

Quarter Turn Direct Gas Actuator RTQD Series Model RTQD-04S-160-HP INSTRUCTION MANUAL 5900









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1 GENERAL INFORMATION

1.1 General Warnings

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

1.2 Generalities

STI S.r.I. 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 RTQD actuator series, is **STI S.r.I.** as specified on the machinery label.

STI S.r.l. Via Dei Caravaggi 15 24040 Levate (BG) Italy Tel. +39 035 2928.2 Fax +39 035 2928.247 imisti.sales@imi-critical.com

1.4 **Terms and conditions**

STI S.r.I. 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.I. 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.
- IEC 61508-1/7 (Ed.2010)
- IEC 61511-1 (Ed. 2016) _
- 2006/42/EC Machinery Directive.
- 2014/68/EU Pressure Equipments Directive (PED)
- 2014/35/EU Directive for Low Voltage Equipment (LV)**
- 2014/30/EU Directive relating to the Electromagnetic Compatibility (EMC)**
- 2014/34/EU Directive concerning equipment for use in potentially explosive atmospheres (ATEX)

** Applicable only when electrical control panel is supplied integrate with the actuator

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.







DANGER POWER SUPPLY

CRUSHING HAZARD

1.7.2 Sings of obbligation





General obligation (with the possible supplementary signboard)

Must wear protective clothing.



wear

protective

footwear.



wear a helmet.

Is required to protect the eyes.



Obligation to protect your hearing.



2 DEVICE DESCRIPTION

2.1 General Description

RTQD double acting direct gas actuators, are suitable for the operation of quarter turn valves (ball valves, butterfly valves, plug valves) for ON-OFF service

The actuator is made up of a weatherproof scotch yoke mechanism transforming the linear movement of the gas operated cylinder (on closing or opening) into the rotary movement, which is necessary for valve operation.

The travel stroke of the yoke is adjustable between -4 deg / +4 deg at both ends by means of the external mechanical stops arranged into the side-wall of the mechanism body and into the end flange of the cylinder.

Scotch yoke mechanism centerbody cover is machined to provide the assembly pattern for any required accessories (i.e. positioner, signaling limit switches, position transducer, etc.) by means of proper matching units. The above mentioned accessories are operated by the actuator drive sleeve.

Actuator centerbody bottom wall is machined with threaded holes to allow actuator mounting on top of valve top-work either directly or, when required, with the interposition of an adaptor flange or a mounting bracket.

RTQD actuators are equipped with an hydraulic cylinder, mounted on the opposite side of the gas operated cylinder, to move the valve in absence of the fluid power by means of an hand pump mounted on the control cabinet.

2.2 Identification of the Main Parts

The RTQD actuator is composed by the following main parts:

- 1) Scotch yoke mechanism.
- 2) Gas cylinder.
- 3) Hydraulic cylinder for manual operation.
- 4) Stopper screw assembly.
- 5) Control cabinet
- 6) Position Indicator
- 7) Gas tanks.



Fig. 1: Main parts for RTQD actuator series



2.3 Actuator specific layout



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2.4 Actuator coding description

\	/ _ N	N	Y] .	-	C	-	ŀ	4
V	Version								
RTQD	Double acting								
			-		_				
м	Model								
01	Model 01	05	Model 05						
02	Model 02	06	Model 06						
03	Model 03	07	Model 07		-				
04	Model 04	08	Model 08						
Y	Yoke type				-				
S	Symmetric								
C	Canted				-				
6	Culindon diamatan								
60	Diameter -60 mm								
75	Diameter = 75 mm								
100	Diameter = 100 mm								
135	Diameter = 135 mm								
160	Diameter = 160 mm								
200	Diameter = 200 mm								
235	Diameter = 235 mm								
280	Diameter = 280 mm								
300	Diameter = 300 mm								
								• 	
н	Accessories								
HP	Hydraulic hand pump)							



3 TECHNICAL DATA

GENERAL DATA for RTQD Series				
Supply medium	Natural sweet gas or Nitrogen			
Operating temperature ranges	Standard : -20°C +100°C Optional : -60°C +100°C			
Operating temperature ranges	PED applications: Standard : -20°C +100°C Optional : -50°C +100°C			
Cylinder design pressures	85 or 114 bar depending on the application			
Operating pressure range	Data are available on actuator nameplate (depending on customer requirements and specifications.)			
Max operating torque (MOT)	RTQD 01 Series up to 12.000 Nm RTQD 02 Series up to 22.000 Nm RTQD 03 Series up to 40.000 Nm RTQD 04 Series up to 70.000 Nm RTQD 05 Series up to 125.000 Nm RTQD 06 Series up to 220.000 Nm RTQD 07 Series up to 350.000 Nm RTQD 08 Series up to 500.000 Nm			
Applications	On-Off			

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 GENERAL IDENTIFICATION PLATE

STI S	TI s.r.l. Via Dei Caravaggi 15 24040 LEVATE(Bg)-ITALY vw.imi-critical.com - FAX +39 035 2928247
CE	
Order	Serial. Nº
Model	Max Oper. Torque Nm
Valve Tag	Year Fluid
Pressur Range	≥
Mass	kg Degree of Protection: IP66/IP67M



5 GENERAL INFORMATION for INSTALLATION

Important



Not performing the following procedures will invalidate the product guarantee.

5.1 Transport

Warning	The lifting and handling must be made by qualified staff and in compliance with the laws
	and provisions in force.
^	Lift the actuator as shown in Figure 2 taking care that the maximum opening angle
	between the chains remains below 90°.
	The lifting points are appropriate for the lifting of the actuator alone and not for the valve +
	actuator assembly.
	Avoid that during the handling, the actuator passes above the staff.
	The actuator should be handled with appropriate lifting means considering the mass of
	actuator. The mass is printed on the label of the actuator.
	The mass is also reported on the delivery bill and on overall-dimensions drawings
	furnished with the documents accompanying the actuator.
	In case the information regarding the weight is missing consult www.stiactuation.com for
	base actuators or ask this information at info@stistrumentazione.com



Fig. 2 – Lifting points for RTQD 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 RTQD 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 RTQD 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 gas 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 gas 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

- Operating diagrams, wiring diagrams and dimensional drawing are attached to this Instruction Manual and also furnished with the documents accompanying the actuator:
- 180674TD01
- ED72741_01
- DD51712



5.6 Installation

Warning	
	 Before proceeding with any Installation the following instructions must be respected: 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.

5.6.1 Checks to be performed before installation

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

- Check that the coupling dimensions of the actuator/coupling block flange and stem meet the specified coupling dimensions.
- Prepare the necessary tools for the assembly and setting of the unit.
- Check that the outer surface of the actuator is free from dust and dirt.
- 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 either by using the actuator-housing flange with threaded holes, or by the interposition of a proper mounting hardware.

The actuator drive sleeve is generally connected to the valve stem by an insert bush or a stem extension. The assembly position of the actuator, with reference to the valve, must comply with the plant requirements (cylinder axis parallel or perpendicular to the pipeline axis).

To assemble the actuator onto the valve proceeds as follows (see Fig. 3):

- Move the valve and the actuator to their safe position (position reached in case of lack of pressure)
- If an insert bush or stem extension for the connection to the valve is supplied separately, assemble it onto the valve stem and fasten it by tightening the proper stop dowels.
- Connect a sling to the support points of the actuator and lift it: make sure the sling is suitable for the actuator weight
- Lower the actuator onto the valve in such a way that the insert bush, assembled on the valve stem, enters the actuator drive sleeve. This coupling must take place without forcing and only with the weight of the actuator.
- When the insert bush has entered the actuator drive sleeve, check the holes / pin of the valve flange meet the actuator holes and pin, otherwise rotate the mounting bracket to obtain a right assembling.



Fig.3





To guarantee the correct transmission of torque 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

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 Operating diagram





5.6.4 Gas Connections

Check that the values of gas supply available are compatible with those reported on the identification plate of the actuator.
Use pipes and connections appropriate as for type, rating, material and dimensions.
The connection should be made by qualified staff.
To identify the right gas connections in relation to the operating diagram refer to the Fig. 4 here attached.

Gas connections are foreseen on the left side on control cabinet.

Follow the instructions here below listed to do a correct connection:

- 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,
- make the connections according to the operating diagram attached to paragraph 5.6.3 of this manual,
- if necessary due to the length, fix and fasten the connection pipes so that no irregular strains at entries or loosening of threaded connections occur,
- after connection check the absence of leakages from gas connections; if necessary tighten the nuts of the pipe-fittings.

Line Break pilot connection

Gas supply connection



Fig. 4 – Gas connections



5.6.5 Electrical Connections



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.

For a correct cabling follow the instructions here below listed:

- Introduce connection cables on the junction box through the holes D=26mm foreseen on the bottom of control cabinet (see Fig. 6).
- Utilize suitable cable glands to enter in the control cabinet with at least IP65 (EN 60529) protection.
- Make the wiring in the proper terminals in the junction box in compliance with the applicable wiring diagrams available on the documentation supplied and at paragraph 5.6.6 of this manual.
- Screw properly all the cable glands.



Fig. 6 – Cable entries

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5.6.6 Wiring diagram







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5.6.7 Earting connection

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

5.6.8 Setting instructions

Actuator is shipped already set and configured with Line Break Device (see item in Fig. 7) set to trip at pressure drop rate \geq 5 bar/minute.

In case the above value need to be modified, see specific instructions attached at Appendix A.



Fig. 7 – Control Cabinet main components

Item Description

- 1 Line Break Device
- 2 Junction Box
- 3 Solenoid Valves
- 4 Gas Filter
- 5 Manual Pump



5.6.9 Line Break reset

To restore the normal operation after a Line Break intervention it is necessary a local reset following the procedure here below indicated (refer to Fig. 8):

- reset the Line Break through the hand lever (2) following the instructions in Appendix A.
- exhaust the internal Line Break pilot through the needle valve item 17;
- reset by pulling the 3/2 pneumatic pilot/hand valve item 22



Fig. 8 – Line Break Reset instructions



5.7 Disassembling

Warning	Before starting the disassembly operations it is mandatory to disconnect the gas supply and to exhaust the cylinder and any other pressure retaining component
	mounted on the actuator.
	Before removing the screws between actuator and valve or
<u> </u>	adaptor flange or mounting bracket, the actuator should be
	connected with appropriate lifting means. Lift the actuator as
	shown in Fig.9.
	The lifting points are appropriate for handling the actuator
	alone and not for the valve + actuator assembly.
	Pay attention to the danger signal present on the actuator.
	During the disassembling take care that the mounting coupling
	block is fix on the valve stem to avoid any dangerous situation.



Fig. 9 – Disassembling of the actuator



6 OPERATION AND USE

6.1 **Operation description**

The RTQD series is hydarulic actuator designed for on-off and control service and is applicable over a wide range of pressure, temperatures and environments.

The scotch yoke mechanism converts the linear motion of the cylinder piston rod into valve rotation by the actuator shaft.

Depending which chamber of cylinder is pressurized, the valve either opens or closes.

The symmetric scotch yoke mechanism generates high torque at start (0° degree) and the end (90° degree) of the valve stroke, typically valve torque figure of ball valve. The canted scotch yoke mechanism generates very high torque when valve is closed, typically valve torque figure of butterfly valve.

6.2 Intended use

The machinery covered in this Instruction Manual is single acting direct gas RTQD actuator series designed to operate a quarter turn industrial valve (ball valves, butterfly valves, plug valves,,...) for ON-OFF heavy duty service.

This RTQD actuator is produced by **STI srI** [Manufacturer] and identified by a label with a product designation code. **STI srI** 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 srI** 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 srI** 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. RTQD 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.

Warning



It is severely forbidden to use the RTQD actuators series for purpose or application other than those for which it was designed and here above specified



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.

Warning

It is severely forbidden to use the actuator under conditions other than those provided on the nameplate.

6.5 Residual Risks



- 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 natural gas is used as motive energy.



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 gas supply (filtering degree,....) are as prescribed.
- Check that the feed voltage values for the electric components (solenoid valve coils, micro-switches,....) are as prescribed.
- Check that the actuator controls work properly (remote control, local control, emergency controls, etc.)
- Check that the required remote signals (valve position, alarms,...) are correct.
- Check that the setting of the components of the actuator control unit (line break device,....) meet the plant requirements.
- Check that there are not leak in the gas connections; if necessary tighten the nuts of the pipe fittings.
- 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



It is recommended that the stroke adjustment is carried out in the workshop using low pressure air of manual hand pump to move the actuator. The use of manual hand pump is recommended for this operation. Following instructions are applicable when the actuator is already installed on the valve.

It is important that the mechanical stops of the actuator (and not those of the valve) stop the rotary stroke at both extreme valve positions (fully open and fully closed).

The setting of the open/closed valve position is performed by adjusting the setting screws foreseen into the end flanges of the gas and hydraulic cylinders (see Fig. 10).

For the adjustment of the travel stop screws in the end flanges of the gas operated and hydraulic cylinders proceed as follows (Fig.10) repeating the operation for both ends of position.

- Remove the plug (4.1) from the travel stop protection (4.3) keeping the protection (4.3) locked with a proper wrench key and unscrew the travel stop screw.
- Adjust the valve stroke by moving the actuator as indicated in the head of this section 7.2.
- Adjust the travel stop screw (4.2) until it stops against the cylinder rod termination.
- After reached the right position, tight the travel stop protection (4.3) against the cylinder end flange, having care do not damage the O-ring (4.4), keeping the stopper screw (4.2) locked.
- Screw the plug (4.1) into the travel stop protection (4.3).



Fig. 10 – Stroke adjustment



Operate the actuator with gas supply to check that the actuator moves properly and that there are no leakages.



7.3 Line Break Device

Line Break Device is factory set to trip for a pressure drop rate \geq 5 bar/minute. In case different value is requested please refer to the Appendix A.

Refer to paragraph 5.6.9 to reset the Line Break Device after an intervention.

7.4 Manual Override

Manual override to move the actuator in case of lack of gas pressure is supplied as an integral part of the actuator itself.

For the double acting actuators Series RTQD the manual override is based on hydraulic hand pump type HP and a dedicated cylinder.

Important	In relation to the correct actuator operation, the position of the valve and position of the manual override MUST be known.
	Position of the valve is provided by the local indicator described at paragraph 2.2 item 6).
	The following paragraph 7.4.1 provides the information to enable the operator to know the position of the manual override.

7.4.1 Indication of position of the manual override type HP

For this type of Manual Override a specific **Instruction Manual 2094** is available.

To engaged the manual operation the **Selector Lever** must be switched to **LOCAL** position (see Figure 11) Whit Selector Lever in LOCAL position, the **Hydraulic Distributor** must be moved to the left or right position to select to CLOSE or to OPEN. The manual override HP now is engaged, therefore the manual operation can be performed by pumping. To restore the **Automatic Function** the Selector Lever must be rotated 90° clockwise towards the position identified by the label REMOTE and the Hydraulic Distributor must be returned in central (vertical) position as displayed by the label.

If during a manual operation the actuator is automatically operated from remote or by local solenoid levers, the manual operation by hand pump is inhibited and automatic command has the priority.



Fig. 11 – HP device



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 air filter on the actuator, bleed the condense water accumulated in the cup by opening the drain cock. Disassemble the cup periodically and wash it with soap and water; disassemble the filter: if this is made up of a sintered cartridge, wash it with nitrate solvent and blow through with air. If the filter is made of cellulose, it must be replaced when clogged.
- 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 gas connections. If necessary tighten the nuts of the pipe-fittings.



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.



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.



8.2 Special maintenance

Under normal condition the actuator don't need special maintenance. If there are leaks in the gas operated 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.



Before performing any maintenance operations use always wear protective gloves, clothing, and eyewear when performing any maintenance operations.

Warning	
	 Before proceeding with any maintenance operation it is mandatory: to close the gas supply lines, to vent, through the proper vent valves, the gas storage tank and the gas reference tank, to vent the gas cylinder and control unit through the vent valve mounted into the cabinet. The gas supply lines must remain close and the vent valves must remain open during all the maintenance operations.



8.2.1 Scotch yoke Mechanism seals replacement



Fig. 12 – Scotch yoke mechanism seals replacement

To replace the cover gasket (1.8) under the cover (1.5), the position indicator (6.2) and relevant screws (6.3) and all the cover's screws (1.13, 1.14) must be removed.

Before replace cover gasket clean the housing and cover.

After removing the cover you may disassemble the bushing (1.3) and replace the O-ring (1.15, 1.16). Clean the seal groove carefully and lubricate it with protective oil or grease film.



Fig. 13 – Scotch yoke mechanism seals replacement.

Once perform these actions is possible to remove the gasket between actuator housing and cylinder (2): Remove the screw (1.16) to disengage the guide block from spring cartridge, move the scotch yoke in central position (45°) remove the screw (1.15) to disengage the 2 off half rings (1.14) from flange (1.9), remove the fixing nut (5.3) on the cylinder side, remove, remove the cylinder (2) and replace the gasket (5.2), before replace cylinder clean the surface of housing and cylinder head flange.

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At these point is possible replace the O-ring on the bottom of the scotch yoke. Remove the guide bar (1.1) extract the scotch yoke (1.7) and guide block (1.2) disassemble the bushing (1.3) and replace the O-ring (1.15, 1.16).



Fig. 14 – Scotch yoke mechanism seals replacement

To replace the gasket between actuator and stop settings screw kit, once the cover (1.5) has been removed, is necessary remove the fixing nut (5.3) on the side without cylinder, remove the screw, remove flange (3.4) and replace the gasket (5.2), before replace flange and kit stopper clean the surface of housing and flange (3.4).



8.2.2 Hydraulic cylinder seals replacement.



Fig. 15 - Gas/Hydraulic cylinder seals replacement

It is possible to completely disassemble the cylinder without disconnecting it from the actuator body in order to replace the seals.

Remove the nuts (2.8) from tie rods, remove the end flange (2.20) after that replace the o-ring (2.16) and back-up ring (2.2) from the seal groove.

Disassemble the cylinder tube (2.4) to replace the sliding guides (2.9) and piston seal (2.10) from the seal groove and the o-ring (2.16) and back-up ring (2.2) on the head flange (2.19).

Remove the nut (2.5) from the piston rod (2.17), remove the piston (2.11) and replace the O-ring (2.15) and back-up rings.

Unscrew the screws (2.22), disassemble the flange (2.7) and replace the piston rod Seal-ring (2.12).

Remove the nut (4.3) holding the travel stop (4.2) and the washer (4.1) and then, if necessary, replace the sealing washer (4.4).

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 gas/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 RTQD series label must be specified when spares are ordered.

8.4 Reassembling

8.4.1 Gas/Hydraulic cylinder re-assembling.

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 groves taking care there are not damages on seal surfaces.

Slide the spacer/cylinder tube onto the piston taking care not to damage the o-ring: the tube bevel has to smoothly compress the piston seal ring; take care also not to damage the head flange O-ring.

Assemble the end flange by centering it on the inside diameter of the tube, taking care not to damage the O-ring.

Assemble the nuts (please refer to cylinder sectional dwg.) onto the tie rods. Tighten the nuts to the recommended torque as per Table 1 in sec. 5.6.2, alternating between opposite corners.

8.4.2 Actuator re-assembling

Assemble the hydraulic cylinder to the housing tightening, with recommended torque table, the screw between cylinder and housing. Replace o-ring at the bottom of the housing making attention there are not dirty or damage on the seal surface, put the bushing on its seat. Re-assemble scotch yoke and guiding block, make a generous coating of grease on the contact surfaces of yoke and the bushings, assemble the guide bar and close the assemble the plug to close the guide bar. Tighten the screw between cylinder piston rod and guiding block, with recommended torque, using a wrench.. Assemble the o-ring, the cover gasket and the cover with all screw.

Recommended tighten torque as per Table 1 in Section 5.6.2.



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.



8.5 Mechanism Lubrication

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

8.6 Hydraulic Fluid for Manual Hand Pump

Recommended hydraulic fluids to be used on the manual hand pump of RTQD actuators are listed here below.

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

ed in standard temperature conditions 00°C)
urer: Agip at 40°C: 22 cSt at 100°C: 4,94 cSt Index: 157 nt COC: 192 °C nt: < -39 °C nsity at 15°C: 0,857 kg/l



9 TROUBLESHOOTING

Event	Possible cause	Remedy
	Lack of pressure supply	Check supply line
Actuator doesn't work	Defective main valve	Consult valve manufacturer documentation
ргорепу	Failure of the control group	Call STI s.r.l Customer Care Dept.
	Low supply pressure	Adjust supply pressure
	Incorrect speed control settings	Adjust speed controls to increase flow
Actuator too slow	Exhaust port blocked	Remove and clean the exhaust port silencers and replace
	Wear of the main valve	Consult valve manufacturer documentation
Actuator too foot	High supply pressure	Reset
Actuator too fast	Incorrect speed control settings	Adjust speed controls to decrease flow
Leakages on gas or	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 gas or hydraulic cylinder	Damage to seals	Replace cylinder seals
Incorrect position of the	Wrong adjustment of mechanical stops	Re-adjust setting
valve	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 RTQD series.



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



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



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



10.1 Scotch yoke mechanism



Scotch yoke mechanism part list

Item	Description	Qty	Material	Spare Parts
1	Guide Bar	1	Alloy steel	
2	Guide block	1	Carbon steel	
3	Scotch yoke bushing	2	Bronze	
4	Housing	1	Carbon steel	
5	Cover	1	Carbon steel	
6	Cylinder pin	4	Alloy steel	
7	Scotch yoke	1	Carbon steel	
8	Cover gasket	1	Fiber	#
9	Plate	1	Carbon steel	
10	Plate	1	Carbon steel	
11	Screw	2	Carbon steel	
12	Screw	2	Carbon steel	
13	Screw	(**)	Carbon steel	
14	Screw	10	Carbon steel	
15	Seal washer	(**)	Carbon steel+NBR	
16	O-ring	2	NBR (*)	#
17	O-ring	2	NBR (*)	#
18	Half ring	2	Alloy steel	

(*) NBR standard material for temperature range from -20°C up to +100°C. (**) Quantity depends on the model.





10.2 Double acting gas/hydraulic cylinder

Double acting gas/hydraulic cylinder part list

ltem	Description	Qty	Material	Spare Parts
1	Back-up ring	1	NBR	#
2	Back-up ring	1	NBR	#
3	Bushing	1	Steel/Bronze/PTFE	
4	Cylinder tube	1	Carbon steel	
5	Stem nut	1	Carbon steel	
6	Plug	2	Carbon steel	
7	Retaining flange	1	Carbon steel	
8	Tie rod nut	(**)	Carbon steel	
9	Sliding guide	2	PTFE	#
10	Piston seal	1	PTFE/NBR (*)	#
11	Piston	1	Carbon steel	
12	Rod seal	1 (2)	PTFE/NBR (*)	#
13	Washer	1	Carbon steel	
14	Seal washer	2	Carbon steel/NBR	
15	O-ring	1	NBR (*)	#
16	O-ring	1	NBR (*)	#
17	Stem	1	Alloy steel	
18	Drain plug	2	Carbon steel	
19	Head flange	1	Carbon steel	
20	End flange	1	Carbon steel	
21	Tie rod	(**)	Carbon steel	
22	Screw	4	Carbon steel	
23	Stopper assembly	1	Carbon steel/Stainless steel	

(*) NBR standard material for temperature range from -20°C up to +100°C. (**) Quantity depends on the model.



10.3 Stop protection assembly for cylinders



Stop protection assembly part list

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

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



10.4 Control cabinet



STI S.r.I. – Via Dei Caravaggi 15, 24040 Levate (BG) – ITALY www.imi-critical.com



POS. 1 2			STI srt Levate (8	9b) TEL 035/29282 www.stiactuation.com			
1 2	Ο Τλ	DESCRIZIONE	DIMENSIONI	MATERIALE	CODICE	N * DISEGNO	DICAMBIO
1 2	Sec.1.8	DESCRIZIONE	DIALNOTONI	DATERIALE	CODICE	IN DISECTION	RICARDIU
2	1	FORATURA CASSA ILINOX 1000x1000x450	-	ASTM A240/A240M TP316L	-	FD50501	
	1	FORATURA PLASTRA INTERNA ILINOX	-	ASTM A240/A240M TP316L	155127	FD50500	
3	8	KIT PASSAPARETE 1/2" NPT-F 1/2" NPT-F (DIELETTRICO)	-	VEDI TABELLA	154914	ZD46578_1	
4	7		1/2" NPT - AUX2807 (1.3000	1315 1214	27253	-	
-	1 i i		INE THE F - MOREDON CELEBOOD		15/012	4054925	H
2	1	Constant Charles Control of Contr		TEOT TABELLA	04713	AD21022	├──── ┥
6	10	Swagelok ELDOW FITTING SS-12M0-2-8	Pipe 1/2"NPT-Tube @12mm	A151 316	48195	-	
7	2	SwageLok straight adapter SS-16-MTA-1-8	Tube @16mm - Pipe 1/2" NPT	AISI 316	113373	-	
8	1	PIASTRA DI RINFORZO FONDO CASSA PER GRUPPO HP	-	ASTH A240/A240M TP316	155598	FD52095	
9	3	DISTANZIALE DI17 Dek0 H52		ASTN A276/A276M TP316	155208	ED51979	
10	1	COMANDO MANUALE NO DNO DE DEEVALENZA DENOTA (ASSIENE)		VEDI TABELLA	153070	AD51792	
10		CUMANDU MANUALE HP UNIS DE PREVALENZA REMUTA (ASSIEME)	-	VEUT TABELLA	100979	AU51/62	└──── ┤
11	2	Swagelok elbow fitting SS-16M0-2-12	Tube Ø16mm - 3/4" male NPT	AISI 316	104272	-	
12	3	ROSETTA CON CAVA OR Di17 De65 Sp.5	-	ASTM A240/A240M TP316	155209	FD51980	
10	2	0_DING 2225	Di 54 82 c2 42	NDD 20 CHUDE	30174		
13			01 30,02 12,02	NDK 70 SHUKE	39174	-	
14	3	Seal washer U16.70-24.00-1.50 (M16)	Di=16,7 - De=24 - Sp=1,5	SS316 + NBR	154944	-	
15	3	VITE TE	M16x85 UNI 5739	A4-70	142370	-	
16	1	FILTRO SEPARATORE DI CONDENSA PN105 CONNESSIONI FILETTATE		VEDI TABFILA	154912	AD51829	
~	- ÷		_	VEDI TADELLA	455.044	3054000	<u> </u>
1/		KIT STAFFA SUPPUKTU FILIKU GAS STI	-	YEUT TABELLA	155211	2051909	<u> </u>
18	1	FILTRO DISIDRAT. / SEPAR. DI CONDENSA PN105 CONNESSIONI FILETTATE	-	VED I TABELLA	154162	AD51805	
19	5	RUBINETTO A SPILLO - INDRA	MOD 015-BB-DLN-T	AISI 316	145893		
20	1 i	MANOMETOD 0.63 - 1/4" NPT	W1KA 232 50 063 0x000Bar	AISI 316	154.723		
20		HANDELIKO DOS - 1/4 MPT	WINA 232.50.003 0400bar	AISI SID	134723	-	└──── ┤
21	4	LUNNELTUR	Ue 50 x 50	AI51 516	108157	FU35185	L
22	3	VALVOLA DI NON RITORNO INOXRIVA 1/2"	VRU/PG-1123-N-A3	AISI 316	127411	-	
23	1	RUBINETTO A SFERA 3/2 - INOXRIVA	VSL-N12-XX-00	AISI 316	154527	-	
24	3	EXHAUST PIPE (INSTANCE ED20727 53)	1/2" x 53	AISI 316	125953	ED 20727	
25	-	KIT DASCADADETE 1/2" NOT E 1/2" NOT E		VEDI TABELLA	10/ 300	70/4570	
40	2	NTE PASSAPARETE 1/2 NPT-P 1/2" NPT-P	-	VEUT TABELLA	124308	2040578	L
26	1	NIPPLU INOXRIVA	1/2" NPT x 1" NPT - AUX2819	AISI 316L	64220	-	
27	1	VALVOLA DI SICUREZZA NGI	E10-LS 1/2"	AISI 316	154295	-	
28	1	PROLUNGA INDICEIVA	1/2" NPT - AUX3104 S 3000	1815 121A	99224	-	
20	1	Susseal of Staniabit Eithing SS_4280_4 P	Dine 1/2*NDT Tube 442a-	AISI 244	19101		├─── ┤
69	· •	swagnok sinaigni rinning 35-12MU-1-8	Pipe 1/2 NP1-Tube @12mm	A151 516	40194	-	↓
30	1	CASSETTA DI DERIVAZIONE ROSE	35.30.20.12	AISI 316L	145289	-	
31	4	VITE TE	M8x20 UNI 5739	A4-70	52391	-	
32	4	GUARNIZIONE RCN	6125NY	NYLÓN PA6	109774		
32	<u> </u>	DADO DON	1 107 00		441.005		├──── ┤
33	4	DADO KUN	L 125 UN	UTTONE NICHELATO	114005		
36	2	PRESSACAVO RCN	KIT RN 25-125-EP-ON-1P66/68	OTTONE NICHELATO	153699	-	
35	13	GUARNIZIONE RCN	6120NY	NYLON PA6	109167	-	
36	0	DADO PCN	1 120 04	OTTONE NICHELATO	110844		I
30	0		L 120 UN	OTTONE NICHELATO	110040		├ ───┤
51	6	MALE MLOG REN MOD. T-120-ON	H20x1,5	UTTUNE NICHELATO	109490	•	
38	2	PRESSACAVO RCN	AD-20-10.5-15-120-EP-ON-IP66/68	OTTONE NICHELATO	114008	-	
39	5	PRESSACAVO RCN	RN 16-7-120-EP-ON-IP66/68	OTTONE NICHELATO	135565	-	
40	1	DISTANZIALE DA TIRO	Da 12 So 4 L 20	ASTN 4260/4260H T026/	12/50/	ED/5/7E 4	I
4U	•	UNITED OF LUE DESIL	De.12 Sp.1 L.20	A310 A209/A209M 1P316	12 1304	rU400/5_1	<u> </u>
41	1	MANIFOLD PER LINE BREAK DR.BREIT	-	EN AW-6082 T6 EN755-2	154916	FD51502	
42	4	VITE TCEI	M6x70 UNI 5931	A4-70	56042	-	
43	1	VALVOLA DI LINE BREAK DR.BREIT	207003014	ALLUMINIO	153336		
11	Ē	SULENZIATORE 1/4" NOT (ASSIENE)		VEDI TABELLA	126.808	4044330	
	-	STEERETHINKE I/A INFT (ASSIETE)	-	VEDT TABELLA	120808	AU+0337	
45	4	SwageLok Stright Fitting SS-8M0-1-4	Tube Ø8mm - Pipe 1/4" NPT	AISI 316	47758	-	
46	11	SwageLok Elbow Fitting SS-8M0-2-4	Tube Ø8mm - Pipe 1/4" NPT	AISI 316	47731	-	
47	1	SwageLok elbow fifting SS-8M0-2-8	Tube (8mm - Pipe 1/2"NPT	AISI 316	65725	-	
68	4	Swagelok Straight Fitting CC.8N0.4.8	Tube (8mm - Dine 4/21407	4151 246	45450	-	
	-	Tables	AND NOT ADVOIDED PARTY	101 310	0.030		├──── ┤
49	3	TAPPU	1/4" NPT AUX2352 PN350	A151 316	62140	•	
50	1	INOXRIVA GOMITO 1/4" NPT	AUX1602 5.3000	AISI 316L	100463	-	
51	3	NIPPLO_INOXRIVA	1/4" NPT - AUX2803 CL.3000	AISI 316L	37320	-	
50	1		1011 02 440 11 0 4 4 417	4101 344	400007		<u> </u>
52		VALVOLA DI NON KITOKNO - INGARIYA	4K07Fg=110-H=011 174	AISESIO	122274	-	└──── ┤
53	1	KIT SUPPORTO MICRO STAHL 8060	-	VEDT TABELLA	165212	ZD51985	
54	1	MICROINTERRUTTORE - STAHL	8060/2-2-WH-60	PLASTICA	153723	-	
55	2	LAMPADA - STAHL	8013/311-AL	PLASTICA	153724		
54	2	VIT SUDDODTO ELETTROVALVOLA DOTEV 20152		VEDI TARELLA	455.247	7051097	
50					453300	2051907	←
57	4	ELETTRUVALVULA 372NL - RUTEX 30	152-0.0-28-M4-24 VUL-0/NS-01+010	DE ALLUHINIU	153322	-	└──── ┤
58	3	INOXRIVA GOMITO 1/4" NPT	RMX1102N	AISI 316	37319	-	
59	1	Swagelok Tee SS-8M0-3-4TTM	Tube @8mm - Pipe 1/4"NPT	AISI 316	48185	-	
60	1	VALVOLA 3/2 PILOT, PNEUM, - RIT, MANUALE ROTEX	GDAF9280-6.7-28-52	ALLUMINIÓ+INÓX	153444		
64		VALVALA 2/2 DILAT, DALLA DIT MALLA DICAD	EDIS AND ADD AD AD	AICI 3441	153604	-	I
01		THETHER ATE FILMI, FRENT, * KIT, RULLA BIPULU	FF 15/11/06/22/5/6	ATST STOL	03071		<u> </u>
62	1	TAPPU	3/8" NPT AUX2353 PN350	AISI 316	89219	-	
63	3	ROSETTA ELASTICA SPACCATA	Øi8 UNI 1751-A	A4-70	50349	-	
64	3	VITE TCEI	M8x55 UNI 5931	A4-70	56058		
65	2		1/8" NPT y 1/2" NPT 10/2000	AICI 3441	17000	-	
00	4	NUT W INVALITA	00 mm x 1/4 mm - AUX2802	A151 310L	11.4.40		
**		VALVOLA CELETTRICE DI MACCINI, DOFOCIONE		10001 010001	10000	-	
66	2	VALVOLA SELETTRICE DI MASSIMA PRESSIONE	-	VEDI TABELLA	154147	AD51741	
66 67	2	VALVOLA SELETTRICE DI MASSIMA PRESSIONE RIDUZIONE INOXRIVA	1/2"x1/4"NPT AUX2010 CL.6000	VEDI TABELLA AISI 316L	154147 28304	AD51741	
66 67 68	2 3 2	VALVOLA SELETTRICE DI MASSIMA PRESSIONE RIDUZIONE INOXRIVA NIPPLO N°2X1/4°NPT-H + N°1x1/4°NPT-F + N°1x1/8°NPT-F	1/2"x1/4"NPT AUX2010 CL.6000	VEDI TABELLA AISI 316L ASTM A276/A276M TP316	154147 28304 117340	AD51741	
66 67 68 69	2 3 2 2 2	VALVOLA SELETTRICE DI MASSIMA PRESSIONE RIDUZIONE INOXRIVA NIPPLO N'2x1/4"NPT-H + N'tx1/4"NPT-F + N'tx1/8"NPT-F VALVIDIA 3/2 PILOT_PNRIM - DIT MOLIA DOTEV	1/2"x1/4"NPT AUX2010 CL.6000	VEDI TABELLA AISI 316L ASTN A276/A276M TP316 ALLIMINIO-IMOV	154147 28304 117340 753335	AD51741 FD42821	
66 67 68 69	2 3 2 2	VALVOLA SELETTRICE DI MASSIMA PRESSIONE RIDUZIONE INOXRIVA NIPPLO N'ZXIA'NPT-M + N*tx1/4'NPT-F + N*tx1/8'NPT-F VALVOLA 3/2 PLIOT, PNEUM - RIT, MOLLA ROTEX	1/2"x1/4"NPT AUX2010 CL.6000 GDAF9210-6.7-2R-S2	VEDI TABELLA AISI 316L ASTH A276/A276M TP316 ALLUMINO+INOX	154147 28304 117340 153335	AD51741 - FD42821 -	
66 67 68 69 70	2 3 2 2 3	VALVOLA SELETTRICE DI MASSIMA PRESSIONE RIDUZIONE INVORTIVA NIPPEO N'2X124'NPT-H + N'1x124'NPT-F + N'1x128'NPT-F VALVOLA 3/2 PILOT. PNEUM RIT. MOLLA ROTEX Swagelok Straight filting SS-8-MO-1-2	1/2*x1/4*NPT AUX2010 CL.6000 GDAF9210-6.7-2R-S2 Tube @Bmm - Pipe 1/8* NPT	VEDI TABELLA AISI 316L ASTH A276/A276M TP316 ALLUMINIO+INOX AISI 316	154147 28304 117340 153335 47757	- AD51741 	
66 67 68 69 70 71	2 3 2 2 3 2	VALVOLA SELETTRICE DI MASSIMA PRESSIONE RIDUZIONE INOXRIVA. NIPPLO N°2XI/4"NPT-M + N°txl/4"NPT-F + N°txl/8"NPT-F VALVOLA 3/2 PILOT. PREUM RIT. HOLLA ROTEX SwageLok Straight filting SS-8-MO-1-2 TAPPO	1/2"x1/4"NPT AUX2010 CL.6000 	VEDI TABELLA AISI 316L ASTH A276/A276M TP316 ALLUMINIO-INOX AISI 316 AISI 316	154147 28304 117340 153335 47757 67748	AD51741 	
66 67 68 69 70 71 72	2 3 2 3 2 1	VALVOLA SELETTRICE DI MASSIMA PRESSIONE RIDUZIONE INDRIVA NIPPLO N'2X124'NPT-H + N'1x124'NPT-F + N'1x128'NPT-F VALVOLA 3/2 PILOT. PNEUM RIT. HOLLA ROTEX Swagelok Straight filting SS-8-MO-1-2 TAPPO Swagelok elbow filting SS-12H0-2-6	1/2"x1/4"NPT AUX2010 CL.6000 G0AF9210-6.7-2R-S2 Tube 08mm - Pipe 1/8" NPT 1/8" NPT AUX2351 PN350 Tube 012 - Pipe 3/8" NPT	VED I TABELIA AISI 316L ASTH AZ76/A276H TP316 ALLUMINIO-INOX AISI 316 AISI 316 AISI 316	154147 28304 117340 153335 47757 67748 152099	AD51741 	
66 67 68 69 70 71 72 73	2 3 2 3 2 1 1	VALV0LA SELETTRICE DI MASSIMA PRESSIONE RIDUZIONE INDRIVA NIPPLO N*2x1/4*MPT-M + N*tx1/4*MPT-F + N*tx1/8*MPT-F VALV0LA 3/2 PILOT. PREUM RIT. MULLA ROTEX Swagetok Straight fitting SS-8-M0-1-2 TAPPO Swagetok elbow fitting SS-12M0-2-6 Swagetok elbow fitting SS-12M0-1-6	1/2*x1/4*NPT AUX2010 CL.6000 GDAF920-6.7-2R-S2 Tube 48mm - Pipe 1/8* NPT 1/8* NPT AUX2351 PN350 Tube 4912 - Pipe 3/8* NPT Tube 4912 - Pipe 3/8* NPT Tube 4912 - Pipe 3/8* NPT	VED 1 TABELLA AISTI 316L ASTN A276/A276M TP316 ALLUMINIO-INOX AIST 316 AIST 316 AIST 316 AIST 316	154147 28304 117340 153335 47757 67748 152099 154915	AD51741 	
66 67 68 69 70 71 72 73 74	2 3 2 3 2 1 1	VALVOLA SELETTRICE DI MASSIMA PRESSIONE RIDUZIONE INDORIVA NIPPEO N'2x124'NPT-H + N'1x124'NPT-F + N'1x128'NPT-F VALVOLA 3/2 PILOT. PNEUM RIT. MOLLA ROTEX Swagetok Straight filting SS-8-M0-1-2 TAPPO Swagetok Straight filting SS-12M0-2-6 Swagetok Straight filting SS-12M0-1-6 Swagetok Straight filting SS-12M0-2-9	1/2*x1/4*NPT AUX2010 CL.6000 GDAF9210-6.7-2R-52 Tube 08mm - Pipe 1/8* NPT 1/8* NPT AUX2351 PN350 Tube 012 - Pipe 3/8* NPT Tube 012 - Pipe 3/8* NPT Tube 012 - Pipe 3/8* NPT	VEDI TABELLA AISI 316L ASTH AZGA/AZ76M TP316 ALLUMINIO-INOX AISI 316 AISI 316 AISI 316 AISI 316 AISI 316 AISI 316 AISI 316	154147 28304 117340 153335 47757 67748 152099 154915 49732	A051741 	
56 57 58 59 70 71 72 73 74	2 3 2 3 2 1 1 2	VALV0LA SELETTRICE DI MASSIMA PRESSIONE RIDUZIONE INDORIVA NIPPLO N*2x1/4*NPT-M + N*tx1/4*NPT-F + N*tx1/8*NPT-F VALV0LA 3/2 PILOT. PREUM RIT. MOLLA ROTEX Swagetok Straight filting SS-8-M0-1-2 TAPPO Swagetok istraight filting SS-12M0-2-6 Swagetok istraight filting SS-8M0-2-2 Swagetok istraight filting SS-8M0-2-2 Swagetok istraight filting SS-8M0-2-2	1/2*x1/4*NPT AUX2010 CL.6000 60 AF9210-6.7-2R-52 Tube @Rmm - Pipe 1/8* NPT 1/8* NPT AUX2351 PM350 Tube @12 - Pipe 3/8* NPT Tube @12 - Pipe 3/8* NPT Tube @3 - Pipe 1/8* NPT Tube @3 - Pipe 1/8* NPT	VEDI TABELLA AISI 316L ASTH A276/A276H TP316 ALLURINIO-INIX AISI 316 AISI 316 AISI 316 AISI 316 AISI 316 AISI 316 AISI 316	154147 28304 117340 153335 47757 67748 152099 154915 47733 47733	A051741	
56 57 58 59 70 71 72 73 74 75	2 3 2 3 2 1 1 2 1 1 2 1	VALVOLA SELETTRICE DI MASSIMA PRESSIONE RIDUZIONE INDORIVA NIPPEO N°2x124°NPT-H + N°1x124°NPT-F + N°1x128°NPT-F VALVOLA 3/2 PILOT. PNEUM RIT. MOLLA ROTEX Swagetok Siraight filting SS-8-M0-1-2 Swagetok Siraight filting SS-12M0-2-6 Swagetok siraight filting SS-12M0-1-6 Swagetok elbow filting SS-12M0-1-6 Swagetok elbow filting SS-12M0-2-2 BOLCHETTO	1/2*x1/4*NPT AUX2010 CL.6000 50.AF9210-6,7-2R-52 Tube @6mm - Pipe 1/6* NPT 1/8* NPT AUX2351 PN350 Tube @2 - Pipe 3/6* NPT Tube @2 - Pipe 3/6* NPT Tube @2 - Pipe 1/6* NPT De 50 x 70 x	VEDI TABELLA AISI 316L ASTM A276/A276M TP336 ALLUMINIO-INOX AISI 316 AISI 316 AISI 316 AISI 316 AISI 316 AISI 316 SCINIKO 17.72-2 (TP316) EN 10088-	154147 28304 117340 153335 47757 67748 152099 154915 47733 1 56063	A051741 	
56 57 58 59 70 71 72 73 74 75 76	2 2 2 3 2 1 1 2 1 2 1 4	VALV0LA SELETTRICE DI MASSIMA PRESSIONE RIDUZIONE INDORIVA NIPPLO N'2x1/4"NPT-M + N*krL/4"NPT-F + N*krL/8"NPT-F VALV0LA 3/2 PILOT. PREUM RIT. MOLLA ROTEX Swagetok Straight filting SS-8-M0-1-2 TAPPO Swagetok istraight filting SS-12M0-2-6 Swagetok elbow filting SS-12M0-2-6 Swagetok istraight filting SS-8M0-2-2 BLOCCHETTO Swagetok istraight filting SS-12M0-1-4	1/2*x1/4*NPT AUX2010 CL.6000 6DAF9210-6.7-2R-52 Tube @Rmm - Pipe 1/8* NPT 1/8* NPT AUX2351 PN350 Tube @t2 - Pipe 3/8* NPT Tube @t2 - Pipe 1/4* NPT	VEDI TABELLA AISI 3161. ASTH A276/A276H TP316 ALLUMINIO-INDX AISI 316 AISI 316 AISI 316 AISI 316 AISI 316 AISI 316 SCMINO 17-12-2 (TP316) EN 10088- AISI 316	154147 28304 117340 153335 47757 67748 152099 154915 47733 1 56063 51812	A051741 	
56 57 58 59 70 71 72 73 74 75 76 77	2 3 2 3 2 1 1 2 1 2 1 4 1	VALVOLA SELETTRICE DI MASSIMA PRESSIONE RIDUZIONE INDORIVA NIPPEO N°2x1/4/NPT-H + N°1x1/4/NPT-F + N°1x1/8/NPT-F VALVOLA 3/2 PILOT. PNEUM RIT. HOLLA ROTEX Swagetok Straight filting SS-8-M0-1-2 Swagetok sibraight filting SS-12H0-2-6 Swagetok sibraight filting SS-12H0-2-6 Swagetok sibraight filting SS-12H0-1-6 Swagetok sibraight filting SS-12H0-1-4 MANDETERD DG = 1/4/ NPT	1/2*x1/4*NPT AUX2010 CL.6000 50.AF9210-6,7-2R-52 Tube @6mm - Pipe 1/6* NPT 1/8* NPT AUX2351 PN350 Tube @2 - Pipe 3/6* NPT Tube @2 - Pipe 3/6* NPT Tube @2 - Pipe 3/6* NPT Tube @2 - Pipe 1/6* NPT 0 = 50 x 70 W IKA 233.50.63	VEDI TABELLA AISI 316L ASTM A276/A276M TP336 ALLUMINIO-INOX AISI 316 AISI 316 AISI 316 AISI 316 AISI 316 SCINIKO 17-12-2 (TP316) EN 10088- AISI 316 AISI 316	154147 28304 117340 153335 47757 67748 152099 154915 47733 1 56063 51812 153629	A051741 	
56 57 58 59 70 71 72 73 74 75 76 77 78	2 3 2 3 2 1 1 2 1 4 1 1	VALVOLA SELETTRICE DI MASSIMA PRESSIONE RIDUZIONE INDORIVA NIPPLO N'2x1/4"NPT-H + N*kr1/4"NPT-F + N*kr1/8"NPT-F VALVOLA 3/2 PILOT. PREUM RIT. MOLLA ROTEX Swagetok Straight fitting SS-8-M0-1-2 TAPPO Swagetok Straight fitting SS-12N0-2-6 Swagetok elbow fitting SS-12N0-1-6 Swagetok istraight fitting SS-12N0-1-7 BLOCCHETTO Swagetok istraight fitting SS-12N0-1-4 MANDETRD 0-3 - 1/4" NPT PACCORDO T 1/2" NPT	1/2*x1/4*NPT AUX2010 CL.6000 GD.AF9210-6.7-2R-52 Tube @mm - Pipe 1/8* NPT 1/8* NPT AUX2351 PN350 Tube @12 - Pipe 3/8* NPT Tube @2 - Pipe 1/4*NPT W IKA 233.50.63 AUX350.45 - 3000	VEDI TABELLA AISI 316L ASTH A276/A276H TP316 ALLUMINIO-INDX AISI 316 AISI 316	154147 28304 117340 153335 47757 67748 152099 154915 47733 1 56063 51812 153629 154929	A051741 	
66 67 68 69 70 71 72 73 74 75 76 77 78 78	2 3 2 3 2 1 1 2 1 1 2 1 4 1 1	VALVOLA SELETTRICE DI MASSIMA PRESSIONE RIDUZIONE INDORIVA NIPPEO N°2x1/4/NPT-H + N°1x1/4/NPT-F + N°1x1/8/NPT-F VALVOLA 3/2 PILOT. PNEUM RIT. HOLLA ROTEX Swagetok Straight filting SS-8-M0-1-2 TAPPO Swagetok elbow filting SS-12H0-2-6 Swagetok elbow filting SS-12H0-2-6 RUCCHETTO Swagetok straight filting SS-12H0-1-6 MANDETERD Do 3 - 1/4' NPT RACCERDO T 1/2' NPT	1/2*x1/4*NPT AUX2010 CL.6000 50.AF9210-6,7-2R-52 Tube @6mm - Pipe 1/6* NPT 1/8* NPT AUX2351 PN350 Tube @2 - Pipe 3/6* NPT Tube @2 - Pipe 3/6* NPT Tube @2 - Pipe 1/6* NPT 0 = 50 x 70 Tube @12mm - Pipe 1/4*NPT W IKA 233.50.63 AUX3504 5.3000 De 55 2 - 1 = 0	VEDI TABELLA AISI 316L ASTM A276/A276M TP336 ALLMINIKO-INOX AISI 316 AISI 316 AISI 316 AISI 316 AISI 316 SCINIKO 17-12-2 (TP316) EN 10088- AISI 316 AISI 316 AISI 316 AISI 316 AISI 316 AISI 316	154147 28304 117340 653335 47757 67748 152099 154915 47733 1 56063 51612 153629 153629 153629	A051741 	
66 67 68 69 70 71 72 73 74 75 76 77 78 79	2 3 2 3 2 1 1 2 1 1 2 1 4 1 1 4 1 1 4	VALV0LA SELETTRICE DI MASSIMA PRESSIONE RIDUZIONE INDORIVA NIPPLO N'2x1/4"NPT-H + N*krL/4"NPT-F + N*krL/8"NPT-F VALV0LA 3/2 PILOT. PREUM RIT. MULLA ROTEX Swagetok Straight filting SS-6400-1-2 TAPPO Swagetok istraight filting SS-12N0-2-6 Swagetok istraight filting SS-12N0-1-6 Swagetok istraight filting SS-6400-1-2 BLOCCHETTO Swagetok istraight filting SS-12N0-1-4 MANDERRD 0.3 - 1/4" NPT RACCORDO T: L/2" NPT DISTANZIALE DA TUBO	1/2*x1/4*NPT AUX2010 CL.6000 GD.AF9210-6.7-2R-52 Tube @Rmm - Pipe 1/8* NPT 1/8* NPT AUX2315 PM500 Tube #12 - Pipe 3/8* NPT Tube #12 - Pipe 3/8* NPT Tube #12 - Pipe 1/8* NPT Ube #12 - Pipe 1/8* NPT Ube #12 - Pipe 1/8* NPT Ube #12 - Pipe 1/8* NPT W IKA 233.50.63 AUX304 5.3000 De.12 Sp.1 L.50	VEDI TABELLA AISI 316L ASTH A276/A276H TP336 ALLUMINIO-INIX AISI 316 AISI 316L	154447 28304 117340 53335 47757 67748 52099 54915 47733 1 56063 51812 153029 125946	A051741 	
666 57 58 59 70 71 71 72 73 72 73 74 75 76 77 77 78 80	2 3 2 3 2 1 1 2 1 1 4 1 1 4 1 1 4 1	VALVOLA SELETTRICE DI MASSIMA PRESSIONE RIDUZIONE INDORIVA NIPPEO N'2xt/4'NPT-H + N'1xt/4'NPT-F + N'1xt/8'NPT-F VALVOLA 3/2 PILOT. PNEUM RIT. MOLLA ROTEX Swagetok Straight filting SS-8-M0-1-2 TAPPO Swagetok straight filting SS-12M0-2-6 Swagetok straight filting SS-12M0-1-6 Swagetok straight filting SS-12M0-1-7 BOCCHETTO COMESSIONI N'4x1/4'NPT-F	1/2*x1/4*NPT AUX2010 CL.6000 GDAF9210-6,7-2R-52 Tube @8mm - Pipe 1/6* NPT 1/8* NPT AUX2351 PN350 Tube @2 - Pipe 3/6* NPT Tube @2 - Pipe 3/6* NPT Tube @2 - Pipe 1/6* NPT Tube @2 - Pipe 1/6* NPT 0 = 50 x 70 Tube @12mm - Pipe 1/4*NPT W IKA 233.50.63 AUX3504 5.3000 De.12 Sp.1 L.50	VEDI TABELLA AISI 316L ASTM A276/A276M TP336 ALLMINIKO-INOX AISI 316 AISI 316 AISI 316 AISI 316 AISI 316 SCINIKO 17-12-2 (TP316) EN 10088- AISI 316 AISI 4269/A269M TP316	154147 28304 117340 153335 47757 67748 152099 154915 47733 1 56063 51802 153629 154979 129946 146201	A051741 - F042821 - - - - - - - - - - - - -	
666 57 58 59 70 70 71 72 73 74 75 76 77 78 79 79 70 70 71 72 73 74 75 76 77 77 78 79 79 70 70 70 71 72 73 74 75 76 77 77 76 77 77 77 78 77 77 77 77 77 77	2 3 2 3 2 1 1 1 2 1 4 1 1 4 1 1 4 4	VALVOLA SELETTRICE DI MASSIMA PRESSIONE RIDUZIONE INDORIVA NIPPLO N'2x1/4"NPT-H + N*k1/4"NPT-F + N*k1/8"NPT-F VALVOLA 3/2 PILOT. PREUM RIT. MOLLA ROTEX Swagetok sitrajaht filting SS-8-M0-1-2 TAPPD Swagetok istrajaht filting SS-12M0-2-6 Swagetok istrajaht filting SS-12M0-2-6 Swagetok istrajaht filting SS-12M0-1-6 Swagetok istrajaht filting SS-12M0-1-6 Swagetok istrajaht filting SS-12M0-1-4 MAXORETRO 0.3 - 1/4" NPT RACCORDO T. 1/2" NPT DISTANZIALE D.A TUBO BLOCCHETTO COMPESSIONI N*4x1/4"NPT-F VITE TCEI	1/2*x1/4*NPT AUX2010 CL.6000 GD.AF9210-6.7-2R-52 Tube @Rmm - Pipe 1/8* NPT 1/8* NPT AUX2315 PN050 Tube 0f2 - Pipe 3/8* NPT Tube 0f2 - Pipe 3/8* NPT Tube 0f2 - Pipe 1/8* NPT Use 0f2 - Pipe 1/8* NPT Use 0f2 - Pipe 1/8* NPT Use 0f2 - Pipe 1/8* NPT W IKA 223.50.63 AUX504 5.3000 D.e.f2 Sp.1 L.50 N5x90 UNI 5931	VEDI TABELLA AISI 316L ASTH A276/A276H TP336 ALLUMINIO-INOX AISI 316 AISI 3	154447 28304 117340 153335 47757 67748 152099 154915 47733 1 56063 51612 153629 129946 129946 146201 107677	A057741 	
666 57 58 59 70 71 72 73 74 75 76 77 78 79 79 30 31 32	2 3 2 3 2 1 1 2 1 1 2 1 4 1 4 1 4 1 4 1	VALVOLA SELETTRICE DI MASSIMA PRESSIONE RIDUZIONE INDORIVA NIPPEO N'2xt/4'NPT-H + N'1xt/4'NPT-F + N'1xt/8'NPT-F VALVOLA 3/2 PILOT. PNEUM RIT. MOLLA ROTEX Swagetok Straight filting SS-8'NO-1-2 TAPPO Swagetok straight filting SS-12M0-2-6 Swagetok straight filting SS-12M0-2-6 Swagetok straight filting SS-12M0-2-6 Swagetok straight filting SS-12M0-2-6 Swagetok straight filting SS-12M0-1-6 Swagetok straight filting SS-12M0-1-7 VITE TO COMESSIONI N'4x1/4'NPT-F	1/2*x1/4*NPT AUX2010 C1.6000 G0.AF9210-6,7-2R-52 Tube @8mm - Pipe 1/6* NPT 1/8* NPT AUX2351 PN350 Tube @2 - Pipe 3/8* NPT Tube @2 - Pipe 3/8* NPT Tube @2 - Pipe 1/8* NPT Tube @2 - Pipe 1/4*NPT W IKA 233.50.63 AUX3504 5.3000 De.12 Sp.1 L.50 M5x90 UNI 5931 mod.660 1/4* NPT	VEDI TABELLA AISI 316L ASTH A276/A276M TP336 ALLMINIKO-INOX AISI 316 AISI 316 AISI 316 AISI 316 AISI 316 SCINIKO 17-12-2 (TP316) EN 10088- AISI 316 AISI 316 AISI 316 AISI 316 AISI 316 AISI 316 AISI 316 AISI 316 AISI 4260/A276M TP316 A4-70 AISI 316	154147 28304 117340 153335 47757 67748 152099 154915 47733 1 56063 51812 153629 153629 153629 154979 127946 146201 146201 107677 28998	A057741 - F042821	
66 57 58 59 70 71 72 73 74 75 76 77 78 79 930 931 932 933 933 933 934 935 935 937 937 937 937 937 937 937 937	2 3 2 2 3 2 1 1 2 1 1 4 1 4 1 4 1 4 1 4 1 4	VALVOLA SELETTRICE DI MASSIMA PRESSIONE VALVOLA SELETTRICE DI MASSIMA PRESSIONE RIDUZIONE INDORIVA NIPPLO N'2x1/4"NPT-H + N"x1/4"NPT-F + N"1x1/8"NPT-F VALVOLA 3/2 PILOT. PREUM RIT. MOLLA ROTEX Swagetok Straight filling SS-8400-1-2 TAPPD Swagetok istraight filling SS-12M0-2-6 Swagetok istraight filling SS-12M0-1-6 Swagetok istraight filling SS-12M0-1-6 Swagetok istraight filling SS-12M0-1-6 Swagetok istraight filling SS-12M0-1-4 MAXCORDO T. L/2" NPT RACCORDO T. L/2" NPT DISTANZIALE D.A TUBO BLOCCHETTO COMRESSIONI N"4x1/4"NPT-F VITE TCEL RUBINETTO A SFERA - IVR RUCCHETTO	1/2*x1/4*NPT AUX2010 CL.6000 GD.AF9210-6.7-2R-52 Tube @Rmm - Pipe 1/8* NPT 1/8* NPT AUX2315 NPA5 Tube @12 - Pipe 3/8* NPT Tube @12 - Pipe 3/8* NPT Tube @12 - Pipe 1/8* NPT De 50 x 70 X Tube @12 - Pipe 1/8* NPT W IKA 233.50.63 AUX3504 5.3000 De 1/2 Sp.1 L.50 NSx90 UNI 5931 mod.660 1/4* NPT (FH 32 - 49	VEDI TABELLA AISI 316L ASTH A276/A276H TP336 ALLUMINIO-INOX AISI 316 AISI 3	154447 28304 117340 117340 117340 117340 117340 117340 117340 117340 117340 117340 117340 117340 1153029 112946 1166201 112946 1166201 112946 1166201 112946 1166201 112946 1166201 112946 1166201 112946 112946 112946 112946 112946 112946 112946 112946 112946 112946 112946 112946 112946 112946 112946 112947 112946 112947 112	A057741 	
66 57 58 59 70 71 72 73 74 75 76 77 78 79 930 931 932 933 934	2 3 2 2 3 2 1 1 1 2 1 4 1 1 4 1 1 4 1 1 4 1 1 4 1 1 4	VALVOLA SELETTRICE DI MASSIMA PRESSIONE RIDUZIONE INDORIVA NIPPEO N°2x1/4/NPT-H + N°1x1/4/NPT-F + N°1x1/8/NPT-F VALVOLA 3/2 PILOT. PNEUM RIT. MOLLA ROTEX Swagetok Straight filting SS-8/NO-1-2 Swagetok straight filting SS-12NO-2-6 Swagetok straight filting SS-12NO-2-6 Swagetok straight filting SS-12NO-1-6 Swagetok straight filting S	1/2*x1/4*NPT AUX2010 C1.6000 G0.AF9210-6,7-2R-52 Tube @8mm - Pipe 1/6* NPT 1/8* NPT AUX251 PN350 Tube @2 - Pipe 3/8* NPT Tube @2 - Pipe 3/8* NPT Tube @2 - Pipe 1/8* NPT Tube @2 - Pipe 1/4* NPT W IKA 233.50.63 AUX3504 S3000 De.12 Sp.1 L.50 MSx90 UNI 5931 md.660 1/4* NPT CH.32 x 49 x 400 x 57 0 x	VEDI TABELLA AISI 316L ASTM A276/A276M TP336 ALLMINIKO-INOX AISI 316 AISI 316 AISI 316 AISI 316 AISI 316 SCINIKO 17-T2-2 (TP316) EN 10088- AISI 316 AISI 316 AISI 316 AISI 316 AISI 316 SCINIKO 426/A266M TP336 ASTM A269/A266M TP336 ASTM A269/A266M TP336 ASTM A269/A266M TP36 AA-70 AISI 316 EXENTED 420/A266M TP36 ASTM A269/A266M TP36	154447 28304 117340 107340 107340 107340 107340 107748 10704 10731 10748 102099 1034915 105063 105063 105063 105063 10507577 28998 1 1050693 1050757	A051741 - F042821 - - - - - - - - - - - - -	
6 7 8 8 9 9 0 11 2 3 3 4 5 6 7 8 9 9 10 11 2 3 3 4 5 6 17 7 8 9 9 10 11 2 3 3 4 5 5 16 9 10 17 17 18 19 19 10 10 10 10 10 10 10 10 10 10 10 10 10	2 3 2 3 2 1 1 2 1 1 4 1 1 4 1 1 4 1 1 1 1 1 1 1	VALVOLA SELETTRICE DI MASSIMA PRESSIONE VALVOLA SELETTRICE DI MASSIMA PRESSIONE RIDUZIONE INDRIVA NIPPLO N'2x1/4"NPT-H + N"x1/4"NPT-F + N"1x1/8"NPT-F VALVOLA 3/2 PILOT. PNEUM RIT. MOLLA ROTEX Swagetok Straight fitting SS-8-M0-1-2 TAPPD Swagetok istraight fitting SS-12M0-2-6 Swagetok istraight fitting SS-12M0-1-6 Swagetok istraight fitting SS-12M0-1-6 Swagetok istraight fitting SS-12M0-1-4 MAXCORDO T. L2" NPT DISTARZIALE DA TUBO BLOCCHETTO CONNESSIONI N"4x1/4"NPT-F VITE TCEI RUBINETTO A SFERA - IVR BLOCCHETO EXALUST PUPE EXALUST PUPE	1/2*x1/4*NPT AUX2010 CL.6000 GD.AF9210-6.7-2R-52 Tube @Rmm - Pipe 1/8* NPT 1/8* NPT AUX2315 NPA5 Tube @12 - Pipe 3/8* NPT Tube @12 - Pipe 3/8* NPT Tube @12 - Pipe 1/8* NPT De 50 x 70 X Tube @12 - Pipe 1/8* NPT W IKA 233.50.63 AUX3504 5.3000 De 1/2 Sp.1 L.50 NSx90 UNI 5931 mod.660 1/4* NPT CH.32 x 49 X 1/4* x 53	VEDI TABELLA AISI 316L ASTH A276/A276H TP336 ALLURINIO-INOX AISI 316 AISI 3	154447 28304 117340 153335 47757 67748 152099 154915 47733 1 56063 51612 153629 12946 166201 12946 166201 12996 15693 97501	A057741 	
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666 577 588 599 70 71 72 73 74 777 76 777 778 779 777 778 779 779 779	2 2 2 2 2 2 2 2 1 1 1 2 2 1 1 4 1 1 4 1 1 1 2 2 2 1 1 4 1 1 2 2 2 2 1 1 4 4 1 1 1 2 2 2 2 2 1 1 4 4 1 1 1 2 2 2 2 1 1 4 4 1 1 1 4 4 1 1 1 1 2 2 2 1 1 1 4 4 1 1 1 1 1 1 1 1 1 1 1 1 1	VALVOLA SELETTRICE DI MASSIMA PRESSIONE VALVOLA SELETTRICE DI MASSIMA PRESSIONE NIPPEO N'2x1/4'NPT-H + N'1x1/4'NPT-F + N'1x1/8'NPT-F VALVOLA 3/2 PILOT. PNEUM RIT. MOLLA ROTEX Swagetok Straight filting SS-8-M0-1-2 TAPPO Swagetok Straight filting SS-12M0-2-6 Swagetok straight filting SS-12M0-2-6 Swagetok straight filting SS-12M0-1-6 Swagetok straight filting SS-12M0-1-6 Swagetok straight filting SS-12M0-1-4 MANDETER DO SO - 1/4' NPT RACCORD T 1/2' NPT DISTANCIALE DA TUBO BLOCCHETTO CONNESSIONI N'4x1/4'NPT-F VITE TCEI RUBINETTO A SFERA - IVR BLOCCHETTO EXRAUST PIPE PRESSACAVO RCH PRESSACAVO RCH PRESSACAVO RCH PRESSACAVO RCH PRESSACAVO RCH PROLA CLIP PER SUPPORTO LEVA COHANDO HP ROSCHET US-O-9.00-1.00 (M5) VITE TE TARGHET M'SCHEVLY LINE"	1/2*x1/4*NPT AUX2010 CL.6000 GD.AF9210-6,7-2R-52 Tube @Rm - Pipe 1/6* NPT 1/8* NPT AUX2351 PM350 Tube @Z - Pipe 3/8* NPT Tube @Z - Pipe 3/8* NPT Tube @Z - Pipe 3/8* NPT Tube @Z - Pipe 1/8* NPT De 50 x 70 x Tube @Zmn - Pipe 1/4*NPT W IKA 233,50.63 AUX3504 5,3000 De.12 Sp.1 L50 De.12 Sp.1 L50 DE.12 Sp.1 L50 DE.12 Sp.1 L50 RN 50-7-136-EP-ON-IP66/68 RN 50-7-136-EP-ON-IP66/68 RN 5588-65 DI-5,5-1 DE-9 ØI 5 LNI 175-A H5 UNI 5588-65 DI-5,7 - DE-9 - Sp-1 H5x10 UNI 5739	VEDI TABELLA AISI 316L ASTM A276/A276M TP36 ALLUNINIO-INOX AISI 316 AISI 316 AISI 316 AISI 316 AISI 316 AISI 316 AISI 316 SCHNIHO 17-12-2 (TP316) EN 10088- AISI 316 AISI 316 AISI 316 SCHNIHO 17-12-2 (TP316) EN 10088- AISI A26/A269M TP36 ASTM A276/A276M TP36 ASTM A276/A276M TP36 DTTOME NICHELATO OTTOME NICHELATO OTTOME NICHELATO OTTOME NICHELATO OTTOME NICHELATO A4-70 AA	154447 28304 117340 117340 117340 117340 117340 117340 117340 117340 117340 117340 117340 1111 1111 1111 1111 1111 1110400 1104000 1104000 1104000 1104000 1104000 <	A051741 - F042821 F042821 F010678 F010678 - F010678 F010692 F025584 F010692 F025584 F041059 F044059 F044059	
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666 677 688 699 700 71 72 73 74 75 76 77 77 788 799 700 71 72 73 74 75 76 77 77 788 799 700 71 72 73 74 75 76 76 77 77 73 74 75 76 77 77 77 77 77 77 77 77 77	2 3 2 2 2 2 3 3 2 1 1 2 2 1 1 2 2 1 1 4 4 1 1 1 4 4 1 1 1 2 2 1 2 2 2 2	VALVOLA SELETTRICE DI MASSIMA PRESSIONE VALVOLA SELETTRICE DI MASSIMA PRESSIONE NIPPLO N'2x1/4/NDT.H + N'1x1/4/NDT.F + N'1x1/8/NDT.F VALVOLA 3/2 PILOT. PNEUM RIT. MOLLA ROTEX Swagelok Straight filling SS-1200-2-6 Swagelok Straight filling SS-1200-2-6 Swagelok straight filling SS-1200-2-6 Swagelok straight filling SS-1200-2-6 Swagelok straight filling SS-1200-1-6 Swagelok straight filling SS-1200-1-4 MANOMETRO DGA - 1/4" NPT RACCORDO T 1/2" NPT DISTANZIALE DA TUBO BLOCCHETTO DISTANZIALE DA TUBO BLOCCHETTO PRESSALAVO RON PRESSALAVO RON </td <td>1/2*x1/4*NPT AUX2010 CL.6000 GD.AF9210-6.7-2R-52 Tube @Rmm - Pipe 1/8* NPT Tube @Rm - Pipe 1/8* NPT Tube @Z - Pipe 3/8* NPT Tube @Z - Pipe 3/8* NPT Tube @Z - Pipe 1/8* NPT De 50 x 70 X Tube @Z - Pipe 1/8* NPT De 50 x 70 X W IKA 233,50.63 AU3504 S.3000 De 1/2 Sp.1 L.50 </td> <td>VEDI TABELLA AISI 316L ASTH A276/A276H TP36 ALLMHING-HIOX AISI 316 AISI 316 AISI 316 AISI 316 AISI 316 AISI 316 AISI 316 SCINIKO 77-22 (TP316) EN 10088- AISI 316 AISI 316 AISI 316 AISI 316 SCINIKO 77-12-2 (TP316) EN 10088- ASTH A269/A256H TP36 SCINIKO 77-12-2 (TP316) EN 10088- ASTH A269/A256H TP36 SCINIKO 77-12-2 (TP316) EN 10088- ASTH A269/A256H TP36 OTTOME NICHELATO OTTOME NICHELATO OTTOME NICHELATO OTTOME NICHELATO A4-70 A5TH A240/A246H TP356 ASTH A240/A246H TP356</td> <td>154 147 28304 117340 153335 47757 67748 52099 54915 47733 1 56663 51812 153629 154979 12946 166201 107677 28998 15501 15751 53721 87664 50371 64593 105222 56037 134699</td> <td>A057741 - F042821</td> <td></td>	1/2*x1/4*NPT AUX2010 CL.6000 GD.AF9210-6.7-2R-52 Tube @Rmm - Pipe 1/8* NPT Tube @Rm - Pipe 1/8* NPT Tube @Z - Pipe 3/8* NPT Tube @Z - Pipe 3/8* NPT Tube @Z - Pipe 1/8* NPT De 50 x 70 X Tube @Z - Pipe 1/8* NPT De 50 x 70 X W IKA 233,50.63 AU3504 S.3000 De 1/2 Sp.1 L.50 	VEDI TABELLA AISI 316L ASTH A276/A276H TP36 ALLMHING-HIOX AISI 316 AISI 316 AISI 316 AISI 316 AISI 316 AISI 316 AISI 316 SCINIKO 77-22 (TP316) EN 10088- AISI 316 AISI 316 AISI 316 AISI 316 SCINIKO 77-12-2 (TP316) EN 10088- ASTH A269/A256H TP36 SCINIKO 77-12-2 (TP316) EN 10088- ASTH A269/A256H TP36 SCINIKO 77-12-2 (TP316) EN 10088- ASTH A269/A256H TP36 OTTOME NICHELATO OTTOME NICHELATO OTTOME NICHELATO OTTOME NICHELATO A4-70 A5TH A240/A246H TP356 ASTH A240/A246H TP356	154 147 28304 117340 153335 47757 67748 52099 54915 47733 1 56663 51812 153629 154979 12946 166201 107677 28998 15501 15751 53721 87664 50371 64593 105222 56037 134699	A057741 - F042821	
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666 677 668 697 777 74 75 76 777 778 79 30 51 12 73 74 75 76 77 778 79 30 51 12 73 74 75 76 77 778 79 30 51 77 78 79 30 51 77 78 79 30 51 77 78 79 30 51 77 78 79 70 77 77 77 77 77 77 77 77 77 77 77 77	2 2 2 2 2 1 1 2 2 1 1 2 2 1 1 4 4 1 1 4 4 1 1 1 2 2 1 1 2 2 1 1 2 2 1 1 2 2 1 1 2 2 1 1 2 2 1 1 1 2 2 1 1 1 2 2 1 1 1 2 2 1 1 1 2 2 2 1 1 1 2 2 2 1 1 1 2 2 2 1 1 1 2 2 2 1 1 1 1 2 2 2 1 1 1 1 2 2 2 1 1 1 1 2 2 2 2 1 1 1 1 2 2 2 2 2 2 2 2 2 2 2 2 2	VALVOLA SELETTRICE DI MASSIMA PRESSIONE RIDUZIONE INDRIVA NIPPEO N'2X1/4'NPT-H + N'1x1/4'NPT-F + N'1x1/8'NPT-F YALVOLA 3/2 PILOT. PNEUM RIT. HOLLA ROTEX Swagetok siraight filting SS-0400-1-2 Swagetok siraight filting SS-12H0-2-6 Swagetok siraight filting SS-12H0-2-6 Swagetok siraight filting SS-12H0-2-2 BLOCCHETTO Swagetok siraight filting SS-12H0-1-4 MANDRETRO Da5 - 1/4' NPT RACORDO T 1/2' NPT DISTANZIALE DA TUBO DISTANZIALE DA TUBO BLOCCHETTO COMESSIONI N'4X1/4'NPT-F VITE TCEI RUBINETTO A SFERA - IVR BLOCCHETTO COMESSIONI N'4X1/4'NPT-F VITE TCEI REMINITO A SFERA - IVR BLOCCHETTO DISTANZIALE DA TUBO BREATHER GLAND STAHL PRESSACAVO RCH PRESSACAVO RCH PRESSACAVO RCH DADO MEDIO Seal vasher US.70-9-00-1.00 (MS) VITE TCE TARGHETTA 'SUPPLY LINE' TARGHETTA 'SUPPLY LINE'	1/2*x1/4*NPT AUX2010 CL.6000 GD.AF9210-6.7-2R-52 Tube @6mm - Pipe 1/8* NPT 1/8* NPT AUX2351 PM350 Tube @12 - Pipe 3/8* NPT Tube @12 - Pipe 3/8* NPT Tube @12 - Pipe 3/8* NPT De 50 x 70 X Tube @12 - Pipe 1/8* NPT De 50 x 70 X Tube @12 - Pipe 1/4* NPT W IKA 233.50.63 AUX3504 5.3000 De 12 Sp.1 L.50 	VEDI TABELLA AISI 316L ASTM A276/A276M TP36 ALLMINIO-INOX AISI 316 AISI 316 SCHNIMO 17-12-2 (TP316) EN 10088- AISI 316 AISI 316 BCHNIMO 17-12-2 (TP316) EN 10088- AISI 316 AISI 316 BCHNIMO 17-12-2 (TP316) EN 10088- AISI 316 AISI 316 A	154.147 28304 117340 153335 47757 67748 52099 54915 47733 1 56063 51812 153629 127946 146201 907677 28998 91501 15751 53721 87664 100400 50371 142038 155228 15228 15228 15220 110409	A057741 - F042821 	
666 577 588 599 700 711 722 733 744 755 766 777 788 799 700 711 723 733 744 755 766 777 788 799 700 711 723 733 744 755 766 777 788 799 700 711 723 733 744 755 766 777 788 789 799 790 793 793 794 795 797 798 799 790 797 798 799 790 797 798 799 790 797 798 799 790 797 798 799 790 797 798 799 790 797 798 799 799 790 797 798 799 790 797 798 799 799 790 797 798 799 799 790 797 798 799 799 790 797 798 799 790 797 798 799 799 790 797 798 799 790 797 798 799 799 790 797 798 799 790 797 798 799 790 797 798 799 790 797 798 799 790 797 798 799 790 797 798 799 790 797 798 799 790 797 797 798 799 790 797 797 798 799 790 797 797 798 799 790 797 797 798 799 790 797 797 798 799 790 797 797 798 799 797 797 798 799 797 797	2 2 3 2 2 2 3 3 2 2 1 1 1 1 2 1 1 4 4 1 1 1 1 1 1 1 1 1 1 1 1 1	VALVOLA SELETTRICE DI MASSIMA PRESSIONE VALVOLA SELETTRICE DI MASSIMA PRESSIONE RIDUZIONE INDORIVA NIPPEO N'2X1/4/NPT-H + N'1x1/4/NPT-F + N'1x1/8/NPT-F VALVOLA 3/2 PILOT. PNEUM RIT. MOLLA ROTEX Swagetok Straight filting SS-8/NO-1-2 Swagetok straight filting SS-12NO-2-6 Swagetok straight filting SS-12NO-2-6 Swagetok straight filting SS-12NO-2-6 Swagetok straight filting SS-12NO-2-7 Swagetok straight filting SS-12NO-1-6 Swagetok straight filting SS-12NO-1-0 STARUETA SUPPLY LINE* TARGHTA SUPPLY LINE* TARGHTA FILTA FULL TO VERKIDE*	1/2*x1/4*NPT AUX2010 C1.6000 GDAF9210-6.7-2R-52 Tube @Bem - Pipe 1/8* NPT 1/8* NPT AUX2351 PN350 Tube @Z - Pipe 3/8* NPT Tube @Z - Pipe 3/8* NPT Tube @Z - Pipe 3/8* NPT Tube @Z - Pipe 1/8* NPT Ube @Z - Pipe 1/8* NPT W IKA 23.50.63 AUX3504 5.3000 De.12 Sp.1 L.50 NB 16-7-1402-EP-ON-1P66/68 8*8 6*72 MPT Ube ZSX1.5 RN 25-15.5-125-EP-ON-1P66/68 8*8 6*5 0*15 UNI 1751-A M5 UNI 1751-A M5 UNI 1751-A M5 UNI 5739 - -	VEDI TABELLA AISI 316L ASTH A276/A276M TP336 ALLMINIKO-INOX AISI 316 AISI 316 AISI 316 AISI 316 AISI 316 AISI 316 AISI 316 SCINIKO 17-12-2 (TP316) EN 10088- AISI 316 AISI 316 AISI 316 AISI 316 AISI 316 SCINIKO 17-12-2 (TP316) EN 10088- ASTH A260/A26M TP336 ASTH A260/A26M TP336 AISI 316 OTTOME NICHELATO OTTOME NICHELATO OTTOME NICHELATO OTTOME NICHELATO A4-70 A5TH A240/A26M TP336 ASTH A240/A26M TP356 ASTH A240/A26M TP356 ASTH A240/A26M TP356 ASTH A240/A26M TP356 ASTH A240/A26M TP356	15447 28304 177340 177340 177340 177340 177340 17757 67748 152099 154975 15603 51812 15603 158520 15603 97501 15751 87864 753391 10400 50371 64593 155222 56037 155220 134699 155220 135221	A057741	
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	2 2 3 3 2 2 2 1 1 1 2 1 1 4 1 1 1 1 4 1 1 1 1 1 1 1 1 1 1 1 1 1	VALVOLA SELETTRICE DI MASSIMA PRESSIONE RIDUZIONE INDRIVA NIPPEO N'2X1/4'NPT-H + N'Tx1/4'NPT-F + N'Tx1/8'NPT-F YALVOLA 3/2 PILOT. PNEUM RIT. HOLLA ROTEX Swagetok Straight filting SS-8'NO-1-2 Swagetok straight filting SS-12H0-2-6 Swagetok straight filting SS-12H0-2-8 Swagetok straight filting SS-12H0-2-2 BLOCCHETTO Swagetok straight filting SS-12H0-1-4 MANCHETRO Das - 1/4' NPT RACCORDO T 1/2' NPT DISTANZIALE DA TUBO BLOCCHETTO CONFESSIONI N'4X1/4'NPT-F VITE TCEI RUBINETTO A SFERA - IVR BLOCCHETTO CONFESSIONI N'4X1/4'NPT-F VITE TCEI RUBINETTO A SFERA - IVR BLOCCHETTO CONFESSIONI N'4X1/4'NPT-F VITE TCEI RESSALAVIO RCH PRESSALAVIO RCH PRESSALAVIO RCH PRESSALAVIO RCH PRESSALAVIO RCH PRESSALAVIO RCH DADO MEDIO Seal Washer US.70-9.00-1.00 0/5) VITE TE TARGHETTA "SUPPLY LINE" TARGHETTA "SUPPLY LINE" TARGHETTA "SUPPLY LINE" TARGHETTA "SUPPLY LINE" TARGHETTA "SUPPLY LINE" TARGHETTA "SUPPLY LINE" TARGHETTA "PUEN DO VERNIDE" ROSETTA TASTICA SPACCATA DADO MEDIO ROSETTA TASTICA SPACCATA DADO MEDIO ROSETTA FRALECTAL TABLETTICA TARGHETTA "SUPPLY LINE" TARGHETTA THE ENANCEMENTICE" TARGHETTA TUBE REAK COMMECTION" TARGHETTA TUBER REAK COMMECTION"	1/2*x1/4*NPT AUX2010 CL.6000 GD.AF9210-6,7-2R-52 Tube @Emm - Pipe 1/6* NPT 1/8* NPT AUX2351 PM350 Tube @Z - Pipe 3/8* NPT Tube @Z - Pipe 3/8* NPT Tube @Z - Pipe 3/8* NPT Tube @Z - Pipe 1/8* NPT De 50 x 70 x Tube @Z - Pipe 1/4* NPT Ue @Z - Pipe 1/4* NPT Ue @Z - Pipe 1/4* NPT Ue @Z - Pipe 1/4* NPT CH.2 2 x 10 0 E-12 Sp.1 L.50 E-12 Sp.1	VEDI TABELLA AISI 316L ASTM A276/A276M TP36 ALLMINIO-INOX AISI 316 AISI 316 SCHNIMO 17-12-2 (TP316) EN 10088- AISI 316 AISI 316 SCHNIMO 17-12-2 (TP316) EN 10088- AISI A260/A269M TP36 AISI 316 SCHNIMO 17-12-2 (TP316) EN 10088- AISI A260/A269M TP36 AISI 316 OTTOME NICHELATO OTTOME NICHELATO OTTOME NICHELATO OTTOME NICHELATO A4-70 AISI 316 + NBR A4-70 AISI 316 - NBR A4-70 AISI A240/A240M TP316 AISI A240/A240M TP316 AISI A240/A240M TP316 AISI A240/A240M TP316 AISI A240/A240M TP316 AISI A240/A240M TP316 AISI A240/A240M TP316 AISIM A240/A140M TP316	154447 28304 117340 153335 67748 152099 54915 47733 156063 51612 153629 154979 127946 146201 107677 28998 156093 97501 15751 87764 153221 56037 155222 56037 155220 156221 56237 55220 155221 10405 55221 50379 52314	A057741 - F042821 	
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11 SPARE PARTS

Spare part kit for double acting actuator RTQD 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

Warning	The disassembling and further demolition of actuator parts should be made from specialized personnel.
	Before disassembling the actuator it is mandatory:
\wedge	 to close the gas supply lines,
	 to vent, through the proper vent valves, the gas storage tank and the gas reference tank,
	 to vent the gas cylinder and control unit through the vent valve mounted into the cabinet.
	The gas supply lines must remain close and the vent valves must remain open during all the disassembling operations.
	Refer to section 5.1 and section 5.3 to lifting and storage procedure.

Before starting the operations of disassembling 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.

Recycling and disposal

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



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 regulations before disposal.



13 Declaration of Conformity

La	Sottoscr	itta S	TI S.r.I. co	n sede in Via Dei Caravaggi	, 15 – 2	24040 L	evate (BG) – ITALIA, dichiar
We, mai	, STI S. nufactur	r.I . ba er und	sed in Via ler its sole	Dei Caravaggi, 15 – 24040 L responsibility, that the press	e rassi .evate (ure ass	(BG) – I sembly	TALY, hereby declares, as the here below identified:
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14 Appendix A

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SETTING INSTRUCTION

Differential pressure valve (LBS) as a pipe rupture protection

The basis for this setting instruction is the test setup according to the circuit diagram "LBS Test" as well as a description of the "Operating Principle and Properties" of the differential pressure valve.

- General: In order to be able to set the differential pressure valve (LBS) to a certain pressure drop rate, this rate must be known, for example 3 bar/min.
- Step 1: Pressure is applied to the test unit via port P1 and the nitrogen tank (if possible, the system pressure of the system in which the LBS is installed, for example 60 bar).

Absperrventil = AV = shut-off valve = SV Drosselventil = DV = throttle valve = TV

AV1 is open DV1 is open DV2 is closed AV3 is closed AV2 is open

When the pressure of 60 bar in the reference tank is reached, AV1 is closed.

- Step 2: Now you open AV3.
 By means of the pressure gauge connected to P8, the pressure drop rate is now simulated by opening the throttle DV2 and using a timer (stopwatch). Setting the throttle DV2 accordingly requires several attempts. If the above value of 3 bar/min, for example, is reached, close the shut-off valve AV3. No changes may be made to the adjusted throttle DV2. IMPORTANT ! The shut-off valve AV2 will now also be closed.
- Step 3: The differential pressure value is now connected to the test device by means of mini measuring hoses.

The connection "S" = reference tank to P6 The connection "P" = measuring line / pipeline to P7

- Step 4: Preparing the measuring attachment of the differential pressure valve. The measuring spring (4) is completely released by means of the adjustment screw after loosening the counter nut (counterclockwise). Now loosen the counter nut on the throttle valve (6) and open it by turning counterclockwise in reference to the throttle.
- Step 5: Now the shut-off valve AV1 is opened. An internal pressure equalization takes place in the measuring chamber via the opened throttle of the differential pressure valve. When done, AV1 will be closed. Now the shut-off valve AV3 is opened and via the fixed throttle valve DV2 the predetermined pressure drop rate of 3 bar/min is generated. The throttle screw (6)of the throttle valve (lock nut release must be ensured) is now screwed in by turning it clockwise carefully. As a result, the throttle is more and more closed.

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Continuation of Step 5

The diaphragm piston must be carefully observed, because if the throttle gap becomes so small that a pressure equalization on the diaphragm is no longer possible, the diaphragm piston lowers and triggers the actuator to the switching valve - the switching valve is switched and remains in the actuated position.

- Step 6: The shut-off valve AV3 is now closed. Internally, pressure equalization now takes place in the measuring chamber of the differential pressure valve. This causes the diaphragm piston to move in the opposite direction - at positive position. In order to compensate for internal frictional losses, the measuring spring (4) is now pretensioned with the adjustment screw by turning the screw clockwise (loosening of the lock nut) so that a perfect return of the diaphragm is ensured.
- Step 7: Finally, the counter nuts of the throttle screw and the spring washer are slightly tightened. Then repeat the measuring procedure several times, but without renewed adjustment, according to steps 1 to 6.

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Operation and properties:

The measuring port (S) is connected to a pressure vessel (the so-called accumulator), which, together with the throttle valve (6) behaves like a pneumatic timer. As long as the **pressure drop rate dp/dt** is within the permissible range, the pressure in the pressure vessel follows the pressure in the measuring line (P), so that the (7) diaphragm piston is force-free due to the pressure equalization.

In the case of a pipe break, the pressure in the line drops faster than the pressure in the pressure vessel. If the pressure difference is greater than the set value, the diaphragm piston is moved against the measuring spring (4) in such a way that the locking pawl (5) releases the spring-loaded actuating pin (3), which immediately switches over the valve (1) via the hand lever (2) and remains in the switched position. The valve may only be reactivated manually on site.

The pressure difference that occurs in the event of damage depends on the contents of the pressure vessel and on the throttle setting.

The valve may also be switched manually with the lever (2) for test purposes or for maintenance.

At the factory, the valve is set to the desired pressure drop rate and sealed. For this, it is necessary to specify the size of the reference tank and the pressure level.

The valve body and all internal parts are made of corrosion-resistant materials.

The switching valve (1) may be a 2/2- or 3/2- way valve that is normally open (NO) or normally closed (NC), which allows all switching functions to be carried out in safety-related systems.

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- (1) Valve
- (2) Hand lever
- (3) Actuating pin
- (4) Measuring spring
- (5) Locking pawl
- (6) Throttle valve
- (7) Diaphragm piston

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