

SC/VHS - VALVE HYDRAULIC ACTUATOR

Single acting stainless steel version type

INSTRUCTION MANUAL 5021



Engineering
GREAT Solutions

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STI S.r.l. has taken every care in collecting and verifying the documentation contained in this Instruction Manual. The information herein contained are reserved property of STI S.r.l.

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1 GENERAL INFORMATION

1.1 General Warnings

<p>Important</p> 	<p>This Instruction Manual is an integral part of the machine, it should be carefully read before carrying out any operation and it should be kept for future references.</p> <p>This Instruction Manual covers the SC/VHS actuators in the base version without any accessories and/or control panel.</p> <p>In case accessories and/or control panel are foreseen mounted on the actuator an additional Section to this Instruction Manual will be attached to the specific actuator.</p> <p>This Instruction Manual is realized in accordance with the Directive 2006/42/CE.</p>
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1.2 Generalities

STI S.r.l. actuators are conceived, manufactured and controlled according to the Quality Control System in compliance with EN ISO 9001 International Standard.

1.3 Manufacturer

With respect to Machinery Directive 2006/42/EC the Manufacturer of the described SC/VHS actuator series, is **STI S.r.l.** as specified on the machinery label.

Address : **STI S.r.l.**
Via Dei Caravaggi, 15
24040 Levate (Bergamo) – Italy

1.4 Terms and conditions

STI S.r.l. guarantees each single product to be free from defects and to conform to current goods specifications. The warranty period is one year from the date of installation by the first user, or eighteen months from the date of shipment to the first user, whichever occurs first.

The warranty does not cover special products or components not covered by warranty in their turn by subcontractors. No warranty is given for products which have been subject to improper storage, improper installation, misuse, or corrosion, or which have been modified or repaired by unauthorised personnel.

Repair work due to improper use will be charged at standard rates.

1.5 Manufacturer's Liability

STI S.r.l. declines all liability in the event of:

- use of the actuator in contravention of local safety at work legislation
- incorrect installation, disregard or incorrect application of the instructions provided on the actuator nameplate and in this manual
- modifications without STI's authorisation
- work done on the unit by unqualified or unsuitable persons.

1.6 Applicable Standards and Directives

- EN ISO 12100:2010: Safety of machinery - General principles for design. Risk asses and risk reduction.
- 2006/42/EC Machinery Directive.
- 97/23/EC Pressure Equipments Directive (PED)
- 2006/95/EC Directive for Low Voltage Equipment (LV)
- 2004/108/EC Directive relating to the Electromagnetic Compatibility (EMC)
- 94/9/CE Directive concerning equipment for use in potentially explosive atmospheres (ATEX)

1.7 Symbology Used

1.7.1 Signs of warning

Be careful where these symbols are shown, they indicate a potentially hazardous situation and they warn that if the steps are not properly performed, **MAY RESULT CAUSING** serious injury, death or long-term risks to the health of exposed persons.



GENERAL DANGER



DANGER POWER SUPPLY



CRUSHING HAZARD

1.7.2 Signs of obligation



General obligation (with the possible supplementary signboard)



Must wear protective clothing.



Obligation to wear protective footwear.



Is required to wear a helmet.



Is required to protect the eyes.



Obligation to protect your hearing.

2 DEVICE DESCRIPTION

2.1 General Description

SC/VHS single acting hydraulic actuators are suitable for the operation of linear valves for ON-OFF and modulating heavy-duty service.

The actuator is made up of a customized adapting valve and an hydraulic cylinder which is necessary to transmit the linear motion for the valve operation.

The linear stroke of the valve is adjustable by means of the external mechanical stop for upward position and by the adjustment of the coupling of valve stem to actuator joint for the downward position.

The actuator pedestal has a flange with threaded holes to fix the actuator to the valve.

STI can offer different types of control system according to specific Customer's requirements.

2.2 Identification of the Main Parts

The SC/VHS actuator is composed by the following main parts:

- 1) Adapting valve assembly
- 2) Hydraulic cylinder
- 3) Stop setting screw kit

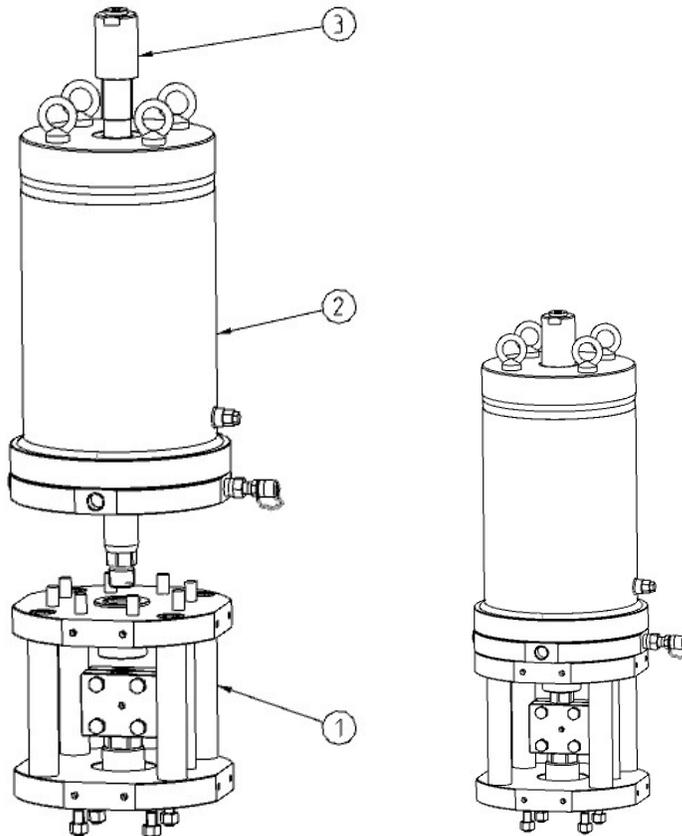
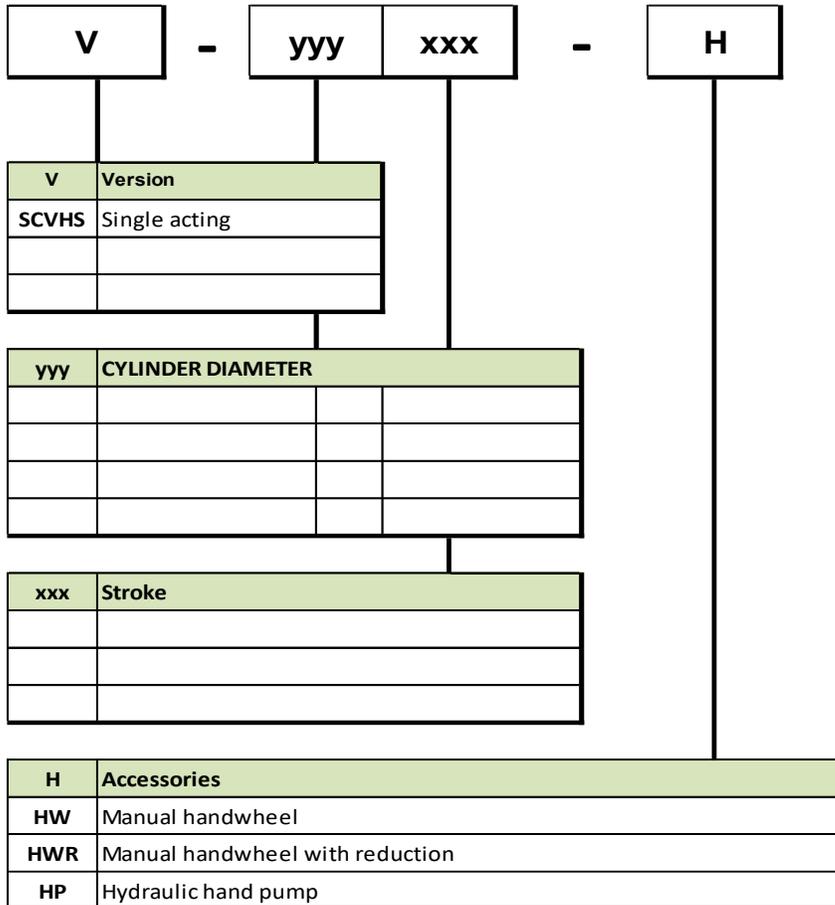


Fig. 1: Main parts for SC/VHS actuator series

2.3 Actuator coding description



3 TECHNICAL DATA

DATA	
Supply medium	Hydraulic fluid (see Section 8.6)
Operating temperature ranges	Standard : -20°C +100°C Optional : -60°C +100°C
Cylinder design pressures	Up to 350 bar (special version on request)
Operating pressure range	Data are available on actuator nameplate (depending on customer requirements and specifications.)
Max operating thrust	Data are available on actuator nameplate
Applications	On-Off Modulating service (on request)

The nameplate fastened on the actuator contains the main actuator operating condition.
It is forbidden to modify the information and the marks without previous written authorization by STI S.r.l.

4 IDENTIFICATION PLATE

 STI s.r.l. Via Dei Caravaggi 15 24040 LEVATE(Bg)–ITALY www.imi-critical.com – FAX +39 035 2928247	
  II 2GD c II	<input type="text"/> T <input type="text"/> ATEX Tech.file ref. <input type="text"/>
Order <input type="text"/>	Serial. N° <input type="text"/>
Model <input type="text"/>	Max Oper. Torque <input type="text"/> Nm
Valve Tag <input type="text"/>	Year <input type="text"/> Fluid <input type="text"/>
Pressure Range <input type="text"/> bar	TMax <input type="text"/> °C Tmin <input type="text"/> °C
Degree of Protection: IP66/IP67M	

5 INSTALLATION



Important: Not performing the following procedures will invalidate the product guarantee.

5.1 Transport



Important: The lifting and handling should be made by qualified staff and in compliance with the laws and provisions in force.



Warning: Lift the actuator as shown in Fig.2.
The fastening points are appropriate for the lifting of the actuator alone and not for the valve + actuator assembly.



Warning: Avoid that during the handling, the actuator passes above the staff.
The actuator should be handled with appropriate lifting means.
The weight is reported on the delivery bill and on overall-dimensions drawings furnished with the documents accompanying the actuator.
For base actuator dimensions and weights please consult www.stiactuation.com

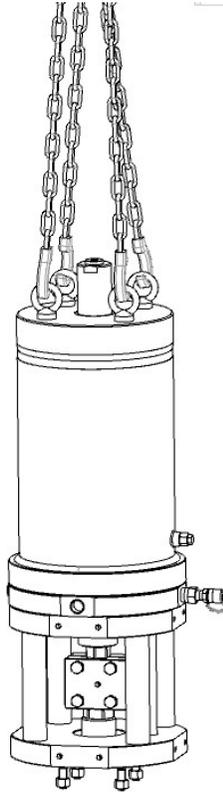


Fig. 2 – Lifting points for SC/VHS actuator series

5.2 Reception

- Check that the model, the serial number of the actuator and the technical data reported on the identification plate correspond with those of order confirmation (Sect. 4).
- Check that the actuator is equipped with the fittings as provided for by order confirmation.
- Check that the actuator was not damaged during transportation: if necessary renovate the painting according to the specification reported on the order confirmation.
- If the actuator is received already assembled with the valve, its settings have already been made at the factory.
- If the actuator is delivered separately from the valve, it is necessary to check, and, if required, to adjust, the settings of the mechanical stops (Sect. 7.2).

5.3 Storage

All the actuators SC/VHS leave the factory in perfect condition. Performances of each unit are guaranteed by individual test and data reported on a specific test certificate issued for each unit.

In order to maintain these characteristics until the SC/VHS actuator is installed on site, proper attention must be observed for preservation during the storage period.

If the actuator needs storage, before installation follow these steps:

- Place it on a wood surface pallet or on metallic support, so that they are not in direct contact with the ground, in order not to deteriorate the area of valve coupling, later it must be packed with appropriate covering.
- Make sure that plastic plugs are present on the hydraulic and electrical connections (if present).
- Check that the limit switch box (if any) is properly closed.

If the storage is long-term or outdoor:

- Keep the actuator protected from direct weather conditions.
- Replace plastic plugs of hydraulic and electrical connections (if any) with metal plugs that guarantee perfect tightness.
- Coat with oil, grease or protection disc, the valve coupling area.
- Periodically operate the actuator (Sect.6).

5.4 Requirements of Stability

- Conditions in which the machinery meets the requirement of stability during use, transportation, assembly, dismantling when out of service, testing or foreseeable breakdowns, are shown in Fig.2.
- The actuator must be put, with extreme caution, in a right position on a plane surface and with adapted capacity to the load to support.
- Do not use actuator eye bolts lifting of valve-actuator package.
- Concerning the requirement of stability during installation and disassembling it 's possible to refer to the next chapters 5.6 and 5.7.

5.5 Interface document and dimensional drawing

- Hydraulic diagrams, wiring diagrams and dimensional drawing are furnished with document accompanying the actuator.

5.6 Installation

	<p>Warning: Before proceeding with any Installation the following instructions must be respected:</p> <ul style="list-style-type: none"> - Always wear protective clothing, gloves, and eyewear to prevent personal injury. - Use the lifting point foreseen on the actuator to move the actuator: if different instructions are not well specified the lifting points foreseen on the actuator must be used only to move the actuator. - Check with your process or safety engineer for any additional measures that must be taken to protect against process media.
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5.6.1 Checks to be performed before installation

If the SC/VHS actuator is purchased separately, proceed as follows before assembling it onto the valve:

- 1) Check that the coupling dimensions of the actuator/coupling block flange and stem meet the specified coupling dimensions.
- 2) Prepare the necessary tools for the assembly and setting of the unit.
- 3) Check that the outer surface of the actuator is free from dust and dirt.
- 4) Clean the actuator flange and remove anything that might prevent a perfect adherence to the actuator/coupling block flange and joint especially all traces of grease.

5.6.2 Assembling of the actuator on the valve

The actuator can be assembled on top of the valve flange by using the lifting eyelets installed on hydraulic cylinder flange.

The assembly position of the actuator, with reference to the valve, must comply with the plant requirements

To assemble the actuator onto the valve proceeds as follows:

- Check that the coupling dimensions of the valve flange and stem, or of the relevant extension, meet the actuator coupling dimensions (valve stem and flange).
- To make easier the assembly, the valve stem has to be in perfect vertical position.
- Disassemble the two halves of actuator shell joint (Fig. 7.2) by unscrewing the retaining screws.
- Lift the actuator by utilizing the proper lifting eyelets, and unscrew the nuts and the stud bolts from the actuator pedestal.
- Assemble the actuator onto the valve, and arrange it in its correct vertical position proper to connection between valve stem and actuator cylinder rod.
- Connect the valve stem and the actuator stem in their place inside into the shell joint and refit the second half, tighten the screws fixing common
- Screw the stud bolts into the actuator pedestal flange, and screw the nuts on the stud bolts.
- Tighten according to the nut size torque requirements.

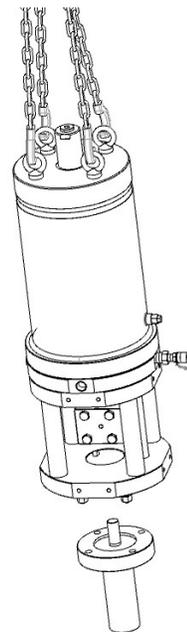


Fig. 3

 <p>Important</p>	<p>To guarantee the correct transmission from the actuator to valve stem without phenomena of slip it is important to remove any trace of oil and/or grease from the mating surfaces of valve and actuator or bracket and tighten the nuts fixing the bolts with the torque specified into the following Table 1</p>
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Table 1

Threading	Tightening torque (Nm)	Threading	Tightening torque (Nm)
M8	20	M24	550
M10	40	M27	800
M12	70	M30	1200
M14	110	M33	1400
M16	150	M36	1800
M20	300		

The torque values in Table 1 have been calculated considering the materials ASTM A320 grade L7/ASTM A193 grade B7 for screws or tie rods and ASTM A194 grade 4 for the nuts. Alternative bolting permitted i.e. ASTM A193 B8M (or B8M3) for tie rods and ASTM A194 Gr.8M for the nuts, provided that yield strength of screws or tie rods is over than 450 Mpa.

5.6.3 Hydraulic Connections

 <p>Warning</p>	<p>Check that the values of hydraulic supply available are compatible with those reported on the identification plate of the actuator.</p> <p>Use pipes and connections appropriate as for type, rating, material and dimensions.</p> <p>The connection should be made by qualified staff.</p>
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- Properly deburr the ends of rigid pipes.
- Properly clean the interior of pipes sending through them plenty of the supply fluid used in the system.
- Carry out the flushing operation before assembling the pipes.
- Mould and fasten the connection pipes so that no irregular strains at entries or loosening of threaded connections occur.
- Make the connections according to the operating diagram.
- Check the absence of leakages from hydraulic connections. If necessary tighten the nuts of the pipe-fittings.

5.6.4 Electrical Connections (If any)

<p>Warning</p> 	<p>Before carrying out electrical connections, switch off any power and control lines. Use components appropriate as for type, material and dimensions. The connections should be made by qualified staff.</p>
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- Introduce connection cables.
- Make the connections in compliance with applicable wiring diagrams on the documentation supplied.
- Screw the cable gland.
- Replace the plastic plugs of unused entries with metal plugs.

5.6.5 Earthing connection

If the earthing connection is not guaranteed through mechanical parts where actuator is mounted, it is necessary ensure a directly earthing connection on provided point of actuator.

5.7 Disassembling

<p>Warning</p> 	<p>Before starting the disassembly operations it is mandatory to disconnect the hydraulic power and to exhaust the cylinder and any other pressure retaining component mounted on the actuator.</p> <p>Before removing the screws between actuator and valve or adaptor flange or mounting bracket, the actuator should be connected with appropriate lifting means. Lift the actuator as shown in Fig.3. The lifting points are appropriate for handling the actuator alone and not for the valve + actuator assembly.</p>
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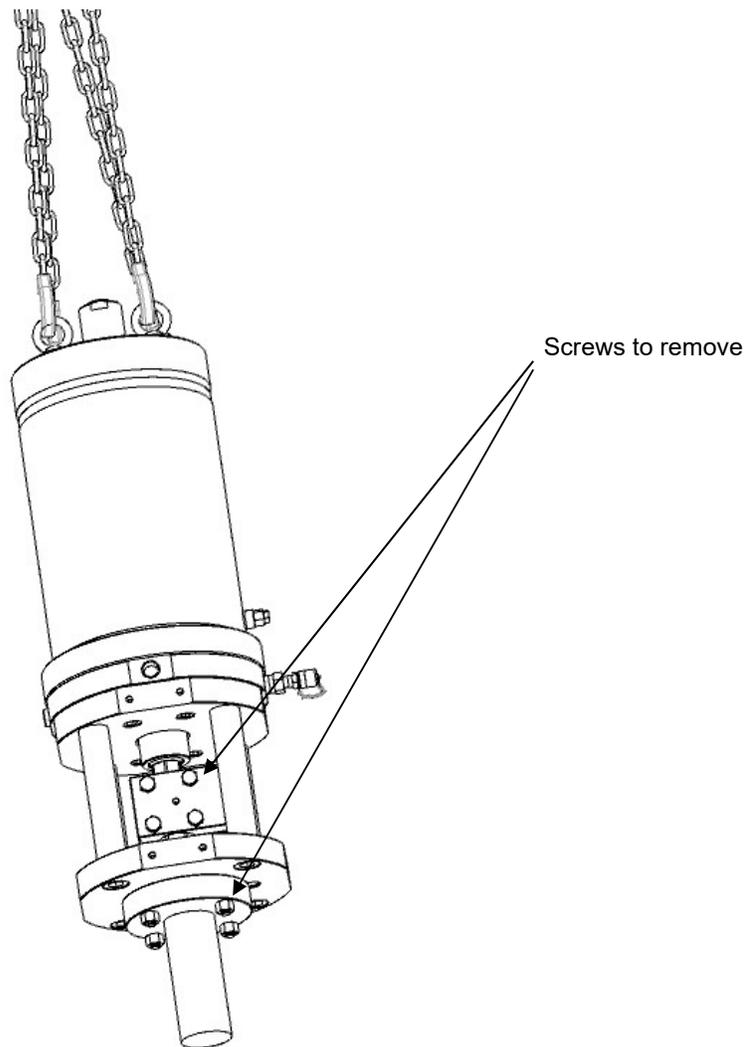


Fig. 4 – Disassembling of the actuator

6 OPERATION AND USE

6.1 Operation description

The SC/VHS series is hydraulic actuator designed for on-off and control service and is applicable over a wide range of pressure, temperatures and environments.

Depending which hydraulic cylinder is pressurized or not, the valve either opens or closes by the action of the piston (cylinder pressurized) or the spring (cylinder not pressurized).

6.2 Intended use

The machinery covered in this Instruction Manual is single acting hydraulic SC/VHS actuator series designed to operate a linear industrial valve (globe valves, gate valves, choke valves, ..) for ON-OFF or modulating heavy duty service.

This SC/VHS actuator is produced by **STI srl** [Manufacturer] and identified by a label with a product designation code. **STI srl** will not be liable for any possible damage or physical injury resulting from use in other than the designated applications or by lack of care during installation, operation, adjustment and maintenance of the machine. Such risks lie entirely with the user. Depending on the specific working conditions, additional precautions may be requested. Considering that **STI srl** has no direct control over particular applications, operation or maintenance conditions, it is the operator's responsibility to comply with all applicable safety rules. Please inform **STI srl** urgently if you face unsafe situations not described in this Instruction Manual. It is the sole responsibility of the operator to ensure that the local health and safety regulations are adhered to.

SC/VHS actuator is designed in accordance with the applicable International Rules and Specifications, but the following Regulations must be observed in any case:

- the general and safety regulations
- the plant specific regulations and requirements
- the proper use of personal and protective devices (glasses, clothing, gloves, etc)
- the proper use of tools, lifting and transport equipment.

<p>Warning</p> 	<p>It is severely forbidden to use the SC/VHS actuators series for purpose or application other than those for which it was designed and here above specified.</p>
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6.3 Reasonably foreseeable misuse

A short list of reasonably foreseeable misuse :

- Installation in ambient with not planned conditions: i.e. climatic conditions different from the specified conditions;
- Insert incorrect fluid into the system;
- Supply pressure out of required range;
- Lifting of the actuator with valve through eye bolts.

6.4 Operating limits

Operating conditions are described in paragraph 3, the nameplate fastened on the actuator contains the main actuator operating condition for the specified application.

<p>Warning</p> 	<p>It is severely forbidden to use the actuator under conditions other than those provided on the nameplate.</p>
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6.5 Residual Risks

<p>Warning</p> 	<p>The actuator has parts under pressure. Use the due caution. Use individual protections provided for by the laws and provisions in force.</p>
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- Risk due to movements of loads during load displacements, assemblage and maintenance servicing.
- Electrical risk due to an incorrect application of the instruction.
- Crushing during assemblage and maintenance servicing.
- Extreme metal temperature at high (over than 80°C) or very low values as consequence of ambient temperature as to be considered as a risk of person injury in case of contact.
- Emissions of hazardous substances where special medium is used as motive energy. (please refer to material safety data sheet of the hydraulic fluid if it is different to those fluids shown in paragraph 8.6)

7 Instructions for the operator

7.1 Start Up

During the start-up of the actuator, proceed as follows:

- Check that the pressure and quality of the hydraulic fluid (filtering degree,....) are as prescribed.
- Check that the feed voltage values of the electric components (solenoid valve coils, micro-switches, pressure switches, etc.) are as prescribed.
- Connect the actuator to the hydraulic feed line with fittings and tubing in accordance to project specifications. They must be sized correctly in order to guarantee the necessary oil flow for the operation of the actuator, with pressure drops not exceeding the maximum allowable value. The shape of the connecting piping must not cause excessive stress to the inlets of the actuator. The piping must be suitably fastened so as not to cause excessive stress or loosening of threaded connections, if the system undergoes strong vibrations.
- Every precaution must be taken to ensure that any solid or liquid contaminants, which may be present in the hydraulic pipework to the actuator, are removed to avoid possible damages to the unit or loss of performance.
- The inside of the pipes used for the connections must be well-cleaned before use: wash them with suitable substances and blow through them with oil or nitrogen. The ends of the tubes must be well deburred and cleaned.
- Connect the electrical feed, control and signal lines to the actuator, by linking them up with the terminal blocks of the electrical components. In order to do this, the housing covers must be removed without damaging the coupling surfaces, the O-rings or the gaskets.
- Remove the plugs from the cable entries.
- For electrical connections use components (cable glands, cables, hoses, conduits) in line with project and hazardous area requirements and codes applicable to the plant specifications (mechanical protection and/or explosion proof protection).
- Screw the cable glands tightly into the threaded inlets, so as to guarantee the weatherproof and explosion proof protection (if applicable).
- Insert the connection cables into the electrical enclosures through the cable glands, and connect the cable wires to the terminals according to the applicable wiring diagram.
- If conduits are used, it is advisable to carry out the connection to the electrical enclosures by inserting hoses so as not to cause anomalous stress on the housing cable entries.
- Replace the plastic plugs of the unused enclosure entries by metal ones, to guarantee perfect weatherproof tightness and to comply with the explosion proof protection codes (where applicable).

Once the connections are completed:

- check that the actuator controls work properly (remote control, local control, emergency controls, etc.)
- operate the actuator and check that it functions correctly, that the operation times meet the plant requirements and that there are no leakages in the hydraulic connections. If necessary tighten the nuts of the pipe fittings.
- Check that the required remote signals (valve position, oil pressure, etc.) are correct.
- Check that the setting of the components of the actuator control unit (pressure regulator, pressure switches, flow control valves, etc.) meet the plant requirements.
- Remove all rust and, in accordance with the applicable painting specifications, repair paint-coat that has been damaged during transport, storage or assembly.

7.2 Stroke adjustment

<p>Important</p> 	<p>It is assumed that the following instructions are executed in the workshop using oil as the power fluid. Instructions are applicable when the actuator is already installed on the valve.</p>
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It is important that the travel stops of the actuator (and not those of the valve) stop the linear stroke at upper end of valve position, except when this is required by the valve operation.

The setting of the open/closed valve position (upward position) is performed by adjusting the travel stop screw into the end flange of the hydraulic cylinder and by the adjustment of the coupling of valve stem to actuator joint for the downward position.

For the adjustment of the travel stop screw in the end flange of the hydraulic cylinder proceed as follows (Fig.5):

- Loosen the plug (3.4) from the travel stop protection (3.2) keeping the latter locked with a proper wrench key.
- Adjust the valve stroke screw/unscrew the travel stop screw (3.1)
- After detected the right position, tight the travel stop protection (3.2) against the cylinder end flange keeping the stopper screw (3.1) locked Screw the plug (3.4) into the travel stop protection (3.2).

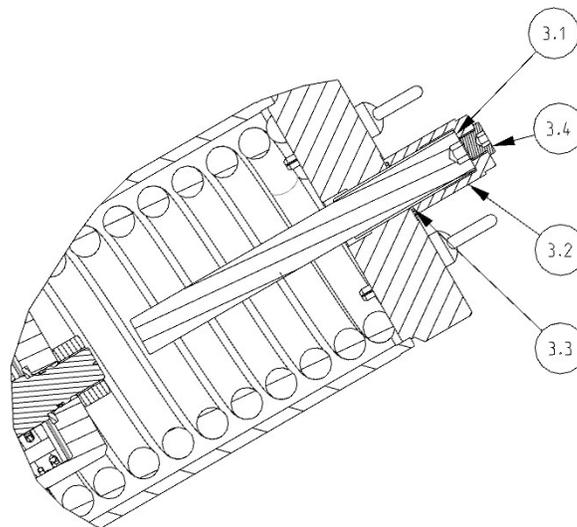


Fig. 5 – Stroke adjustment

	<p>After stroke adjustment, operate the actuator with hydraulic supply to check that the actuator moves properly and that there are no leakages.</p>
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8 MAINTENANCE

8.1 Periodic Inspections

Inspect the general conditions at regular intervals: recommended frequency of inspection is one time every two years but this frequency could be changed depending on the installation and working conditions.

- Check that the actuator operates the valve correctly and with the required operating times. If the actuator operation is very infrequent, carry out a few opening and closing operations with all the existing controls (remote control, local control, emergency controls, etc.), if this is allowed by the conditions of the plant.
- Check that the signals to the remote control desk are correct.
- Check that the hydraulic supply pressure value is within the required range.
- If there is an filter on the actuator please check the proper functionality.
- Check that the external components of the actuator are in good conditions.
- Check all the paint-coat of the actuator. If some areas are damaged, repair the paint-coat according to the applicable specification.
- Check that there is no leak in the hydraulic connections. If necessary tighten the nuts of the pipe-fittings.

	<p>Warning: Take care that a build-up of dust or dirt on the actuator can inhibit cooling and contribute to increase surface temperature. The user should plan and provide for a periodic cleaning/maintenance program that will maintain the external surface of the actuator free from excessive layer of dust.</p>
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	<p>Important: Use only STI: original spare parts. STI cannot accept responsibility for any damages that occur from using spare parts or fastening materials from other manufacturers. If STI products (i.e. gasket, o-ring etc) have been on store for longer periods check these for corrosion or deterioration before using these products.</p>
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8.2 Special maintenance

Under normal condition the actuator don't need special maintenance. If there are leaks in the hydraulic cylinder or a malfunction in the mechanical components, or in case of scheduled preventive maintenance, the actuator must be disassembled and seals must be replaced with reference to the attached sectional drawing and adopting the following procedures.

Important 	Before performing any maintenance operations use always wear protective gloves, clothing, and eyewear when performing any maintenance operations.
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Warning 	Before proceeding with any maintenance operation the following instructions must be respected: <ul style="list-style-type: none">- Disconnect any operating lines providing hydraulic pressure, electric power, or a control signal to the actuator. Be sure the actuator cannot suddenly open or close the valve- Close the hydraulic feed line and make sure that there is no pressure in the actuator cylinder and the control unit, to ensure safety of maintenance staff.
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8.2.1 Hydraulic cylinder seals replacement.

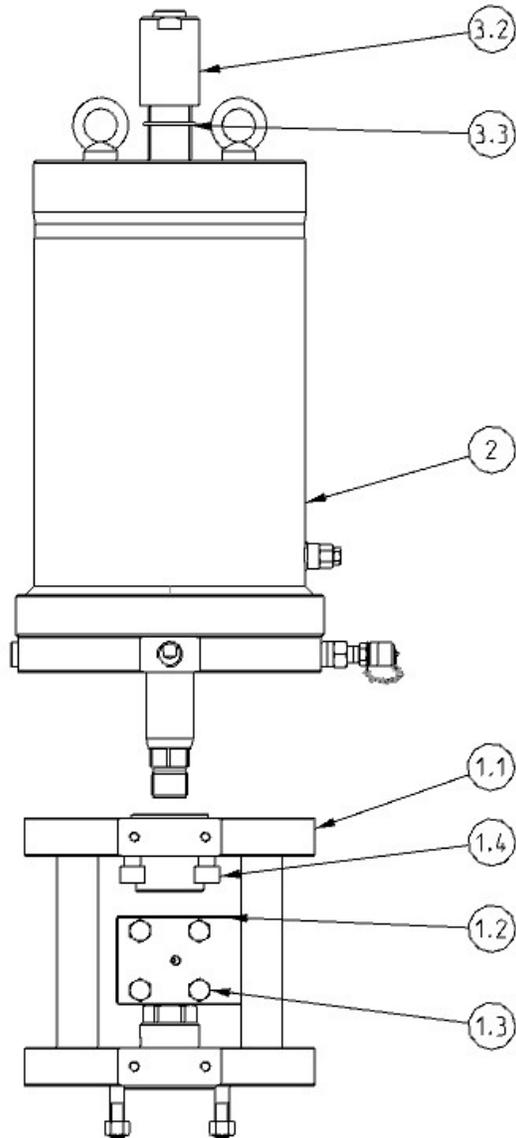


Fig. 6.1

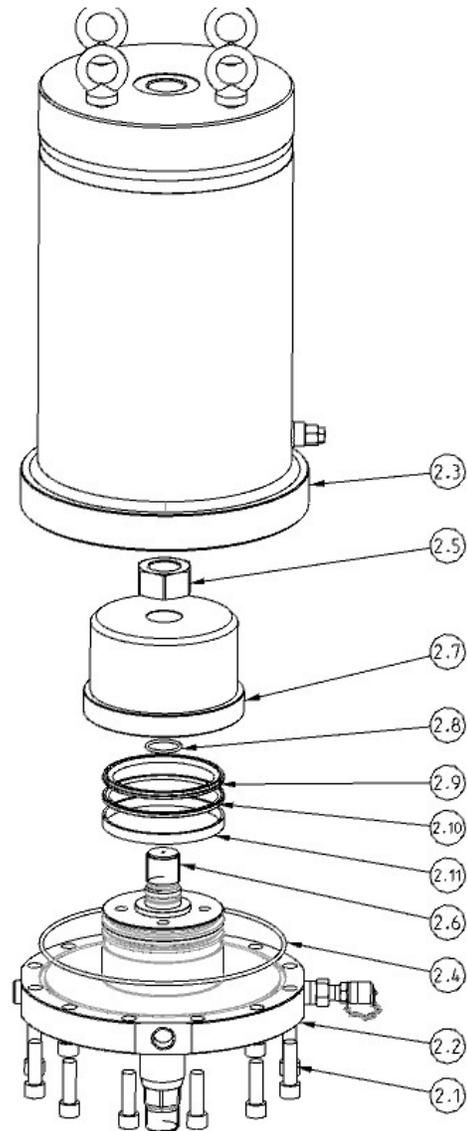


Fig. 6.2

Fig. 6 – Hydraulic cylinder seals replacement

Before unmounting the cylinder (2) it's necessary first of all disassemble the valve adaptation assembly (1.1) and the coupling joint (1.2) by unscrewing the screws (1.3) and (1.4) (fig. 6.1).

1) *Cylinder seals replacement (fig. 6.2)*

- Remove the screws (2.1) and disassemble the spring cartridge (2.3) from the head flange (2.2) after that replace the o-ring (2.4) from the seal groove.

2) *Piston seals replacement (fig. 6.2)*

- Remove the nut (2.5) from the piston rod (2.6) and then remove the cylinder tube (2.7).
- Replace the sliding ring (2.11) and the piston seals (2.9) and (2.10) from the grooves.

3) *Rod seals replacement (fig. 6.3)*

- Remove the nut (2.5) from the piston rod (2.6) and then remove the cylinder tube (2.7).
- Remove the bushing (2.12) and the washer (2.13) and slide off the piston rod (2.6) from the head flange (2.2).
- Replace the rod seals (2.14) and (2.15) and the O-ring (2.8) from the grooves.

4) *Replacement of stopper protection seals (fig.6.1).*

- Remove travel stop protection (3.2) if necessary replace o-ring (3.3).

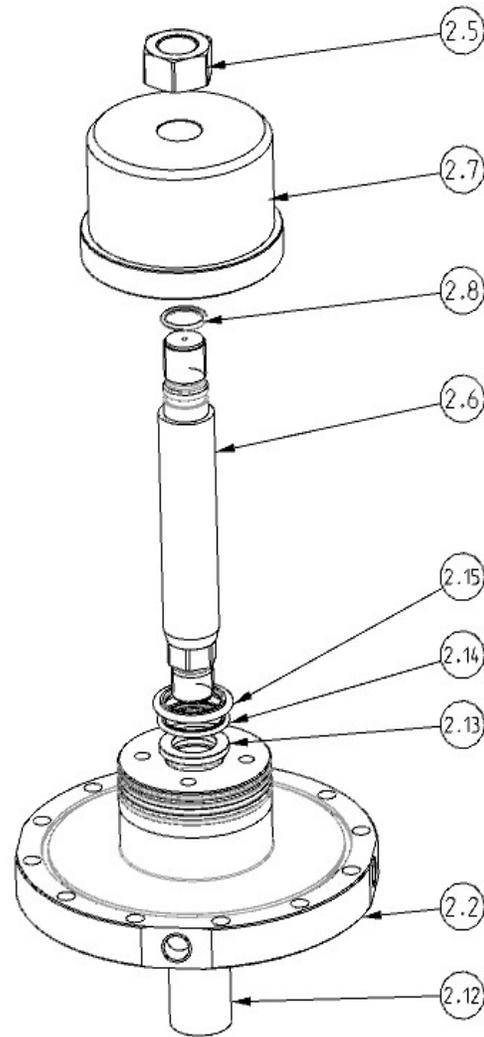


Fig. 6.3

Before re-assemble clean all seal grooves carefully and lubricate them with protective oil or grease film. It is possible to disassemble and replace seals of hydraulic cylinder disconnecting it from the actuator body in order to bring in a safe area.

8.3 Repairs

When needed, repair must only be carried out with Manufacturer's original spare parts.

Original spare parts must be required to the Manufacturer with reference to the item numbers shown in the next Section 10.

To ensure that right spare is provided, **serial number** printed on the SC/VHS series label must be specified when spares are ordered.

8.4 Reassembling

8.4.1 Hydraulic cylinder re-assembly

Carefully clean the inside of the tube and check that the entire surface, particularly that of the bevels, is not damaged. Lubricate with a protective oil or grease film the tube internal surface and the bevels at the ends. Lubricate every seal grooves taking care there are not damages on seal surfaces.

Re-assemble the piston rod into the head flange taking care to not damage the rod seals ring.

Re-assemble the cylinder tube taking care that the tube bevel has to smoothly compress the piston seal ring; take care also not to damage the head flange O-ring.

Assemble the head flange with the spring cartridge by centering it on the inside diameter of the tube, taking care not to damage the O-ring and tighten the screws to the recommended torque as per Table 1 in sec. 5.6.2.

8.4.2 Actuator re-assembly

Assemble the hydraulic cylinder to the adapting valve assembly tightening, with recommended torque table, the screw between cylinder and housing.

Recommended tighten torque as per Table 1 in Section 5.6.2.

Important 	After maintenance operations carry out a few actuator operations to check that its STROKING is regular and that there is no leak through the seals and fittings.
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8.5 Mechanism Lubrication

SC/VHS series does not need lubrication during his life. However it's possible to utilize following grease during special maintenance operations.

AGIP MU EP 2 or equivalent	AEROSHELL GREASE 7 or equivalent
To be used in standard temperature conditions (-20°C/+100°C) NLGI consistency: 2 Worked penetration: 280 dmm ASTM Dropping Point: 185°C Base oil viscosity at 40°C: 160 mm ² /s ISO Classification: L-X-BCHB 2 DIN 51 825: KP2K - 20	To be used in low temperature conditions (-60°C/+100°C) Colour: Yellow/Brown Physical state: Semi-solid at ambient temperature Odour: Slight Density: 966 Kg/m ³ at 15°C Flash Point: >215°C (COC) (Based on synthetic oil) Dropping point: >260°C (ASTM D-566) Product code: 001A0065 Infosafe No.: ACISO GB/eng/C

8.6 Hydraulic Fluid

Recommended hydraulic fluids to operate the SC/VHS actuators are listed here below.

Equivalent fluids can be used provided they have the same characteristics of the below recommended fluids.

AGIP ARNICA 22	AEROSHELL Fluid 41
To be used in standard temperature conditions (-20°C/+100°C) Manufacturer: Agip Viscosity at 40°C: 22 cSt Viscosity at 100°C: 4,94 cSt Viscosity Index: 157 Flash point COC: 192 °C Pour Point: < -39 °C Mass density at 15°C: 0,857 Kg/l	To be used in low temperature conditions (-60°C/+100°C) Manufacturer: Shell Viscosity at 40°C: 14,1 cSt Viscosity at 100°C: 5,30 cSt Viscosity Index: > 200 Flash point COC: 105 °C Pour Point: < -60 °C Mass density at 15°C: 0,87 Kg/l

9 TROUBLESHOOTING

Event	Possible cause	Remedy
Actuator doesn't work properly	Lack of hydraulic supply	Check supply line
	Defective main valve	Consult valve manufacturer documentation
	Failure of the control group	Call STI s.r.l. - Customer Care Dept.
Actuator too slow	Low supply pressure	Adjust supply pressure
	Incorrect speed control settings	Adjust speed controls to increase flow
	Wear of the main valve	Consult valve manufacturer documentation
Actuator too fast	High supply pressure	Reset
	Incorrect speed control settings	Adjust speed controls to decrease flow
Leakages on hydraulic circuits	Deterioration and/or damage to gaskets and or loosed fittings	Tightness loosed fittings Call STI s.r.l. - Customer Care Dept..
	Damage to fittings	Call STI s.r.l. - Customer Care Dept.
Leakages on hydraulic cylinder	Damage to seals	Replace cylinder seals
Incorrect position of the valve	Wrong adjustment of mechanical stops	Re-adjust setting
	Wrong electric limit switches indication.	Re-adjust setting

10 PARTS LIST GENERAL ASSEMBLY

This section includes the drawings and parts lists of each component and subassembly of SC/VHS series.



Important: When ordering spare parts, please indicate the serial number embossed on the actuator nameplate.



Important: When ordering spare parts, please refer to the spare part kit on the attached drawings.



Important: When ordering spare parts, use ONLY original STI spare parts.

Valve adaptation assembly

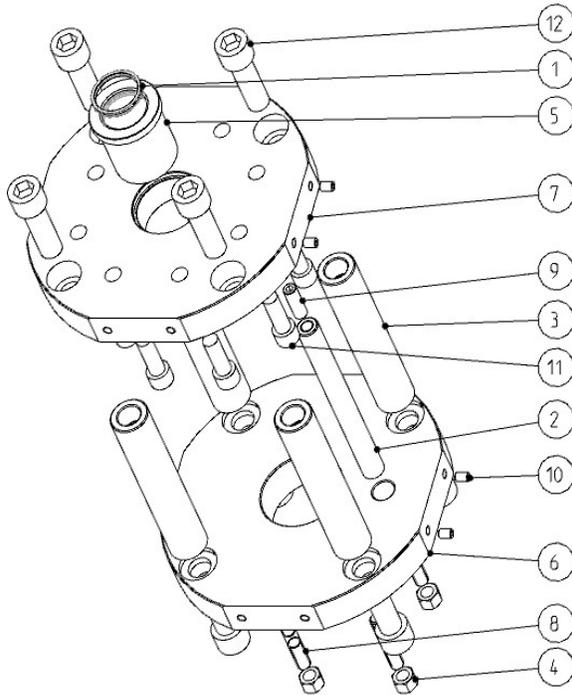


Fig. 7.1

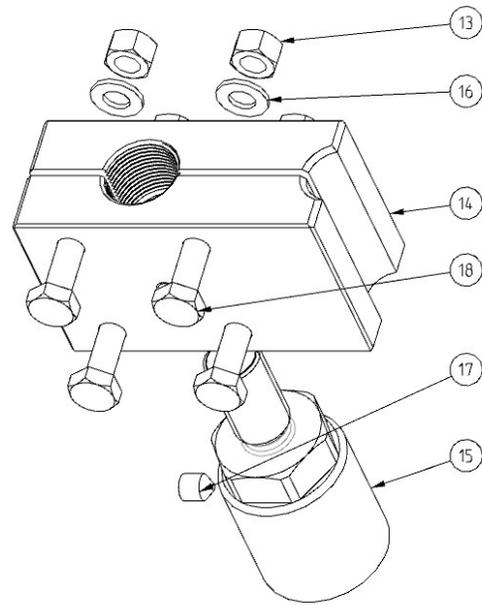


Fig. 7.2

Fig. 7 – Valve adaptation assembly

Valve adaptation part list

Item	Description	Qty	Material	Spare Parts
1	Rod seal	1	PTFE/NBR (*)	
2	Antirotation bar	1	Stainless steel	
3	Column	4	Stainless steel	
4	Nut	4	Stainless steel	
5	Rod sealing flange	1	Stainless steel	
6	Lower flange	1	Stainless steel	
7	Upper flange	1	Stainless steel	
8	Stud bolt	4	Stainless steel	
9	Screw	1	Stainless steel	
10	Screw	4	Stainless steel	
11	Screw	8	Stainless steel	
12	Screw	8	Stainless steel	
13	Nut	4	Stainless steel	
14	Valve coupling joint	1	Stainless steel	
15	Coupling adapter	1	Stainless steel	
16	Washer	4	Stainless steel	
17	Screw	1	Stainless steel	
18	Screw	4	Stainless steel	

(*) NBR standard material for temperature range from -20°C up to +100°C.

(**) Quantity depends on the model.

Single acting hydraulic cylinder

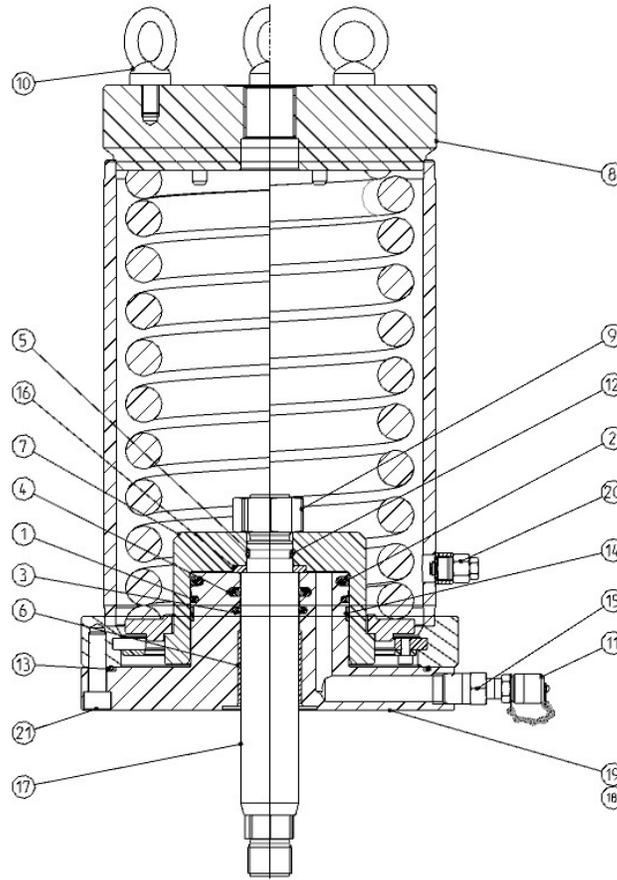


Fig. 8 – Single acting hydraulic cylinder

Single acting hydraulic cylinder part list

Item	Description	Qty	Material	Spare Parts
1	Piston seal	1	PTFE/NBR (*)	#
2	Piston seal	1	PTFE/NBR (*)	#
3	Rod seal	1	PTFE/NBR (*)	#
4	Rod seal	1	PTFE/NBR (*)	#
5	Back-up ring	2	NBR (*)	#
6	Bushing	1	Steel/Bronze/PTFE	
7	Cylinder tube	1	Carbon steel	
8	Spring cartridge	1	Stainless steel	
9	Nut	1	Carbon steel	
10	Male eyebolt	4	Stainless steel	
11	Drain plug	1	Carbon steel	
12	O-ring	1	NBR (*)	#
13	O-ring	1	NBR (*)	#
14	Sliding ring for piston	2	PTFE/NBR (*)	#
15	Adaptor	1	Stainless steel	
16	Washer	1	Alloy steel	

17	Stem	1	Stainless steel	
18	Plug	2	Stainless steel	
19	Head flange	1	Stainless steel	
20	Drain valve	1	Stainless steel	
21	Screw	12	Stainless steel	

(*) NBR standard material for temperature range from -20°C up to +100°C.

(**)Quantity depends on the model

Stop protection assembly for cylinder

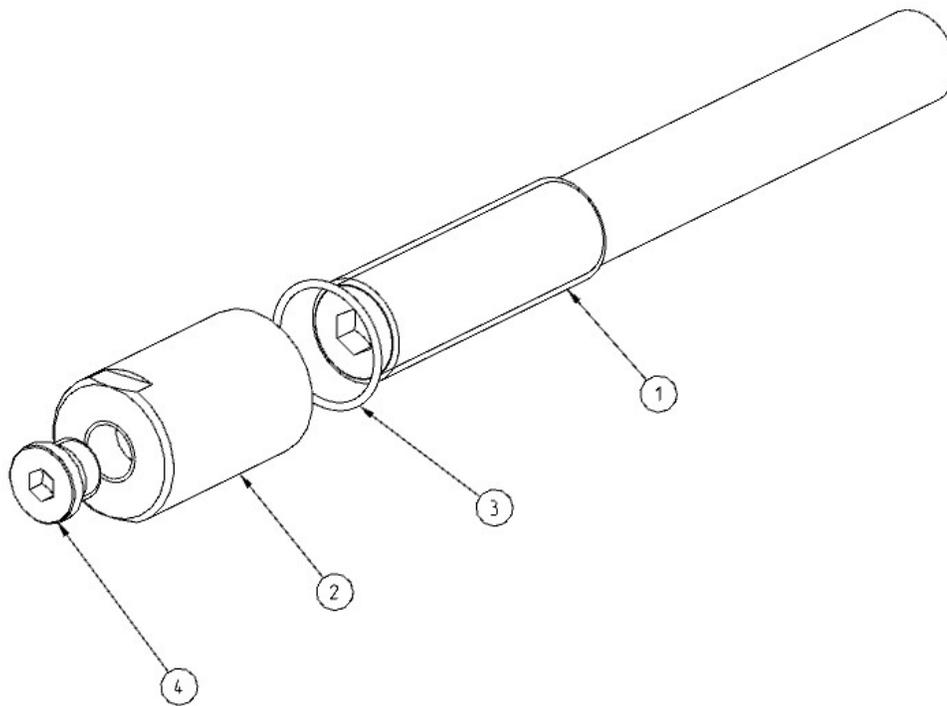


Fig. 9 – Stop protection assembly for cylinder

Stop protection assembly part list

Item	Description	Qty	Material	Spare Parts
1	Travel stop screw	1	Carbon steel	
2	Travel stop protection	1	Stainless steel	
3	O-ring	1	NBR (*)	#
4	Plug	1	Stainless steel	

(*) NBR standard material for temperature range from -20°C up to +100°C.

11 SPARE PARTS

Spare part kit for double acting actuator SC/VHS series

General references for the recommended spare parts are shown in the tables of Section 10.

Individual kit, including all the recommended spares, can be ordered directly to STI srl provided that serial number of the actuator or specific purchasing order for the original actuator is indicated in the request.

12 DECOMMISSIONING

Disposal and recycling

	Warning: Before disassembling actuator it is necessary to intercept the hydraulic connection to discharge hydraulic cylinder and control unit to the atmosphere. If present discharge also the pressure from back-up tank.
	Warning: Refer to section 5.1 and section 5.4 to lifting and storage procedure.
	Warning: If the actuator can be operated, put the actuator in fail safe position and unscrew totally the stopper screw.
	Warning: The demolition of actuator parts should be made from specialized personnel.

Before starting a large area should be created around the actuator so to allow any kind of movement without problems of further risks created by work site.

Subject	Hazardous	Recyclable	Disposal
Metals	No	Yes	Use licensed recyclers
Plastics	No	Yes	Use specialist recyclers
Rubber (seals and o-rings)	Yes	No	May require special treatment before disposal, use specialist waste disposal companies
Oil and grease	Yes	Yes	May require special treatment before disposal, use specialist waste disposal companies
Electric and Electronic equipment	Yes	Yes	Use specialist recyclers



Warning: Do not re-use parts or components which appear to be in good condition after they have been checked or replaced by qualified personnel and declared unsuitable for use.



Important: In all cases check local authority regulation before disposal.

13 DECLARATION OF INCORPORATION

 IMI STI	DICHIARAZIONE DI INCORPORAZIONE <small>(ai sensi dell'allegato II B della Direttiva Macchine 2006/42/CE)</small>	
DECLARATION OF INCORPORATION <small>(in accordance with EC Machinery Directive 2006/42/EC Annex II Section B)</small>		
<p>La Sottoscritta STI S.r.l. con sede in Via Dei Caravaggi, 15 – 24040 Levate (BG) – ITALIA dichiara, in qualità di costruttore sotto la propria responsabilità, che la quasi-macchina qui identificata:</p> <p><i>We, STI S.r.l. based in Via Dei Caravaggi, 15 – 24040 Levate (BG) – ITALY, hereby declares, as the manufacturer under its sole responsibility, that the partly completed machinery here below identified:</i></p> <p>Denominazione Generica/Generic Denomination: Quarter Turn Pneumatic Actuator Series RT</p> <p>Tipi/Types: RTC; RTCS; RTQ; RTQS; RTM; RTMS</p> <ul style="list-style-type: none"> ▪ rispetta i seguenti RES della Direttiva 2006/42/CE/complies with the following EHSRs of Directive 2006/42/EC: 1.1.1 - 1.1.2 - 1.1.3 - 1.1.5 - 1.2.1 - 1.2.2 - 1.3.1 - 1.3.2 - 1.3.4 - 1.3.7 - 1.3.8 - 1.4.1 - 1.5.1 - 1.5.2 - 1.5.3 - 1.5.4 - 1.5.5 - 1.5.6 - 1.5.7 - 1.5.13 - 1.6.1 - 1.7.1 - 1.7.2 - 1.7.3 - 1.7.4 ▪ è destinata ad essere incorporata/assemblata in un'altra macchina, quasi-macchine o apparecchi. <i>is intended to be incorporated into a completed machinery or assembled with other partly completed machinery or equipment.</i> ▪ non può essere messa in servizio prima che la macchina finale in cui sarà incorporata o con cui verrà assemblata sia stata dichiarata conforme alle disposizioni della direttiva 2006/42/CE. <i>must not be put into service until the final machinery into which it is to be incorporated has been declared in conformity with the provisions of Machinery Directive 2006/42/EC.</i> ▪ è conforme alle prescrizioni della/complies with the requirements of: <ul style="list-style-type: none"> ○ Direttiva bassa tensione (DBT) 2006/95/CE, solo per il materiale conforme installato <i>Low Voltage Directive (LVD) 2006/95/EC, only for compliant material installed</i> ○ Direttiva compatibilità elettromagnetica (EMC) 2004/108/CE per i componenti elettrici-elettronici presenti e delle disposizioni nazionali di attuazione / <i>Electromagnetic Compatibility Directive (EMC) 2004/108/CE for the electrical-electronic components present and of National requirement of implementation</i> ○ Norme UNI EN ISO 12100:2010, CEI EN 60204-1:2006/AC:2010 relativamente solo ai RES applicati <i>Harmonised standards EN ISO 12100:2010, EN 60204-1:2006/AC:2010 only referred to EHSRs applied</i> <p>La documentazione tecnica pertinente è stata compilata in conformità dell'allegato VII B: persona autorizzata alla costituzione: STI srl c/o STI srl Via Dei Caravaggi 15 – 24040 Levate (BG) Italia <i>The relevant technical documentation is compiled in accordance with the provisions of part B of Annex VII: person authorised to compile: STI srl at STI srl Via Dei Caravaggi 15 – 24040 Levate (BG) Italia.</i></p> <p>Informazioni pertinenti riguardanti la quasi-macchina saranno trasmesse, in risposta ad una motivata richiesta, alle Autorità Nazionali. <i>The relevant information concerning the partly completed machinery will be transmitted, in response to a motivated request, to the National Authorities.</i></p> <p>Il modello, il numero di matricola, l'anno di costruzione, i dati del costruttore sono riportati sulla targa fissata alla quasi-macchina. <i>The model, serial number, year of manufacture, the manufacturer's data are shown on the nameplate attached to the partly completed machinery.</i></p> <p>Levate, 11 Giugno 2015</p> <p style="text-align: right;">L'Amministratore Delegato Ernestino Bertoli</p> 		