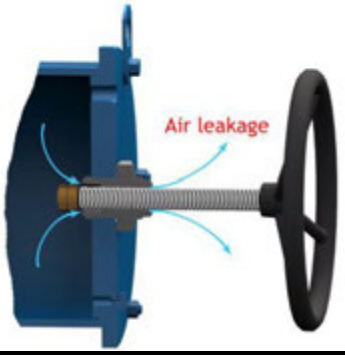
Please note that forces exceeding the maximum input torque to the hand wheel may result in permanent damage to the jack screw .

NOT FORCE THE HAND WHEEL









1.3.0 - STORAGE AND PRE-INSTALLATION

1.3.1 - CHECKS TO BE CARRIED OUT AT THE RECEIPT OF THE ACTUATOR

ACTUATOR DATA PLATE

The following information is mentioned on the stainless steel actuator data plate:

- *Serial number of the actuator;*
- *Actuator model;*
- *Year of construction ;*
- *Medium Supply fluid;*
- *Supply pressure range;*
- *Allowable temperature range;*
- *Valve tag.*

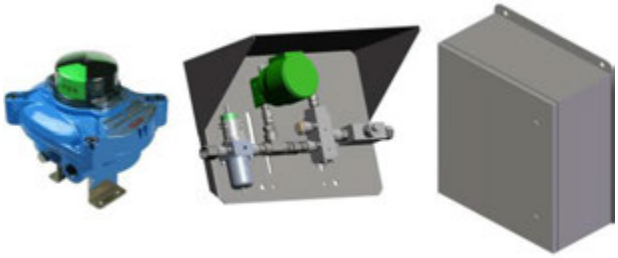
Please check that the information printed on the data-plate conforms with those specified on the order, on the test certificate and on the delivery note.

DAMAGE DURING TRANSPORT

On receipt of actuator, check that it has not been damaged during transport to mechanical parts, the control system if supplied and to the limit switch box if present. Generally damage may occur to the paint-work, if so, proceed with repair of the possible damage or scratches to the paint-work.

ACCESSORIES

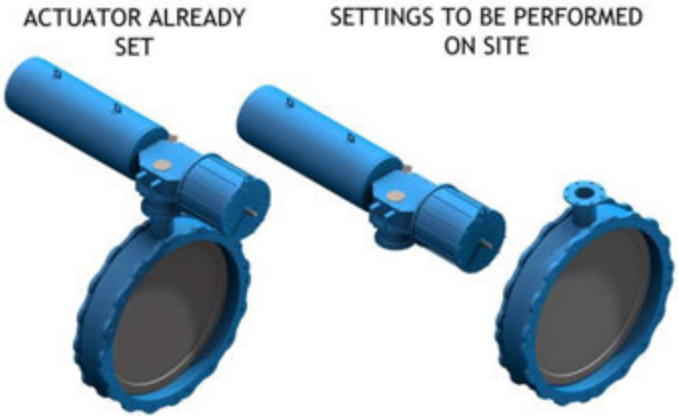
When the supply includes accessories, please check that they are in conformity with those listed in the order and in the shipping documents.



SETTING OF MECHANICAL STOPS AND LIMITSWITCHES

In the event that the actuator has been delivered already assembled onto the valve, the mechanical travel stops and electric limit switches (if existing) have already been set during the relevant assembly and final testing operations.

In the event that the actuator has been delivered separate from the valve, the setting of the mechanical stops and electric limit switches (if existing) has to be checked and, if necessary, carried out after the assembling of the actuator onto the valve according to the instructions stated in this manual under the applicable sections.

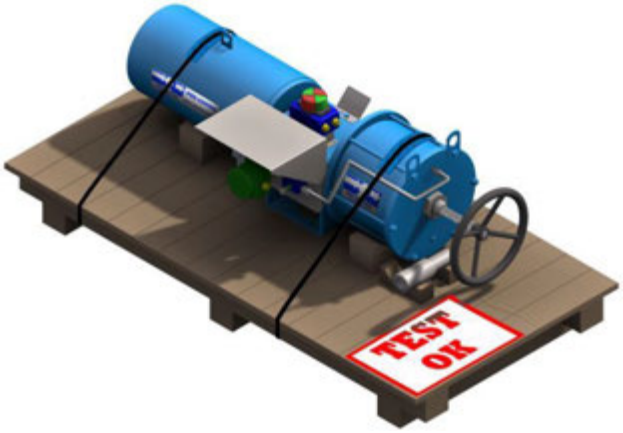


1.3.2 - STORAGE

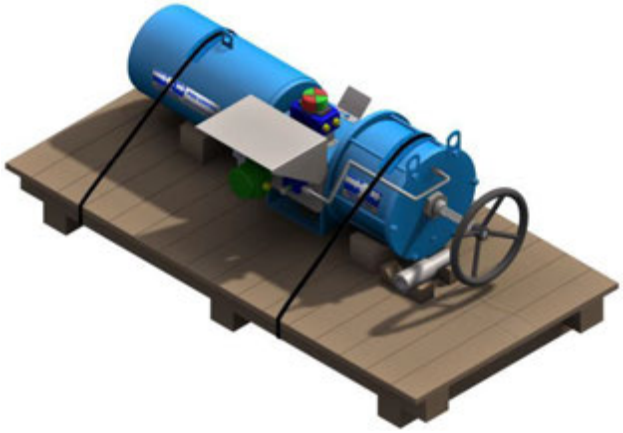
GENERAL INSTRUCTIONS

The actuators leave the Pro Control S.r.l. factory in excellent finish and working conditions which are guaranteed by the inspection certificate issued for each single actuator.

In order to keep the actuators in good conditions until they are assembled in the plant, it is recommended to follow the rules listed here below, during the storage period:



SHORT TERM COVERED STORAGE

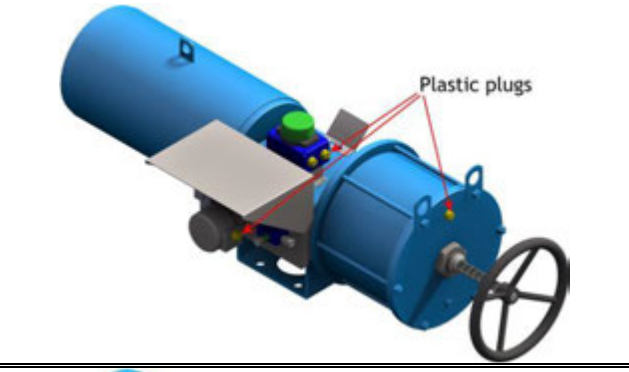


- *Check that all plugs are properly assembled on the pneumatic and electric connections , in order to avoid entry of foreign matter during transport and storage, please note that the plastic plugs do not guarantee waterproof protection ;*

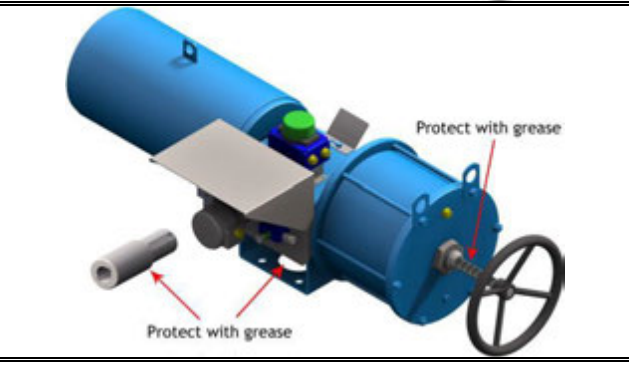
- *The actuators, which are not yet assembled onto the valves, must be placed onto a wooden pallet, in order to prevent any damage to the valve coupling flange.*

LONG TERM OR OUTDOOR STORAGE

In the event of long-term storage, the following rules are also recommended:



- *If actuators and accessories are stored outdoors and subject to weather conditions it will be necessary to replace all the plastic plugs supplied for short term covered storage with metallic plugs which guarantee weatherproof protection.*



- *It is necessary to ensure and protect the coupling parts (adapter and coupling joint, flange, etc.) with grease or protective oils, if possible blank off the actuators ISO flange with protective board in order to avoid foreign objects and insects to enter into the housing through ISO bolt holes;*

- *We strongly recommend is storage is outdoors, to keep the actuators in a dry place or provide some means of protection against the direct action of weathering agents;*
- *If possible, we also recommend to operate periodically the actuators with filtered and dehydrated air. After this operation all the threaded connections of the actuator and of the control panel must be carefully closed.*

1.3.3 - INSTRUCTION TO ASSEMBLE THE ACTUATOR ONTO THE VALVE

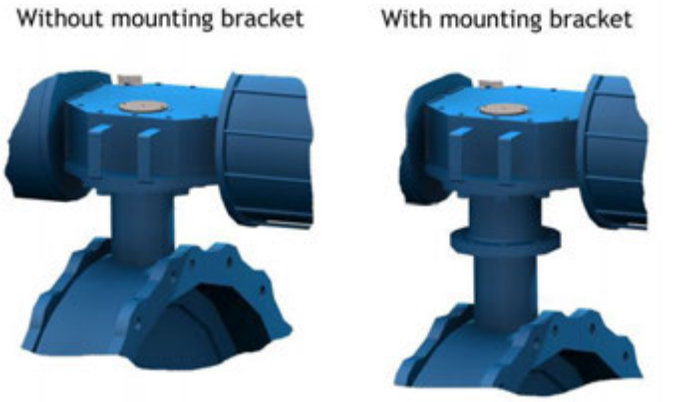
The assembly of the actuator onto the valve can be performed by:

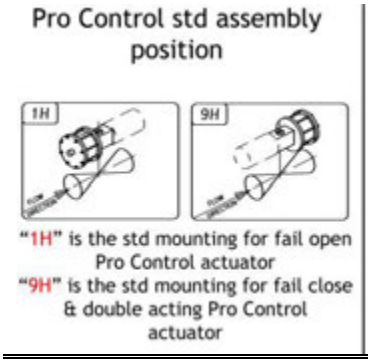
- *Using the actuator housing ISO 5211 flange connection, thus archieving a direct mounting onto the valves top flange and with actuator yoke dimension machined to suit the valves shaft dimension;*
- *By using interposing mounting bracket adapter which may be open box design together with a coupling joint machined to suit the actuators std yoke drilling and the valves shaft dimension.*

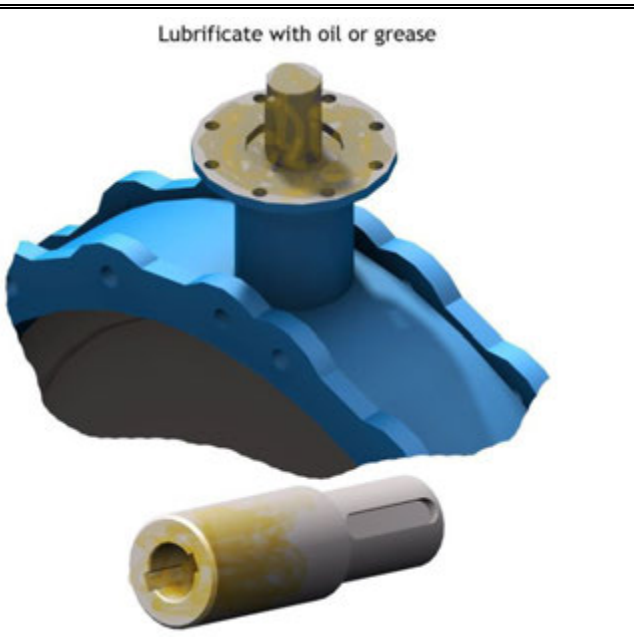
The assembly position of the actuator must be in accordance with plant requirements (which normally cylinder axis parallel to the pipeline or in some cases where spece is limited assembly may be perpendicular to the pipeline axis) and with the valve model.Pro control actuators have as a standard 2 keyways machined into the yoke to allow for for both optional assemblies.

In order to assemble the actuator onto the valve, proceed as follows:

1. *Check that the coupling dimensions of the valve flange and those of the valve stem meet the coupling dimensions of the actuator or of the mounting kit and coupling falnge. Please note that as a standard Pro Control always considers a machining tolerance ranging between +0.15/+0.25 mm in order to ensure mating of the coupling joint.*
2. *Arrange the valve in the open or closed position according to the current position of the actuator.*
3. *Clean the mating coupling flanges of the valve and of the actuator and remove whatever might prevent their perfect adherence. Take care to remove grease perfectly.*
4. *Lubricate the valve stem with oil or grease, in order to make the mating operation easier.*
5. *If the assembling operation is carried out by means of an adapter with a coupling joint (supplied with the actuator as a separate part), grease the coupling joint on both mating surface and assemble it onto the valve stem, before proceeding with the assembling of the actuator.*







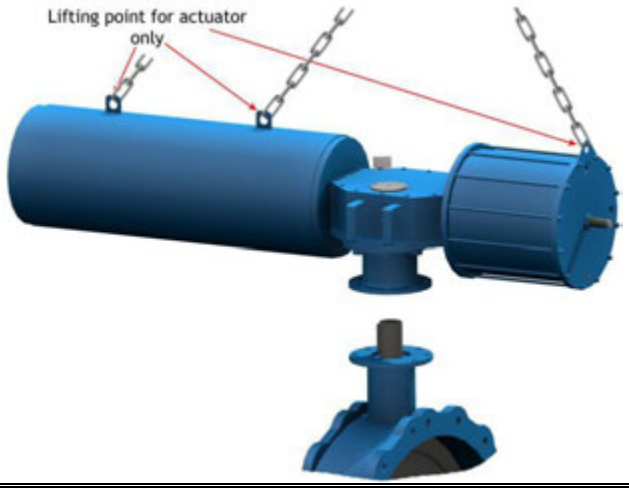
6- *Lift the actuator, by connecting correct size & weight support chain hooks, to the supporting points of the actuator. If possible, place the valve stem in the vertical position in order to make the assembling easier.*

7- *Lower the actuator onto the valve so that the valve stem slips in the actuator yoke or into the coupling joint. It may be necessary to rotate marginally the actuator while coupling together in order to mate up the bolt holes. Fasten the actuator to the valve by means of the stud bolts, which are screwed to its coupling flange.*

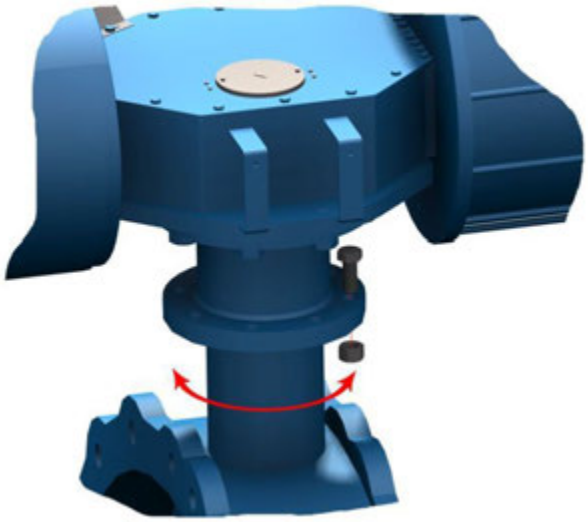
8- *Tighten the nuts of the connecting stud bolts by following the recommended tightening torque listed here below:*

9- *If possible, operate the actuator in order to check that it actuates smoothly the valve.*

THREAD SIZE	***RECOMMENDED TIGHTENING TORQUE***
M8	20 Nm
M10	40 Nm
M12	70 Nm
M14	110 Nm
M16	160 Nm
M20	320 Nm
M22	420 Nm
M24	550 Nm
M27	800 Nm
M30	1100 Nm
M33	1400 Nm
M36	1700 Nm



Rotate marginally the actuator in order to mate up the bolt holes.



1.4.0 - SETTINGS

1.4.1 - SETTING OF ANGULAR STROKE

SETTING OF THE POSITION 'CLOSED'(for actuator "fail open") OPEN(for actuator "fail close")

*The setting of the close/open valve position is performed by adjusting the screw which is inserted into the * as follows:*

- *Loosen the lock nut.*
- *Screw the stop screw to reduce the actuator angular stroke. Unscrew the stop screw to increase the actuator angular stroke.*
- *Tighten the fixing nut.*

SETTING OF THE POSITION 'OPEN'(for actuator "fail open") 'CLOSED'(for actuator "fail close")

*The setting of the open/close valve position is performed by adjusting the screw which is inserted into the * as follows:*

- *Remove the protection plug.*
- *Screw the stop screw to reduce the actuator angular stroke. Unscrew the stop screw to increase the actuator angular stroke.*
- *Reassemble the protection plug.*

**See table below*

	Stop screw locations for SPS actuator	
Actuator model	SETTING OF THE POSITION 'CLOSED'(for actuator "fail open") OPEN(for actuator "fail close")	SETTING OF THE POSITION 'OPEN'(for actuator "fail open") 'CLOSED'(for actuator "fail close")
SPS	* End flange of the pneumatic cylinder (item 3 draw 2-PC)	* End flange of the spring container (item 12 draw 2-SC)
SPS with manual override	* Into the manual override (item 4 draw 2-HW)	* End flange of the spring container (item 12 draw 2-SC)
SPS with hand pump	* End flange of the hydraulic cylinder (item 10 draw 2-HC)	* End flange of the spring container (item 12 draw 2-SC)

	Stop screw locations for SPD actuator	
Actuator model	Setting of the position 'CLOSED'	Setting of the position 'OPEN'
SPD	* Closure flange (item 6 draw 2-CL)	* End flange of the pneumatic cylinder (item 3 draw 2-PC)
SPD with hydraulic hand pump	* End flange of the hydraulic cylinder (item 10 draw 2-HC)	* End flange of the pneumatic cylinder (item 3 draw 2-PC)
SPD with declutchable hand weel	* Into the manual override (item 4 draw 2-HWD)	* End flange of the pneumatic cylinder (item 3 draw 2-PC)

D- DAMPER

The integral damper consist in a quick exhaust with an incorporate pneumatic damper.
The quick exhaust is running for approx. ¾ of the stroke at full bore (depends on the customer requirements).The last parts of the stroke is damped and the damping speed is adjustable by means of an included flow regulator.

2- SETTING OF THE QUICK EXHAUST STROKE

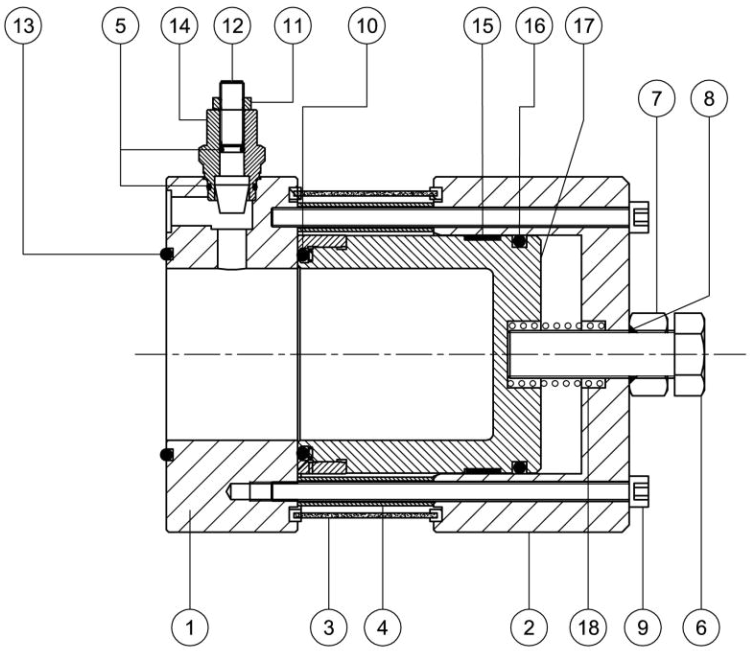
The speed setting of the first parts of the stroke (approx.3/4, quick stroke) can be performed by adjusting the screw which is inserted into the end flange of the pneumatic damper as follows:

- *Loosen the lock nut (item 7 drawing 2-PDS1)*
- *Screw the stop screw to reduce the exhaust speed. Unscrew the stop screw to increase the exhaust speed (item 6 drawing 2-PDS1)*
- *Loosen the lock nut (item 7 drawing 2-PDS1)*

3- SETTING OF THE DAMPING SPEED

The speed setting of the last parts of the stroke (damping stroke) can be performed by adjusting the screw which is inserted into the head flange of the pneumatic damper as follows:

- *Loosen the retaining nut (item 11 drawing 2-PDS1)*
- *Screw the adjustement screw to reduce the damping speed. Unscrew the stop screw to increase the damping speed (item 12 drawing 2-PDS1)*
- *Loosen the retaining nut (item 11 drawing 2-PDS1)*



ITEM	Q.TY	DESCRIPTION	MATERIAL	CODE
1	1	Head flange	EN AW 6082 T6	
2	1	Bottom flange	EN AW 6082 T6	
3	1	Bug screen	AISI 316	
4	3	Spacers tube	AISI 316	
5	2	O-Ring	NBR	●
6	1	Stop screw	AISI 316	
7	1	Retaining nut	AISI 316	
8	1	O-Ring	NBR	●
9	3	Screw	AISI 316	
10	1	O-Ring	NBR	●
11	2	Retaining nut	AISI 316	
12	1	Adjustement nut	AISI 316	
13	4	O-Ring	NBR	●
14	1	Flow regulator body	AISI 316	
15	2	Sliding ring	PTFE + graphite	
16	1	O-Ring	NBR	●
17	4	Piston	P-AlSi1 MgMn UNI3571	
18	1	Spring	Inox EN 10270.3	

* Subjected to requirements ● Recomended spare parts

TYPICAL

REV.	DATE	DRAWN	CHECKED	DESCRIPTION
0	21.10.2010	L.inno	Inzani	ISSUE

REV. 0

PRO CONTROL

PNEUMATIC DAMPER

ASSEMBLY DRAWING

SCALE -

DRAWN L.Innocenti

DATE 21.10.2010

CHECKED M.INZANI

DRAWING N° 2-PDS1

PLEASE CONSIDER ONLY THE LATEST REVISION OF THIS DRAWING

1.5.0 - START-UP

1.5.1 - ARRANGEMENT FOR START-UP

PNEUMATIC CONNECTIONS

1. *Before connecting the actuator to the pneumatic supply line, check that pipes and fittings are according to the applicable plant specifications, in order to guarantee the required air flow for the operation of the actuator and to avoid that the supply pressure drops below the minimum allowable value.*
2. *Clean the inside of the pipes used for connection by washing them with suitable detergent and by blowing air into them. Take every precaution to remove any solid or liquid foreign matter from the pipe work to the actuator, so as to avoid possible damages to the actuator itself or loss of performance.*
   If the actuator is supplied with a filter regulator on the control system there is no specific request for air cleanliness level. Otherwise the air purity max. particle size is 40 µm.
3. *Fasten the piping in a right way, in order not to cause loosening of threaded connections, in the event that the system may be subject to strong vibrations.*
4. *After the completion of the pneumatic connections, operate the actuator in order to ensure that it works correctly.Also check that its operating times are in accordance with those specified in the test certificate and that there are not leakages in the pneumatic connections.*

ELECTRIC CONNECTIONS

The following instructions are applicable to actuators provided with electric accessories (such as limit switches , solenoid valves, etc.)

1. *Check that the components used for electrical connections (such as cable hose conduits, cable glands) are in accordance with the requirements and codes applicable to the plant, with reference to the mechanical and/or explosion-proof protection.*
2. *The electric connection has to be carried out in order to avoid anomalous mechanical stresses in the cable entries, both by using rigid conduits and trailing cables.*
3. *Remove the plugs from cable entries.*
4. *Connect the electric feed, control and signal lines to the actuator, by linking them up with the terminal blocks of electric components in accordance with the applicable wiring diagram.*
5. *Replace plastic plugs with metal plugs on the unused entries of the pull box, in order to guarantee perfect seal and to comply with explosion proof protection codes (where applicable).*
6. *Check that controls and signals are properly working, when connections have been completed.*

1.5.2 - START-UP

During the start-up of the actuator, it is necessary to check that:

- *The pressure of the process supply, as well as its quality (filtering degree, dehydration) are as prescribed.*
- *The feed voltage values of the electric components (solenoid valves coils, micro switches, pressure switches etc., if applicable) are as prescribed.*
- *The actuator controls, such as remote control, local control, emergency control etc. (if applicable), are properly working.*
- *The required remote signals (such as valve position, oil pressure, etc.) are correct.*
- *The setting of the components of the actuator control unit is according to the requirements of the plant.*
- *The pneumatic connections do not show any leakage. If necessary, tighten the nuts of the pipe fittings.*
- *The painted parts have not been damaged during the transport, assembling or storage operations. After having removed rust, repair the damaged parts by following the applicable painting specifications.*

1.6.0 - MAINTENANCE

1.6.1 - PERIODIC MAINTENANCE

Pro Control actuators expected lifetime exceed more than 20 years.

As a general rule, based on our many years of experience in the field, together with our customers know-how, Pro Control's senior technical engineers have selected materials of construction and constructive principles that can specifically guarantee efficiency and reliability in heavy duty services for a long expected lifetime.

Pro Control actuators do not need any extraordinary maintenance. However we recommend to follow regular maintenance schedule.

For heavy duty application it is recommended to restore the housing lubrication following the guidelines in the "Lubrication" section, with a frequency based on parameter agreed during contract phase.

Pro Control recommend also Visual Inspection:
Visual Inspection is an accurate external inspection of actuator. Visual Inspection can reveal and prevent: external corrosion, external leakage and problems in scotch yoke, pneumatic cylinder and spring container external components.

Pro Control advises to perform Visual Inspection, and to verify:
-The signals to the control board are correct.
-The process supply pressure value is within the required range.
-The external components of the actuator are in good conditions.
-The hydraulic/pneumatic connections do not show any leakage.
-The painting work of the actuator is not been damaged.

If necessary, tighten the nuts of the pipe fittings.

If necessary, touch-up damaged areas according to the applicable painting specifications.

The advised Visual Inspection interval (TIVI) is 12 months (8760 h), and in any case it should be performed when Proof Test is performed.

1.6.4 - EXTRAORDINARY MAINTENANCE

REPLACEMENT OF THE CYLINDER SEALS

Usually it is not necessary to replace the cylinder seals, but when for an out of ordinary use, the cylinder seals must be replaced, proceed as described here below:

- *Unscrew the nuts from the tie rods*
- *Remove the bottom flange*
- *Remove the cylinder tube*
- *Slide the rod together with the piston of the head flange*
- *Unscrew the nut*
- *Remove the piston together with the shoulder washer*
- *Unscrew the screw*
- *Remove the head flange*
- *Unscrew the screws*
- *Remove the gasket retaining flange*
- *Remove the o-rings, the gaskets and the guide sliding ring .Carefully clean the relative grooves.*
- *Replace all the above mentioned seals and lubricate them with a grease film.*

Taking care not to damage the seals, proceed with the reassembling as follows:

- *Reassemble the gasket retaining flange and screw the screws*
- *Reassemble the head flange and screw the screws*
- *Reassemble the piston and the shoulder washer*
- *Screw the nut*
- *Insert the rod into the head flange*
- *Reassemble the cylinder tube and the bottom flange*
- *Uniformly screw the nuts on the tie rod*
- *Carry out a few operations with the actuator, in order to check that the movement is regular and that there are no leakages through the seals.*

REPLACEMENT OF THE PNEUMATIC PISTON SEALS

Usually it is not necessary to replace the piston seals, but when for an out of ordinary use, the piston seals must be replaced, proceed as described here below:

- *Unscrew the nuts from the tie rods*
- *Remove the bottom flange*
- *Remove the cylinder tube*
- *Remove the o-rings, the gaskets and the guide sliding ring. Carefully clean the relative piston grooves.*

- *Replace all the above mentioned and lubricate the piston O-Ring and cylinder tube with a film of oil.*
  The oil type suggested is Shell Omala S4 WE320 or equivalent.

Taking care not to damage the seals, proceed with the reassembling as follows:

- *Reassemble the cylinder tube and the bottom flange*
- *Uniformly screw the nuts on the tie rod*
- *Carry out a few operations with the actuator, in order to check that the movement is regular and that there are no leakages through the seals.*

LUBRICATION

Usually it is not necessary to lubricate the actuator, because its mechanism is lubricated for life.
The following grease is used by Pro Control S.r.l. to lubricate the mechanical components and is recommended for future lubrication:

MANUFACTURER:	
TRADE NAME:	*AGIP GR MU EP*
COLOR:	*YELLOW/BROWN*
OIL TYPE:	*MINERAL*
CONSISTENCY (NLGI GRADE)-ASTM D217:	*1*
WORKED PENETRATION AT 25°C-ASTM D217:	*325 dmm*
DROPPING POINT-ASTM D2265	*185°C*
VISCOSITY OF BASE OIL AT 40°C-ASTM D445:	*160 mm2/s*

NOTE:
The above described grease type is the Pro Control S.r.l standard for lubrication of scotch yoke mechanism.

Equivalent to the following:

- Shell Alvania GR.EP2
- BP grease LTX EP2

HYDRAULIC OIL FEATURES
Filled in manual override circuit

MANUFACTURER:	
TRADE NAME:	*ARNICA 22*
VISCOSITY AT 40°C:	*22 mm2/s*
VISCOSITY AT 100°C:	*5,2 mm2/s*
VISCOSITY INDEX ASTM:	*175*
POUR POINT:	*-39 °C*
SPECIFIC WEIGHT AT 15°C:	*0,857 kg/l*

NOTE:
The above described oil type is the Pro Control S.r.l. standard.

Equivalent to the following:

- Shell Tellus Oil T32
- Total Azolla ZS 22
- Rothen Codra Special 22
- BP Energol HLP-HM22
- Castrol Hyspin AWS22
- BR Petrobras Lubrax Industrial HR-22-EP

1.7.0-WARNINGS

It is the responsibility of the user to ensure that the following conditions are respected:

1. The pressure in the cylinder must not exceed the range indicated on the actuator's nameplate. The pneumatic supply line must take in account the necessary precautions in order to respect the required conditions.

2. The temperature of the cylinder must not exceed the range indicated on the actuator's nameplate. Important factors such as the temperature of the valve and pipeline, as well as of the local environment and sun exposition will affect the actuator temperature and should be considered.

3. Ensure that environmental conditions are compatible with design-presumed conditions. In case of doubts please contact Pro Control technical department.

4. Verify that supply fluid composition, filtration and hydration corresponds to the ranges for which the actuator was designed. In case of doubts please contact Pro Control technical department.

5. Don't use the cylinder for any other uses other than which it has been designed .

6. Follow regular maintenance schedule (please consult "Maintenance" section).

7. Before doing any maintenance operation on the actuator it is imperative to ensure that no pressure remains inside the cylinder.

8. The lifting-points placed on the actuator are designed only for actuator lifting (do not use these lifting points to lift actuator + valve).

9. The spring cartridge contains compressed springs, do not dismantle, disassemble or cut open this component. For disposal please contact Pro Control S.rl.

Other extra-warnings linked to the particular installation of the actuator must be taken into account by the installer.

1.8.0-*HEALTH & SAFETY STATEMENT*

Products supplied in their "ex works" condition are intrinsically safe if the guidance instructions contained within this IOM manual are strictly adhered to and executed by a competent person employing good and correct workmanship practices.

The guidance instructions have been compiled with both national and international directives and instructions in mind. Every effort has been made to enter into the spirit, as well as to the letter of these requirements.

No instructions contained within this IOM absolves the end users from their responsibilities under all local safety regulations in force at the time.

For details of these fluids, substances and greases refer to the relevant manuals.
Substances other than those recommended should not be used without Procontrol approval. Great care must be exercised when exchanging one fluid or substance for another, in particular with the (non) compatibility of the fluids or substances. Close attention should be paid to the WARNINGS, CAUTIONS AND NOTES contained within these IOM instructions which are explained as follows:

WARNING *If not observed incurs a high risk of severe damage to equipment and / or severe or fatal injury to personnel.*

CAUTION *If not observed incurs a risk of damage to equipment and/or injury to personnel.*

NOTE *Advisory and informative comments to assist the installation or maintenance staff to carry out working procedures.*

DISPOSAL AT END OF SERVICE LIFE

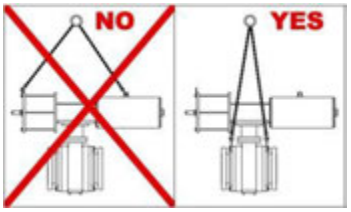
WARNING

Failure to adhere to this warning could result in damaged equipment and / or severe or fatal injury to personnel .

Valve, actuator & control contain stored energy in the form of helical return springs or entrapped gases, oil or lubricants. Prior disposal of any of these products contact the manufacturer for a detailed disposal procedure.

WARNING

Do not lift the complete assembled ball valve unit with the actuator lifting arrangement or the mounting bracket, these are specifically designed to support the actuator only. Under no circumstances should the valve be suspended from the actuator.



WARNING

Before starting any service or disassembly activities either on ball valve, actuator or any control components all electrical power and pneumatic pressure MUST BE removed and in the case of spring return actuators, the actuator must be fully returned / rotated to its spring fail position.
Also, it is understood that the actuator must be removed from the valve as well as all piping and accessories that are mounted on the actuator must be removed prior to actuator disassembly.

Our guarantee and warranty does not cover any malfunction or damages of the equipment which may occurred by improper negligent installation and commissioning.

No instructions contained within this procedure absolves the end users from their responsibilities under all the safety regulations in force at the time.

1.9.0-TROUBLESHOOTING

NOTICED FAULT	POSSIBLE CAUSE	SUGGESTED REMEDY
TORQUE DECREASE.	*Not adequate supply pressure.*	*Verify that the process supply pressure value is within the required range pressure of the actuator (See actuator data plate).*
		Check regulator's filter. If necessary substitute it.
	Pipe work leakage.	*Check the pipe work for leakage. If necessary tighten the nuts of the pipe fittings.*
	Wrong flow control valves settings.	*Adjust flow control valves settings to increase supply flow.*
	Exhaust port silencers blocked.	*Remove and clean silencers.*
		Check if during operations silencers are frozen; adjust flow control valves settings to decrease supply flow.
	Defective controls.	*Check the controls status, reset if necessary . Check and refer to components manufacturer's supplied user manual.*
	Increased valve torque.	*Check the valve manufacturers documentation.*
	Wrong valve sizing.	*Check the required valve torque (valve manufacturers documentation) and the provided actuator torque (Pro Control documentation).*
	Internal Leakage (Damaged piston seals).	*Replacement of the piston seals (see "Extraordinary Maintenance" above).*
	External Leakage (Damaged cylinder seals).	*Replacement of the cylinder seals (see "Extraordinary Maintenance" above).*
STROKE NOT COMPLETED.	*Setting of mechanical stops and/or limit switches not correct.*	*See above "Setting of angular stroke".*
	Encrusted hardened lubricant.	*Disassemble cylinder components (See above "Extraordinary Maintenance"), remove the encrusted lubricant, re-lubricate (See above "Lubrication") and assemble.*
	Defective valve.	*Check the valve manufacturers documentation.*
	Debris left in the cylinder during extraordinary maintenance.	*Disassemble cylinder components (See above "Extraordinary Maintenance"), check the presence of debris and if necessary remove them. Reassemble.*
IRREGULAR STROKE MOVEMENT.	*Not regular pressure of process supply pressure.*	*Check supplied air pressure and if necessary correct and improve its regularity.*
	Not adequate lubrication.	*Disassemble cylinder components (See above "Extraordinary Maintenance"), remove the old lubricant, re-lubricate (See above "Lubrication") and assemble.*
	Worn or sticked valve.	*Check the valve manufacturers documentation.*
	Worn components.	*Consult Pro Control technical department for instructions.*

2.0.0-DRAWINGS

1-SPS-SPD
-PNEUMATIC ACTUATOR ASSEMBLY DRAWING.

2-PC-PED
-PNEUMATIC CYLINDER ASSEMBLY DRAWING.

2-SY / 2-SY(40-60)
-SCOTCH YOKE MECHANISM ASSEMBLY DRAWING.

2-SC
-SPRING HOUSING ASSEMBLY DRAWING.

2-HW
-MANUAL OVERRIDE ASSEMBLY DRAWING.

2-HC
-HYDRAULIC CYLINDER ASSEMBLY DRAWING.

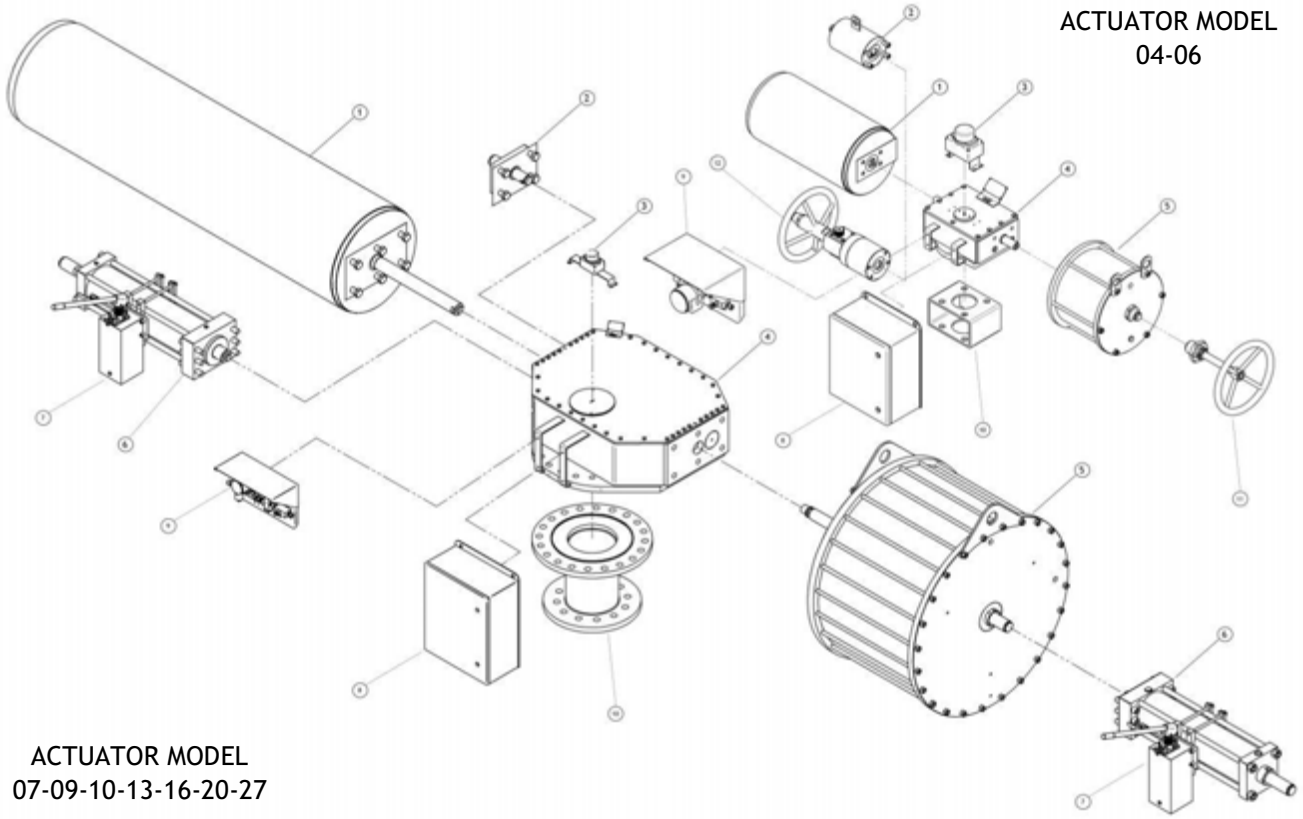
2-HPS
-SINGLE ACTING HYDRAULIC HAND PUMP ASSEMBLY DRAWING.

2-HPD
-DOUBLE ACTING HYDRAULIC HAND PUMP ASSEMBLY DRAWING.

2-CL
-CLOSURE FLANGE ASSEMBLY DRAWING.

SPS-SPD general assembly drawing

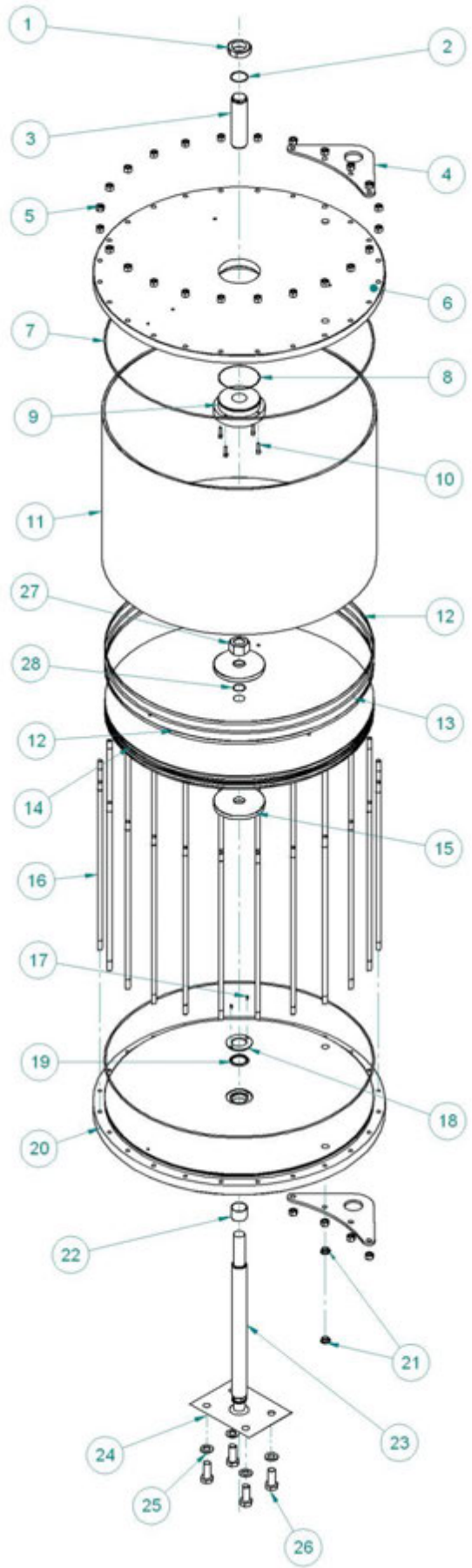
ACTUATOR MODEL
04-06



ACTUATOR MODEL
07-09-10-13-16-20-27

Item	*Description* / Descrizione	Drawing / Disegno
1	*Spring housing* / Contenitore molla	2-SC
2	*Closure flange* / Flangia di chiusura	2-CL
3	*Positioner, signalling micro switches, position transmitter* / Posizionatore, micro switches di segnalazione, trasmettitore di posizione.	-
4	*Scotch yoke mechanism* / Meccanismo a glifo.	2-SY / 2-SY(40-60)
5	*Pneumantic cylinder* / Cilindro pneumatico	2-PC
6	*Hydraulic cylinder* / Cilindro idraulico	2-HC
7	*Hydraulic hand pump* / Pompa manuale idraulica	2-HPS(single acting)/ 2HPD(double acting)
8	*Control cabinet* / Cabinet di controllo	-
9	*Control pannel* / Pannello di controllo	-
10	/ Adattamento Valvola	-
11	Manual override / Volantino manuale	2-HW
12	Declutchable hand wheel / Volantino sganciabile	2-HWD

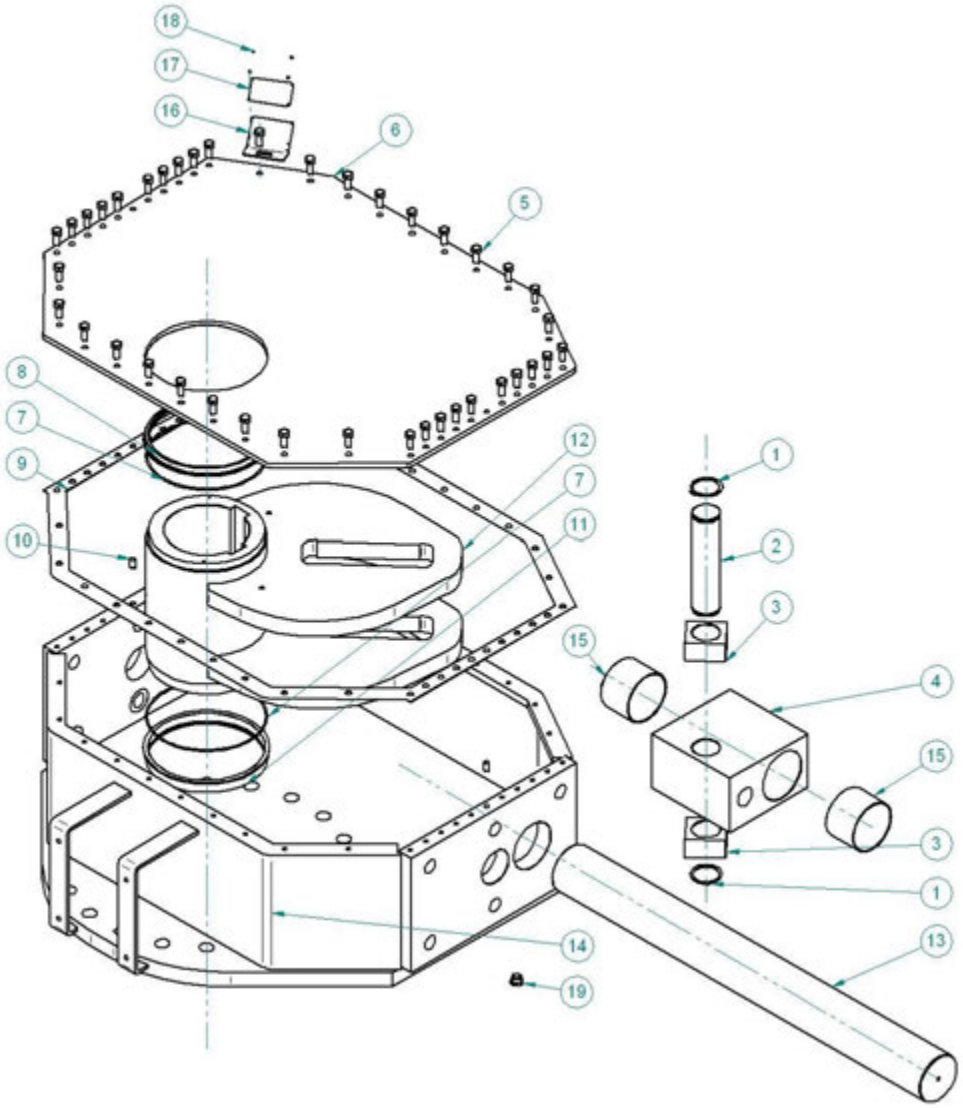
Drawing N°: 1-SPS-SPD



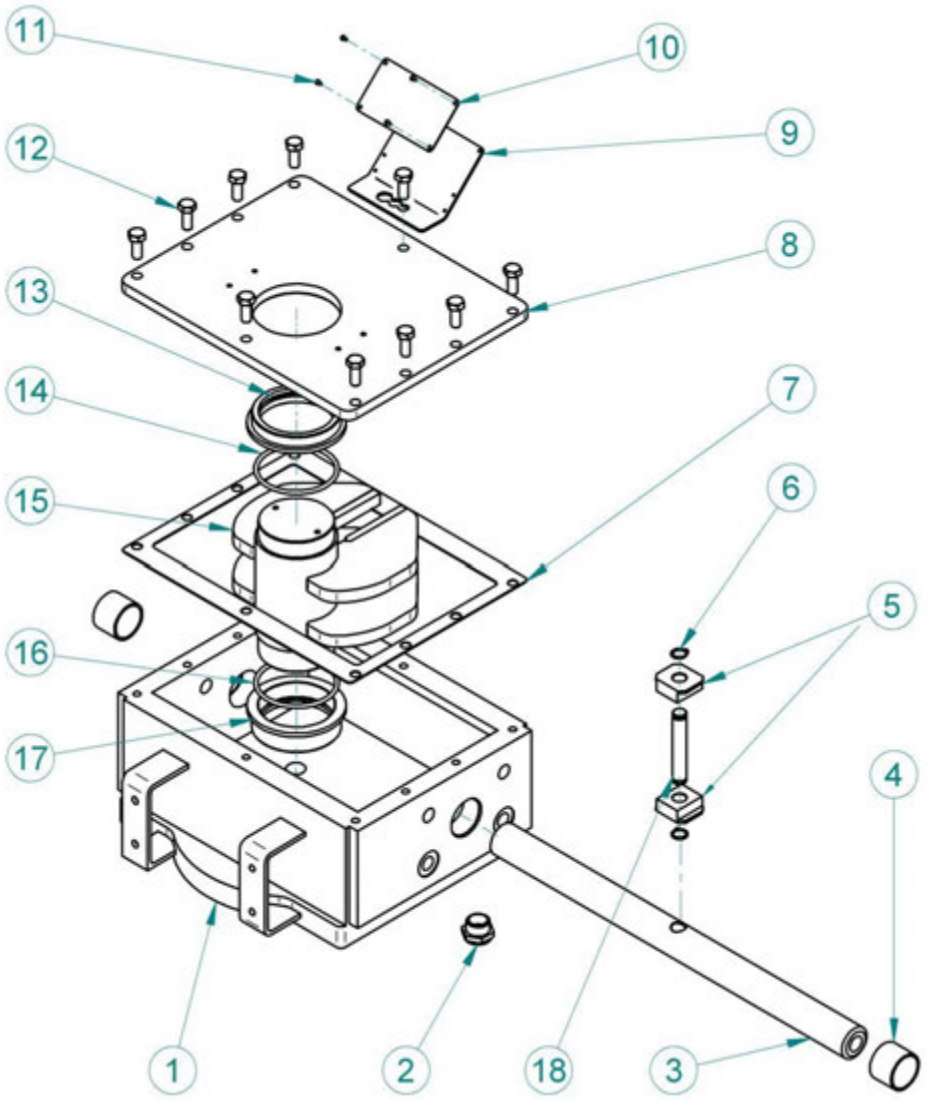
N°	*Description* / Descrizione *Material* / Materiale	
1	*Retaining nut* / Dado di tenuta ASTM A194 GR.7 or 2H	
2	*O-Ring* NBR	🔧
3	*Stop screw* / Grano finecorsa ASTM A320 L7 or ASTM A193 B7 with IMPACT TEST AT -20°C	
4	*Lifting plate* / Anello di sollevamento S355J2G3 UNI EN 10025	
5	*Nut* / Dado *Alloy steel class* / Acciaio classe 8.8 UNI 3740	
6	*Bottom flange* / Flangia di coda P355NH UNI EN 10028-3	
7	*O-Ring* NBR	🔧
8	*O-Ring* NBR	🔧
9	*Bushing* / Bussola S355J2G3 UNI EN 10025	
10	*Screw* / Vite *Alloy steel class* / Acciaio classe 8.8 UNI 3740	
11	*Cylinder* / Cilindro P355NH UNI EN 10028-3 + *Nickel plating* / Nichelato	
12	*Slider ring* / Pattino di guida PTFE + *Graphite* / Grafite	🔧
13	*Piston seal* / Tenuta pistone NBR	🔧
14	*Piston* / Pistone P355NH UNI EN 10028-3	
15	*Shoulder washer* / Rosetta di spallamento 39NiCrMo3Pb UNI 7845	
16	*Tie Rod* / Tirante ASTM A320 L7 or ASTM A193 B7 with IMPACT TEST AT -20°C	
17	*Screw* / Vite AISI 304	
18	*Retaining flange* / Flangetta di tenuta ASTM AISI 304	
19	*Shaft gasket* / Guarnizione stelo NBR + PTFE + *Graphite* / Grafite	🔧
20	*Head flange* / Flangia di testa P355NH UNI EN 10028-3	
21	*Silencer* / Silenziatore	
22	*Bushing* / Boccola *Steel* / Acciaio + *Bronze* / Bronzo + PTFE	
23	*Piston rod* / Stelo 42CrMo4S EN10082-1 with IMPACT TEST AT -20°C	
24	*Gasket* / Guarnizione Tesnit BA-202	🔧
25	*Washer* / Rondella 39NiCrMo3Pb UNI 7845	
26	*Screw* / Vite *Alloy steel class* / Acciaio classe 8.8 UNI 3740	
27	*Nut* / Dado *Alloy steel class* / Acciaio classe 8.8 UNI 3740	
28	*O-Ring* NBR	🔧

Drawing N°: 2-PC-PED

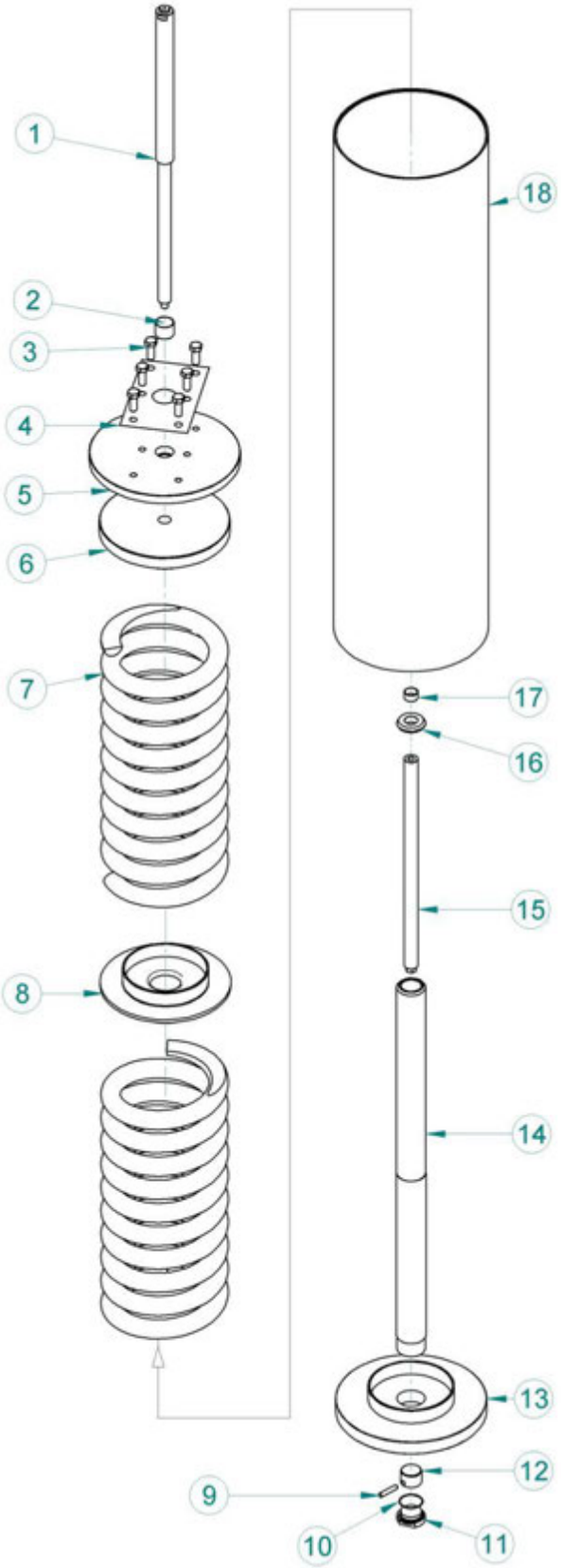
🔧 *Recomended spare parts* / Parti di ricambio suggerite



N°	***Description* / Descrizione**	***Material* / Materiale**	
1	*Snap ring* / Anello elastico	60Si7 UNI 3545	
2	*Bar pin* / Spina	42CrMo4 UNI EN 10083	
3	*Sliding block* / Blocchetto guida	G-CuAl11Fe4 UNI 5274	
4	*Dowel* / Blocchetto	42CrMo4 UNI EN 10083	
5	*Screw* / Vite	*Alloy steel class* / Acciaio classe 8.8 UNI 3740	
6	*Cover* / Coperchio	S275JR UNI EN 10025	
7	O-Ring	NBR	🔧
8	*Bushing* / Boccola	G-CuSn12 UNI 7013	
9	Gasket / Guarnizione	Tesnit BA-202	🔧
10	*Pin* / Spina	42CrMo4 UNI EN 10083	
11	*Bushing* / Boccola	G-CuSn12 UNI 7013	
12	*Scotch yoke* / Glifo	S355J2G3 UNI EN 10025	
13	*Guide bar* / Barra di guida	42CrMo4 UNI EN 10083 + *Chrome plating* / Cromato	
14	Housing / Carter	S275JR UNI EN 10025	
15	*Bushing* / Boccola	*Steel* / Acciaio + *Bronze* / Bronzo + PTFE	
16	Name plate support/Supporto	AISI 316	
17	*Name plate* / Targhetta	AISI 316	
18	*Rivet* / Rivetto	AISI 316	
19	*Safety Valve* / Valvola di sfiato		
Drawing N°: 2-SY		🔧 *Recomended spare parts* / Parti di ricambio suggerite	



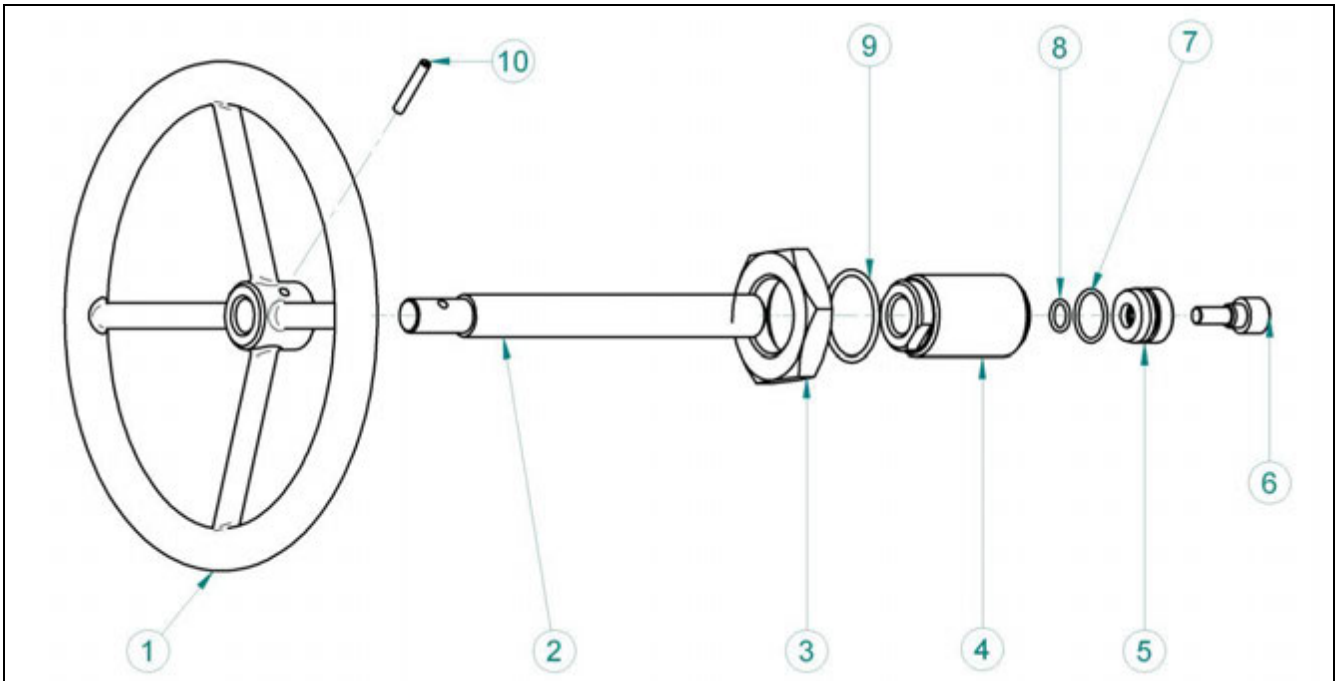
N°	***Description* / Descrizione**	***Material* / Materiale**	
1	Housing / Carter	S275JR UNI EN 10025	
2	*Safety Valve* / Valvola di sfiato		
3	*Guide bar* / Barra di guida	42CrMo4 UNI EN 10083 + *Chrome plating* / Cromato	
4	*Bushing* / Boccola	*Steel* / Acciaio + *Bronze* / Bronzo + PTFE	
5	*Sliding block* / Blocchetto guida	G-CuAl11Fe4 UNI 5274	
6	*Snap ring* / Anello elastico	60Si7 UNI 3545	
7	*Gasket* / Guarnizione	Tesnit BA-202	🔧
8	*Cover* / Coperchio	S275JR UNI EN 10025	
9	Name plate support/Supporto	AISI 316	
10	*Name plate* / Targhetta	AISI 316	
11	*Rivet* / Rivetto	AISI 316	
12	*Screw* / Vite	*Alloy steel class* / Acciaio classe 8.8 UNI 3740	
13	*Bushing* / Boccola	G-CuSn12 UNI 7013	
14	*O-Ring*	NBR	🔧
15	*Scotch yoke* / Glifo	S355J2G3 UNI EN 10025	
16	*O-Ring*	NBR	🔧
17	*Bushing* / Boccola	G-CuSn12 UNI 7013	
18	*Bar pin* / Spina	42CrMo4 UNI EN 10083	
Drawing N°: 2-SY(40-60)		🔧 *Recomended spare parts* / Parti di ricambio suggerite	



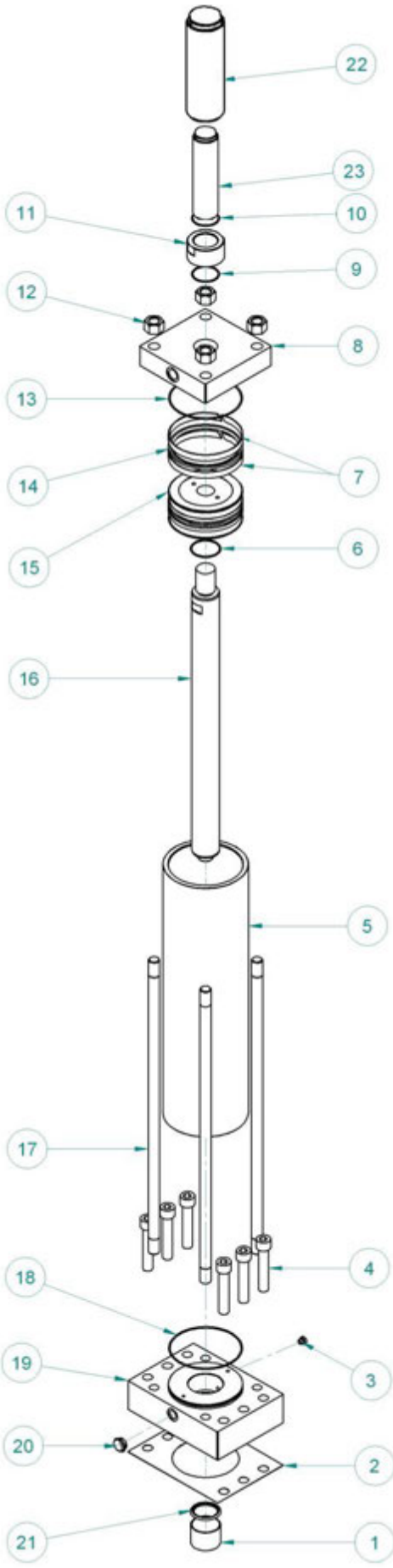
N°	***Description* / Descrizione** ***Material* / Materiale**	
1	*Rod* / Stelo 42CrMo4 UNI EN 10083 + *chrome plating* / cromato	
2	*Centering Bushing* / Boccola di centraggio *Steel* / Acciaio + *Bronze* / Bronzo + PTFE	
3	*Screw* / Vite *Alloy steel class* / Acciaio classe 8.8 UNI 3740	
4	*Gasket* / Guarnizione Tesnit BA-202	🔧
5	*Head flange* / Flangia di testa S355J2G3 UNI EN 10025	
6	*Spring driving flange* / Flangia spingi molla S355J2G3 UNI EN 10025	
7	*Spring* / Molla 60SiCr8 UNI 3545	
8	*Junction flange* / Flangia di giunzione S355J2G3 UNI EN 10025	
9	*Anti loosing device* / Barra anti svitamento *Nylon*	
10	*O-Ring* NBR	🔧
11	*Protection plug* / Tappo di protezione S235JR UNI EN 10025	
12	*Stop screw* / Grano finecorsa 42CrMo4 UNI EN 10083	
13	*Bottom flange* / Flangia di coda S355J2G3 UNI EN 10025	
14	*Rod Container* / Tubo di sicurezza S355J2G3 UNI EN 10025	
15	*Nut* / Prolunga stelo 42CrMo4 UNI EN 10083	
16	*Guide ring* / Anello guida S355J2G3 UNI EN 10025	
17	*Bushing* / Boccola *Steel* / Acciaio + *Bronze* / Bronzo + PTFE	
18	*Enclosure* / Contenitore S355J2G3 UNI EN 10025	

Drawing N°: 2-SC

🔧 *Recomended spare parts* / Parti di ricambio suggerite



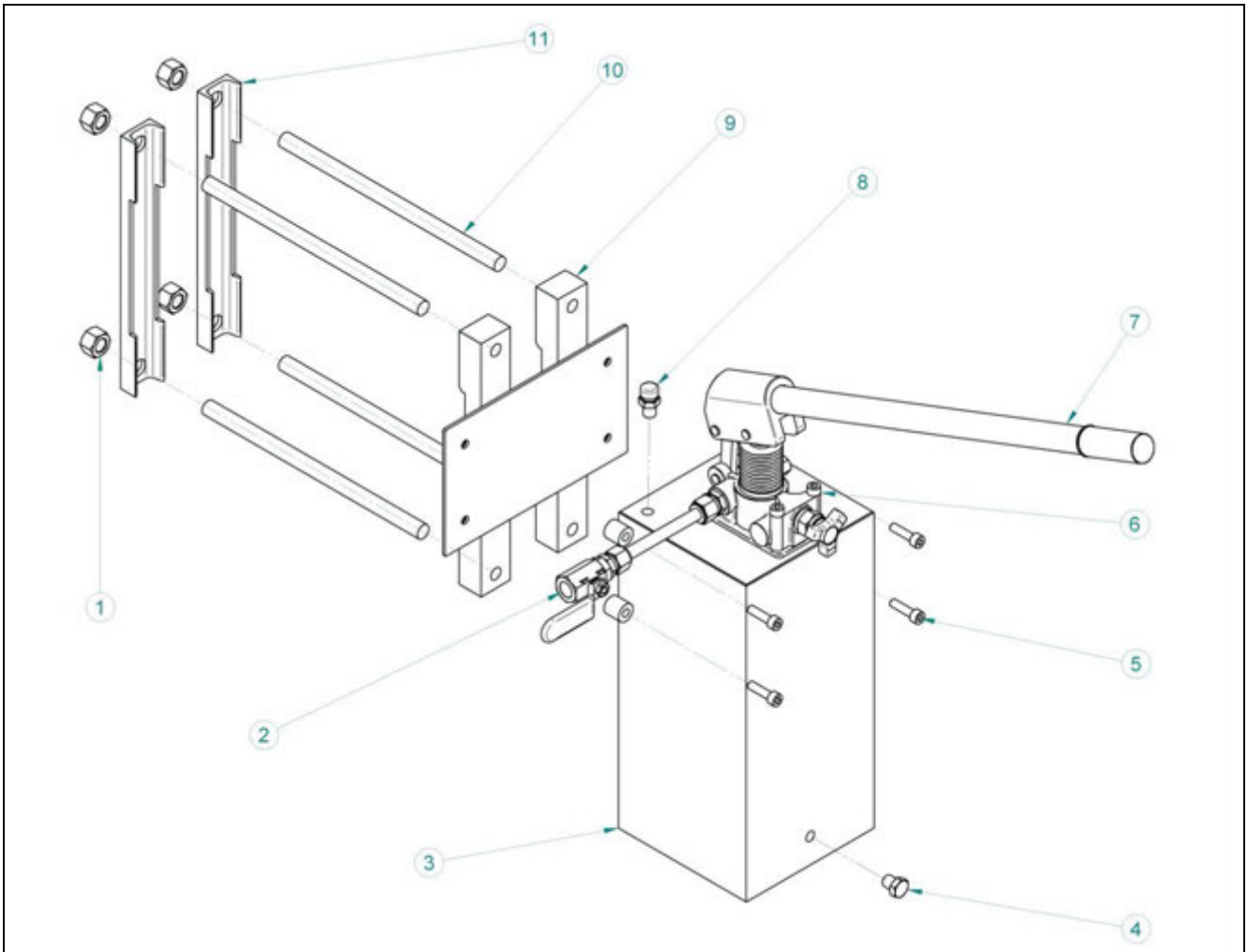
N°	***Description* / Descrizione**	***Material* / Materiale**	
1	*Handweel* / Volantino	S275JR UNI EN 10025	
2	*Screw* / Vite	39NiCrMo3 UNI 7845 + *Nickel plating* / Nichelato	
3	*Nut* / Dado	*Alloy steel class* / Acciaio classe 8.8 UNI 3740	
4	*Screw* / Vite	*Alloy steel class* / Acciaio classe 8.8 UNI 3740	
5	*Back Bush* / Bussola Post.	S355JR UNI EN 10025	
6	*Screw* / Vite	*Alloy steel class* / Acciaio classe 8.8 UNI 3740	
7	*O-Ring*	NBR	
8	*O-Ring*	NBR	
9	*O-Ring*	NBR	
10	*Elastic pin* / Spina elastica	60Si7 UNI3545	
Drawing N°: 2-HW		*Recomended spare parts* / Parti di ricambio suggerite	



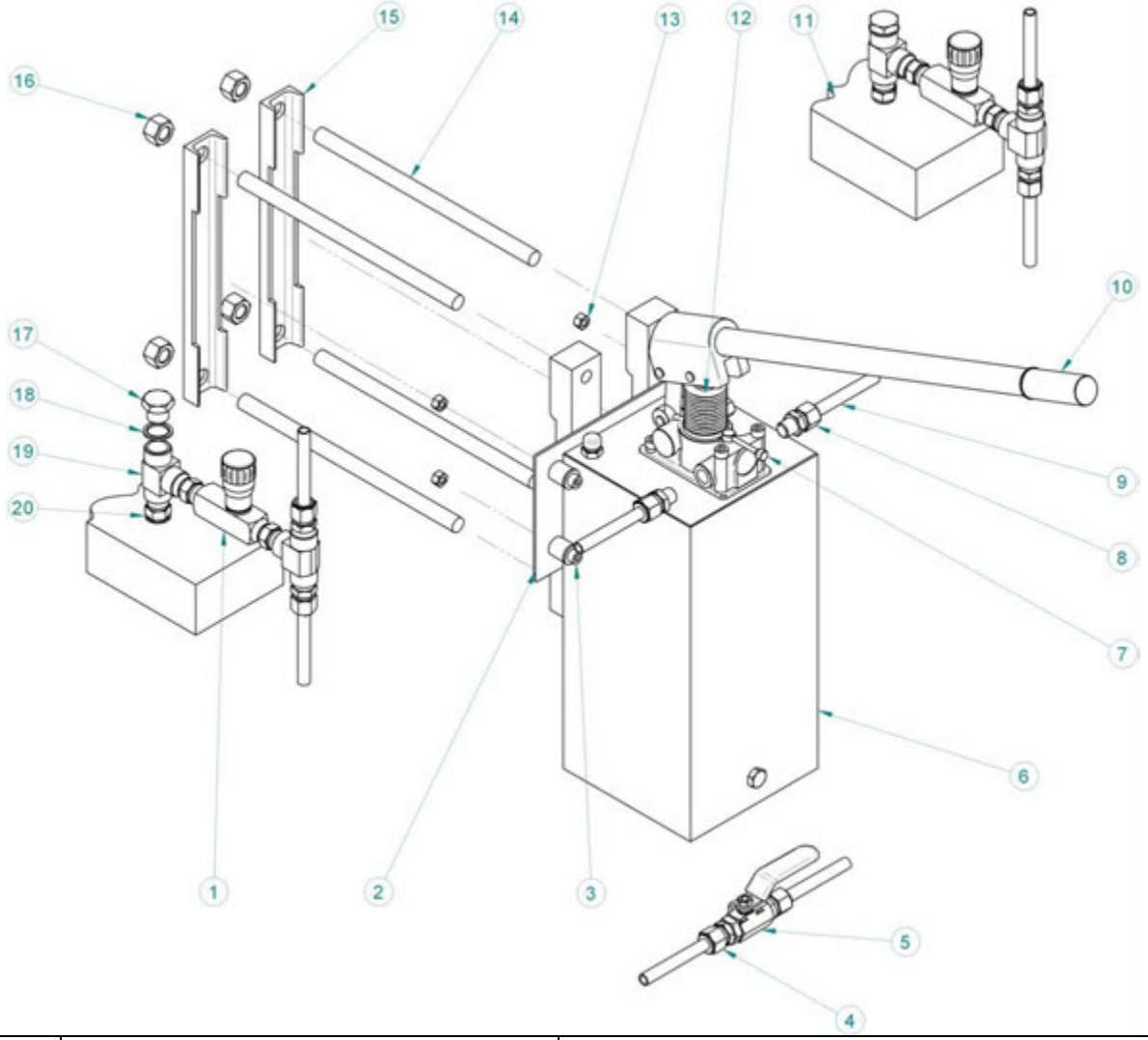
N°	***Description* / Descrizione** ***Material* / Materiale**	
1	*Bushing* / Boccola C40 UNI 7845	
2	*Gasket* / Guarnizione Tesnit BA-202	🔧
3	*Plug* / Tappo *Alloy steel class* / Acciaio classe 8.8 UNI 3740	
4	*Screw* / Vite *Alloy steel class* / Acciaio classe 8.8 UNI 3740	
5	*Cylinder* / Cilindro S355J2G3 UNI EN 10025 + *Nickel plating* / Nichelato	
6	*O-Ring* NBR	🔧
7	*Slider ring* / Pattino di guida PTFE + *Graphite* / Grafite	🔧
8	*Head flange* / Flangia di testa S355J2G3 UNI EN 10025	
9	*O-Ring* NBR	🔧
10	*O-Ring* NBR	🔧
11	*Retaining nut* / Dado di tenuta *Alloy steel class* / Acciaio classe 8.8 UNI 3740	
12	*Nut* / Dado *Alloy steel class* / Acciaio classe 8.8 UNI 3740	
13	*O-Ring* NBR	🔧
14	*O-Ring* NBR	🔧
15	*Piston* / Pistone S275JR UNI EN 10025	
16	*Piston rod* / Stelo C40 UNI 7845 + *Chrome plating* / Cromatura	
17	*Tie Rod* / Tirante 39NiCrMo3Pb UNI EN 10204	
18	*O-Ring* NBR	🔧
19	*Head flange* / Flangia di testa S355J2G3 UNI EN 10025	
20	*Silencer* / Silenziatore	
21	*Shaft gasket* / Guarnizione stelo NBR + PTFE + *Bronze* / Bronzo	🔧
22	*End cap cover* / Cappuccio di protezione SJ235 UNI EN 10025 + Sur Sulf	
23	*Stop screw* / Grano finecorsa 42CrMo4 UNI EN 10204	

Drawing N°: 2-HC

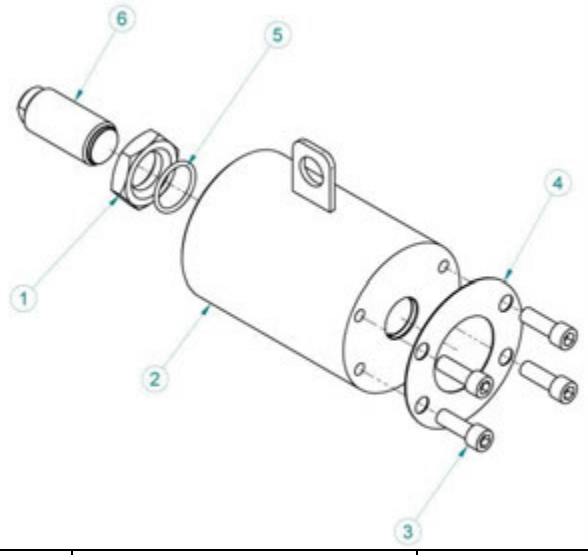
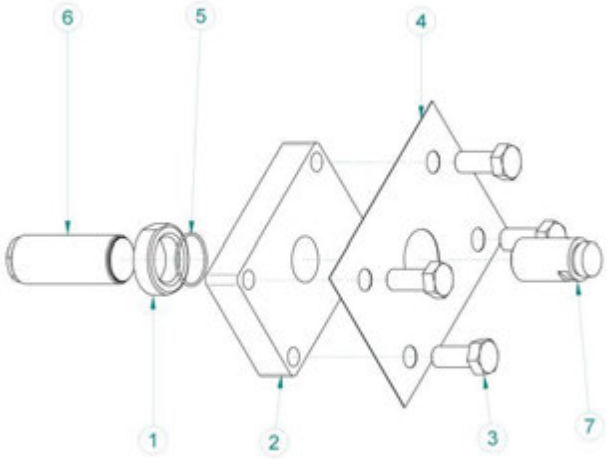
🔧 *Recomended spare parts* / Parti di ricambio suggerite



N°	***Description* / Descrizione**	***Material* / Materiale**	
1	*Nut* / Dado	*Alloy steel class* / Acciaio classe 8.8 UNI 3740	
2	*2/2 manual operated valve* / Rubinetto 2/2	*Carbon Steel* / Acciaio al carbonio	
3	*Oil tank* / Serbatoio	S235JR UNI EN 10025	
4	*Plug* / Tappo	*Alloy steel class* / Acciaio classe 8.8 UNI 3740	
5	*Screw* / Vite	*Alloy steel class* / Acciaio classe 8.8 UNI 3740	
6	*Hydraulic hand punp* / Pompa idraulica	*Nodular cast iron* / Ghisa sferoidale GS 400-12 UNI 4544	
7	*Manual lever* / Leva	S235JR UNI EN 10025 + *zinc plating* / Zincato	
8	*Relief valve* / Valvola di sfiato	*Alloy steel class* / Acciaio classe 8.8 UNI 3740	
9	*Support plate* / Piastra di supporto	S235JR UNI EN 10025	
10	*Tie rod* / *Tirante*	*Alloy steel class* / Acciaio classe 8.8 UNI 3740	
11	*Support plate* / Piastra di supporto	S235JR UNI EN 10025	
Drawing N°: 2-HPS		*Recomended spare parts* / Parti di ricambio suggerite	



N°	***Description* / Descrizione**	***Material* / Materiale**	
1	*Flow regulator valve* / Regolatrice di flusso	9SMnPb23 UNI 5105	
2	*Support plate* / Piastra di supporto	S235JR UNI EN 10025	
3	*Screw* / Vite	*Alloy steel class* / Acciaio classe 8.8 UNI 3740	
4	*Fitting* / Adattamento tubo	S235JR UNI EN 10025 + *zinc plating* / Zincato	
5	*By-pass valve*	9SMnPb23 UNI 5105	
6	*Oil tank* / Serbatoio	S235JR UNI EN 10025	
7	*Hand operated distributor* / Leva di distribuzione	*Nodular cast iron* GS 400-12 UNI 4544 / Ghisa sferoidale	
8	*Fitting* / Adattamento tubo	S235JR UNI EN 10025 + *zinc plating* / Zincato	
9	*Pipe* / tubo	S235JR UNI EN 10025	
10	*Manual lever* / Leva	S235JR UNI EN 10025 + *zinc plating* / Zincato	
11	*Hydraulic cylinder* / cilindro idraulico	*See table* 2-HC / Vedere disegno 2-HC	
12	*Bellows lever* / Soffietto	NBR	
13	*Nut* / Dado	*Alloy steel class* / Acciaio classe 8.8 UNI 3740	
14	*Tie rod* / *Tirante*	*Alloy steel class* / Acciaio classe 8.8 UNI 3740	
15	*Support plate* / Piastra di supporto	S235JR UNI EN 10025	
16	*Nut* / Dado	*Alloy steel class* / Acciaio classe 8.8 UNI 3740	
17	*Plug* / Tappo	S235JR UNI EN 10025 + *zinc plating* / Zincato	
18	*Washer* / Rosetta	*Alloy steel class* 8.8 UNI 3740 + *zinc plating* / *Acciaio zincato*	
19	*"T" fitting* / Adattamento "T"	S235JR UNI EN 10025 + *zinc plating* / Zincato	
20	*Nipple* / Nipplo	S235JR UNI EN 10025 + *zinc plating* / Zincato	
Drawing N°: 2-HPD		*Recomended spare parts* / Parti di ricambio suggerite	

For 040/060 actuators series	*For 07/270 actuators series*
	

N°	***Description* / Descrizione**	***Material* / Materiale**	
1	*Retaining nut* / Dado di tenuta	*Alloy steel class* / Acciaio classe 8.8 UNI 3740	
2	*Flange* / Piastra di chiusura	S355J2G3 UNI EN 10025	
3	*Screw* / Vite	*Alloy steel class* / Acciaio classe 8.8 UNI 3740	
4	*Gasket* / Guarnizione	Tesnit BA-202	
5	O-Ring	NBR	
6	*Stop screw* / Grano finecorsa	42CrMo4 UNI EN 10204	
7	*Screw* / Vite	S355J2G3 UNI EN 10025	
Drawing N°: 2-CL		*Recomended spare parts* / Parti di ricambio suggerite	

2.1.0 – ATEX.

Here are the instructions that define what conditions should be operational Guaranteed, the actuator in operation, in order to prevent the risk of generating a source of power efficient. (Reference: Directive 94/9/EC - ATEX)

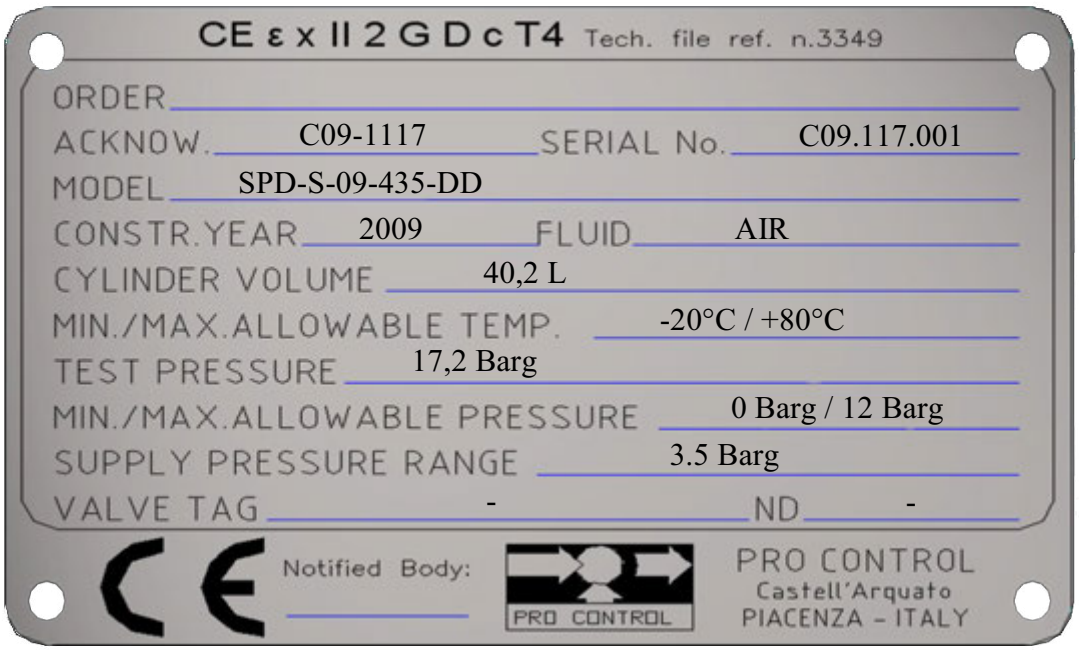
OPERATING CONDITIONS WHICH MUST BE GUARANTEED FOR ACTUATORS OPERATION	***RESPONSABILITY***
The operating strokes must not exceed four strokes per minute	***User***
Avoid introdcution of gas at temperatures > di 100 °C	***User***
In the event of pneumatic or manual operation, it is necessary to ensure discharging of the cylinder subjected to a reduction of volume	***User***
It is necessary to avoid supplying the actuator with oil > di 100 °C	***User***
It is necessary to ensure that the hydraulic cylinder is completely filled with oil	***User***
It is necessary to ensure the correct level of oil is maintained within the hydraulic pump group	***User***
The actuator must be electrically earthed	***User***
If the actuators shall be supplied in an area where ranger of lightening strikes are frequent , then the actuators and related accessories must be adequately protected against lightening strikes.	***User***

2.2.0-SPECIFIC INFORMATION FOR PRESSURE EQUIPMENT

1- WORKING LIMITS

Actuator is designed, manufactured and tested for working under conditions described in the nameplate placed on the actuator.

Please find here below the "facsimile" of the nameplate:



2.2.1- WORKING DECLARATION

The pressure equipment was tested by the notified body and is delivered complete with CE mark, "Installation, commissioning and maintenance User Manual" and CE certificate in accordance with the European directive 97/23/CE.

The owner of the pressure equipment have to produce the working declaration to the competent body (I.S.P.E.S.L. for Italy).

The declaration has to be produced before the start up service of the equipment to allow the competent body to check the equipment.

The working declaration must be produced also in the following situations:

- *the pressure equipment has been repaired/modified;*
- *the pressure equipment is put into a new system;*
- *the pressure equipment is reactivated after an inactivity period;*
- *the pressure equipment owner has changed;*
- *the pressure equipment use has changed;*
- *the pressure equipment is out of use due to the owner;*
- *the pressure equipment is not being used for a period longer than a year.*

3.1.0 - ATTACHEMENTS (if foreseen)