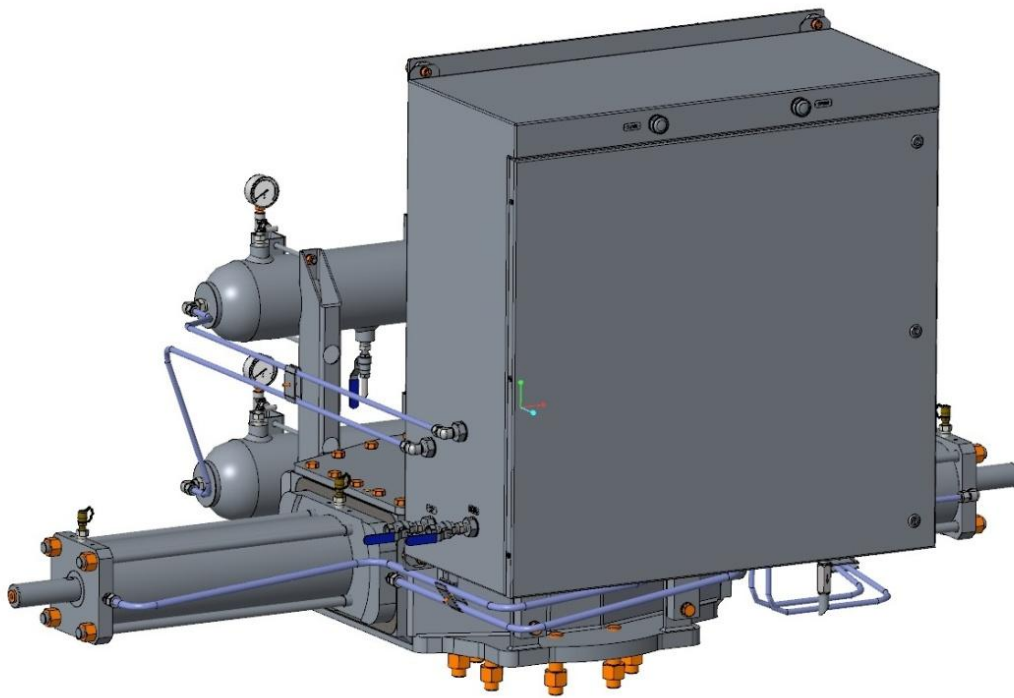



# Quarter Turn Direct Gas Actuator RTQD Series Model RTQD-04S-160-HP INSTRUCTION MANUAL 5900



  
*Engineering  
GREAT Solutions*

Date	Revision	Description	Compiled	Approved
19/07/2018	1	Revision	E. Montagna	G. Alfieri
03/07/2018	0	Issue	E. Montagna	G. Alfieri

*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

<b>Important</b> 	<p><b>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.</b></p> <p><b>This Instruction Manual covers the RTQD actuators in the base version without any accessories and/or control panel.</b></p> <p><b>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.</b></p> <p><b>This Instruction Manual is realized in accordance with the Directive 2006/42/CE.</b></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 RTQD actuator series, is **STI S.r.l.** 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](mailto:imisti.sales@imi-critical.com)

## 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.
- 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.



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

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.

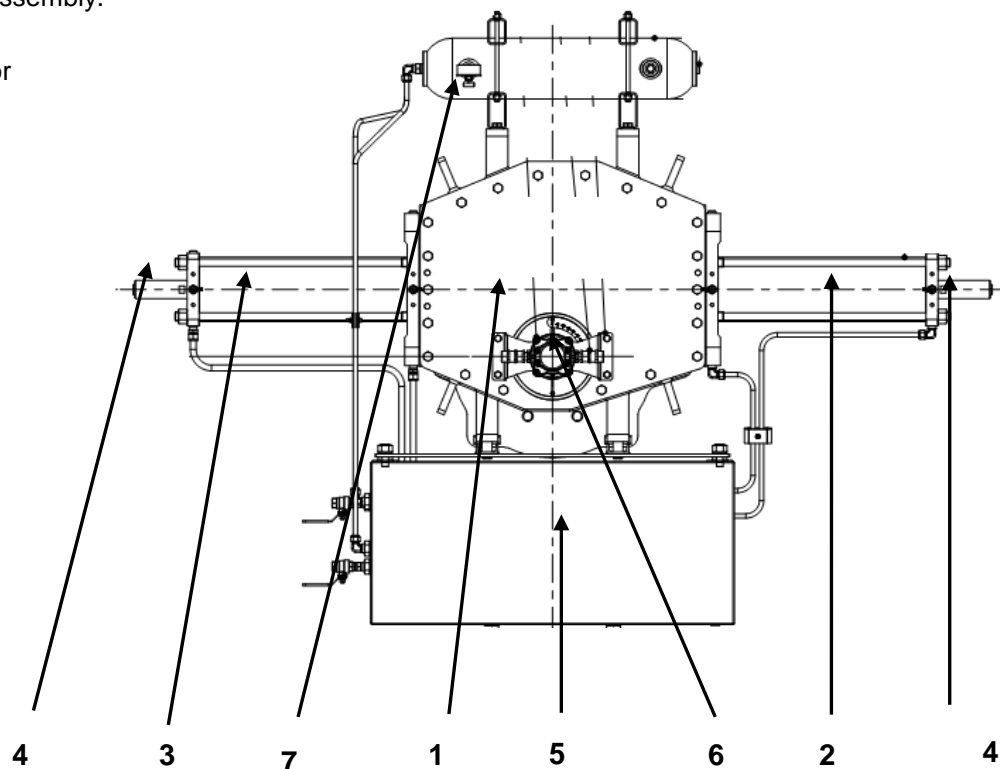


Fig. 1: Main parts for RTQD actuator series

### 2.3 Actuator specific layout

**DOUBLE ACTING PNEUMATIC ACTUATOR**

6100-045-160-HP-F35-D120

STI

DOUBLE ACTING PNEUMATIC ACTUATOR

ISSUED BY: MONTIGNI F. TORREDO

WEIGHT (KG): 1805/174

CODE: AD5/1712

SHEET N. 1 OF 1 SCALE 1:1

DRAWING SIZE: A2 HORIZONTAL

REV. DATE. REVISION DESCRIPTION

A. 26/06/08 FIRST ISSUE

PSI No. 1.1 DESCRIZIONE DIMENSIONI MATERIALE

REV.	DATE	REVISION DESCRIPTION	DIMENSIONI	MATERIALE
1	26/06/08	FIRST ISSUE		

TECHNICAL DATA

Working Temp. -20 to +40 °C

Working Pressure 36 x 73.5 Bar(g)

Supply Medium Natural Gas

Solenoid(s) Voltage 24 Vdc

VALVE TOP MOUNTING DWG. No.: SKM-LE284e/80336/6430

30 26 23 22 21 12 18 25 19 27 13 20 21

10 9 8 29 16 17 11

1 28 14 7 5 6 1714,3 763 185

1209 (2362,5) 183,5 3 2 4 15

1393 160 80 40

30 3 1/2" NPT Threaded hole for gas supply connection

F : 1/2" NPT Threaded hole for line break device pilot connection

G1 : N 2 D 21 + N 2 D 21 (plugged) Holes for cable entry

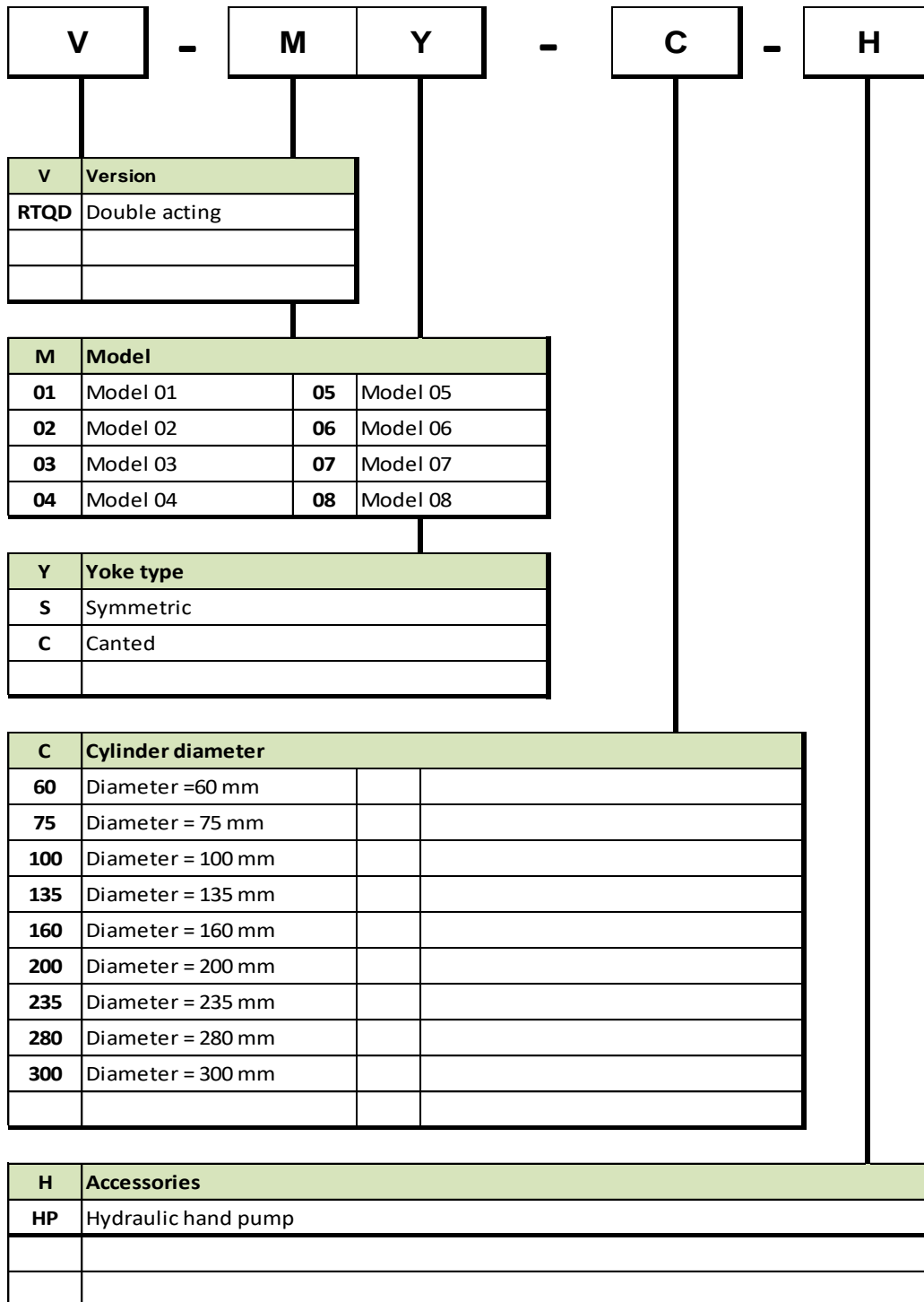
G2 : N 2 Cable glands + N 2 D 21 holes (plugged) for electric connections to junction box

H : 1/2" NPT Threaded hole for line break device pilot connection

30	3	1/2" NPT Threaded hole for gas supply connection	1393	2025A	2025A
29	2	Support flange fitting 55-200x2-8	160	4079A	4079A
28	1	Flange	80	4079A	4079A
27	1	Flange	40	4079A	4079A
26	1	Flange	40	4079A	4079A
25	2	MANIFOLD 1/2" NPT	183,5	4079A	4079A
24	2	MANIFOLD 1/2" NPT	183,5	4079A	4079A
23	1	MANIFOLD 1/2" NPT	183,5	4079A	4079A
22	1	MANIFOLD 1/2" NPT	183,5	4079A	4079A
21	1	MANIFOLD 1/2" NPT	183,5	4079A	4079A
20	2	MANIFOLD 1/2" NPT	183,5	4079A	4079A
19	2	MANIFOLD 1/2" NPT	183,5	4079A	4079A
18	2	MANIFOLD 1/2" NPT	183,5	4079A	4079A
17	1	MANIFOLD 1/2" NPT	183,5	4079A	4079A
16	2	MANIFOLD 1/2" NPT	183,5	4079A	4079A
15	2	MANIFOLD 1/2" NPT	183,5	4079A	4079A
14	2	MANIFOLD 1/2" NPT	183,5	4079A	4079A
13	2	MANIFOLD 1/2" NPT	183,5	4079A	4079A
12	2	MANIFOLD 1/2" NPT	183,5	4079A	4079A
11	2	MANIFOLD 1/2" NPT	183,5	4079A	4079A
10	2	MANIFOLD 1/2" NPT	183,5	4079A	4079A
9	2	MANIFOLD 1/2" NPT	183,5	4079A	4079A
8	2	MANIFOLD 1/2" NPT	183,5	4079A	4079A
7	2	MANIFOLD 1/2" NPT	183,5	4079A	4079A
6	2	MANIFOLD 1/2" NPT	183,5	4079A	4079A
5	2	MANIFOLD 1/2" NPT	183,5	4079A	4079A
4	2	MANIFOLD 1/2" NPT	183,5	4079A	4079A
3	2	MANIFOLD 1/2" NPT	183,5	4079A	4079A



## 2.4 Actuator coding description






### 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
	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

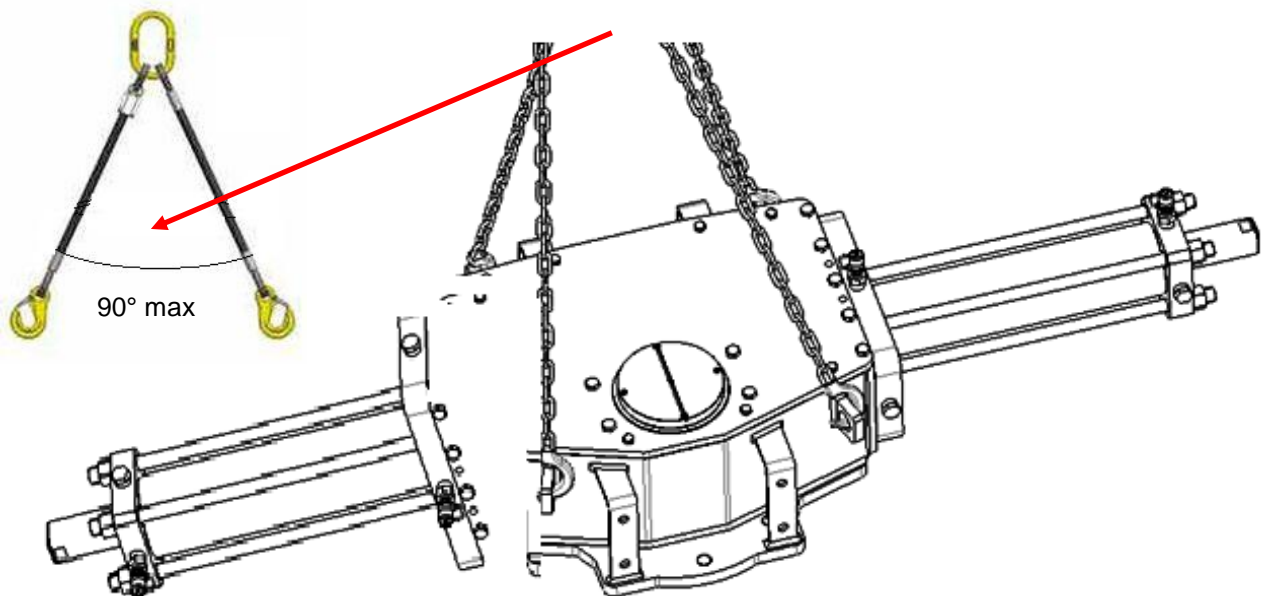
	STI s.r.l. Via Dei Caravaggi 15 24040 LEVATE(Bg)-ITALY www.imi-critical.com - FAX +39 035 2928247		
		II 2GD c II	T <input type="text"/> ATEX Tech.file ref. <input type="text"/>
Order	<input type="text"/>	Serial. N°	<input type="text"/>
Model	<input type="text"/>	Max Oper. Torque	<input type="text"/>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

## 5 GENERAL INFORMATION for INSTALLATION

<p><b>Important</b></p> 	<p>Not performing the following procedures will invalidate the product guarantee.</p>
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### 5.1 Transport

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

<p><b>Warning</b></p> 	<p>Before proceeding with any Installation the following instructions must be respected:</p> <ul style="list-style-type: none"> <li>- Always wear protective clothing, gloves, and eyewear to prevent personal injury.</li> <li>- 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.</li> <li>- Check with your process or safety engineer for any additional measures that must be taken to protect against process media.</li> </ul>
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### 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

 <b>Important</b>	<p>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</p>
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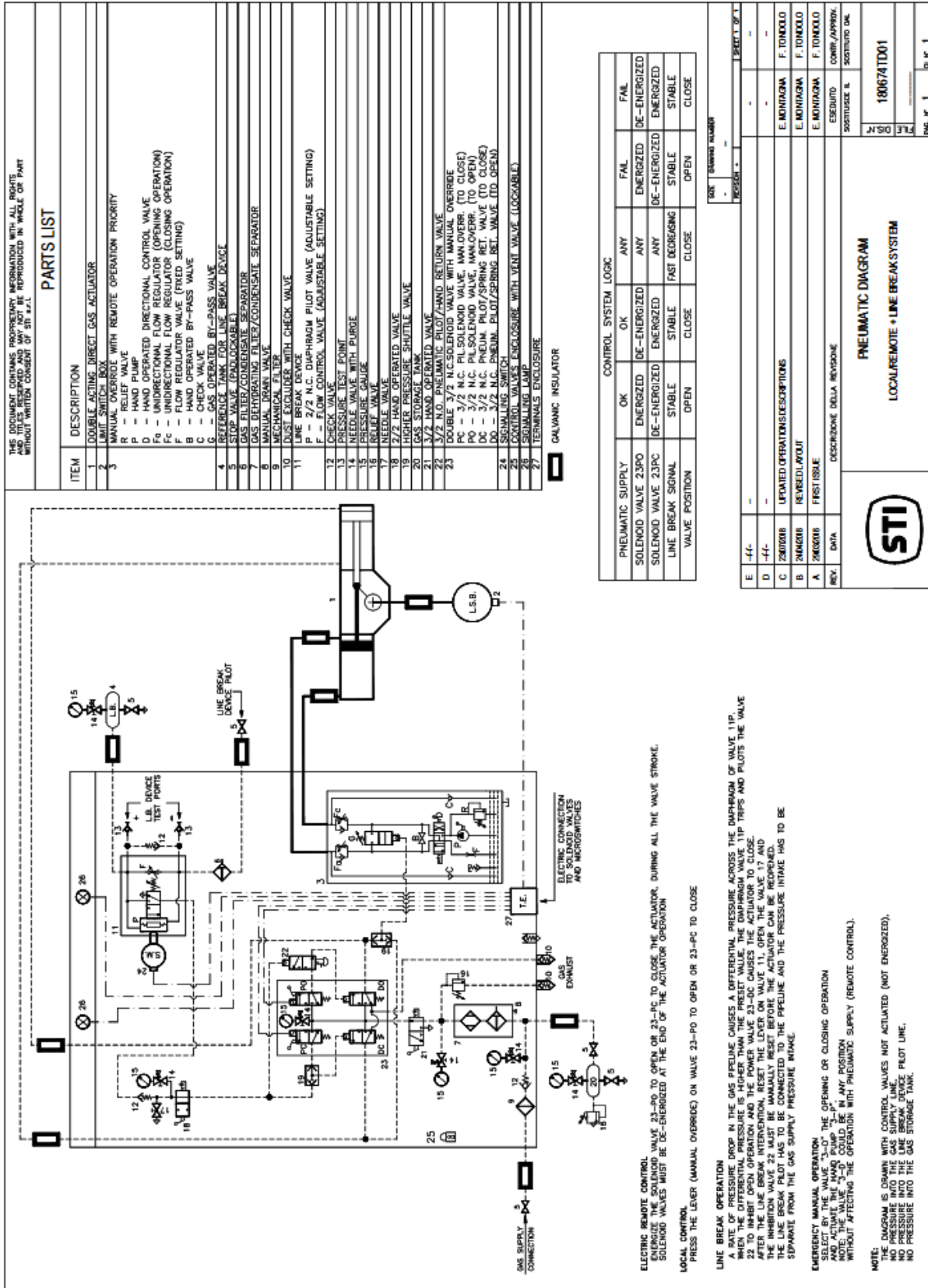
**Table 1**

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 Operating diagram





### 5.6.4 Gas Connections

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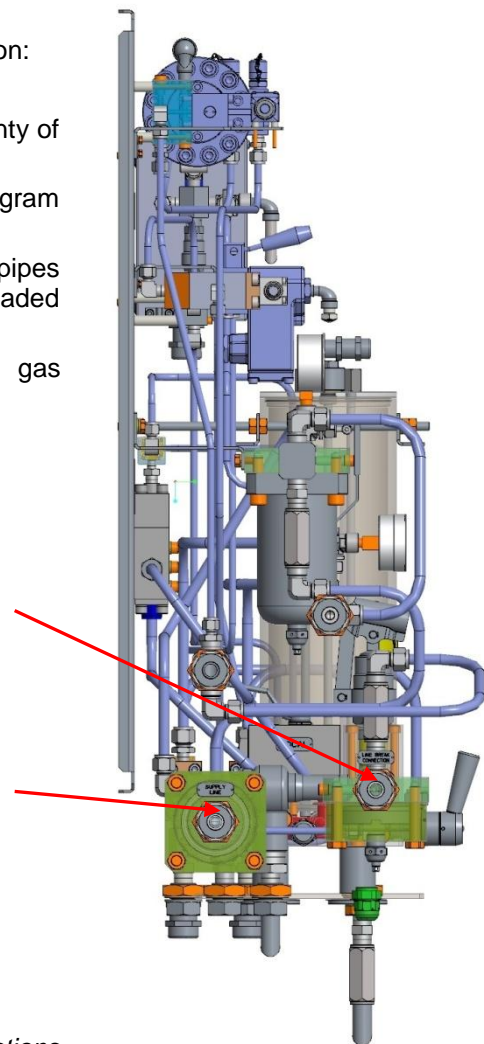
Gas connections are foreseen on the left side on control cabinet.

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

<p><b>Warning</b></p> 	<p><b>Before carrying out electrical connections, switch off any power and control lines.</b></p> <p><b>Use components appropriate as for type, material and dimensions.</b></p> <p><b>The connections should be made by qualified staff.</b></p>
---	---

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.

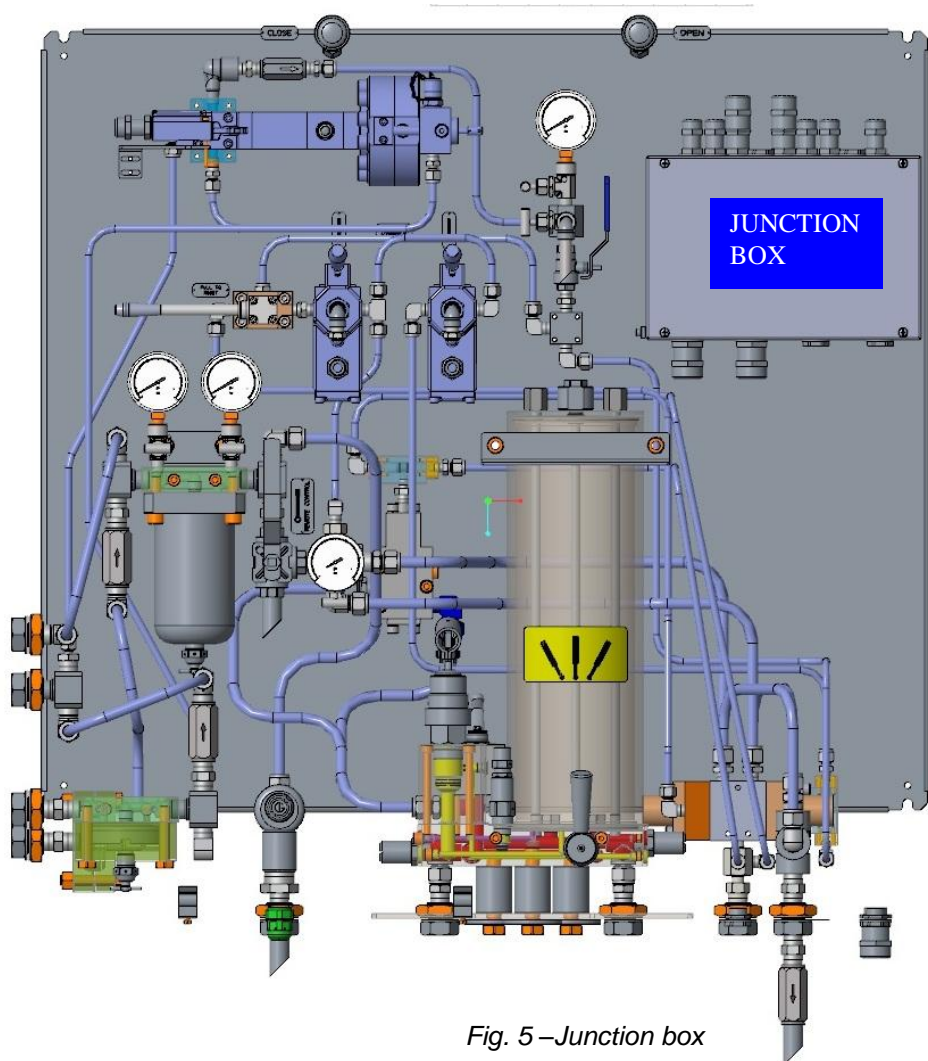


Fig. 5 – Junction box

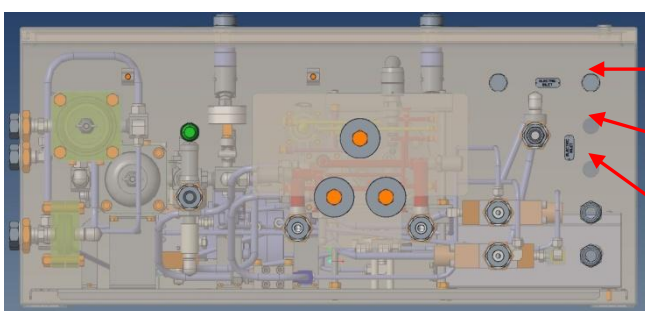
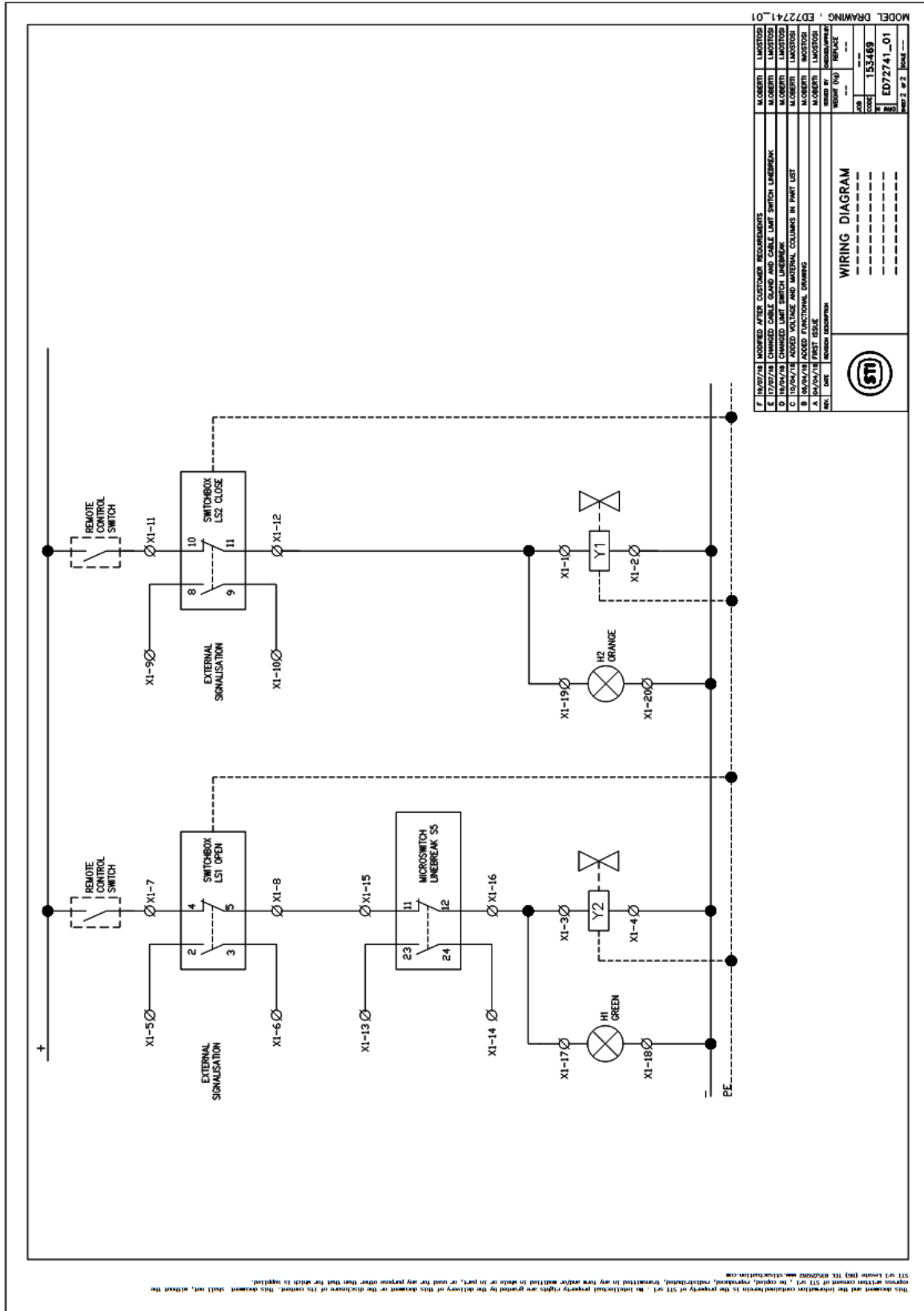


Fig. 6 – Cable entries

### 5.6.6 Wiring diagram





### 5.6.7 Earthing connection

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

### 5.6.8 Setting instructions

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

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

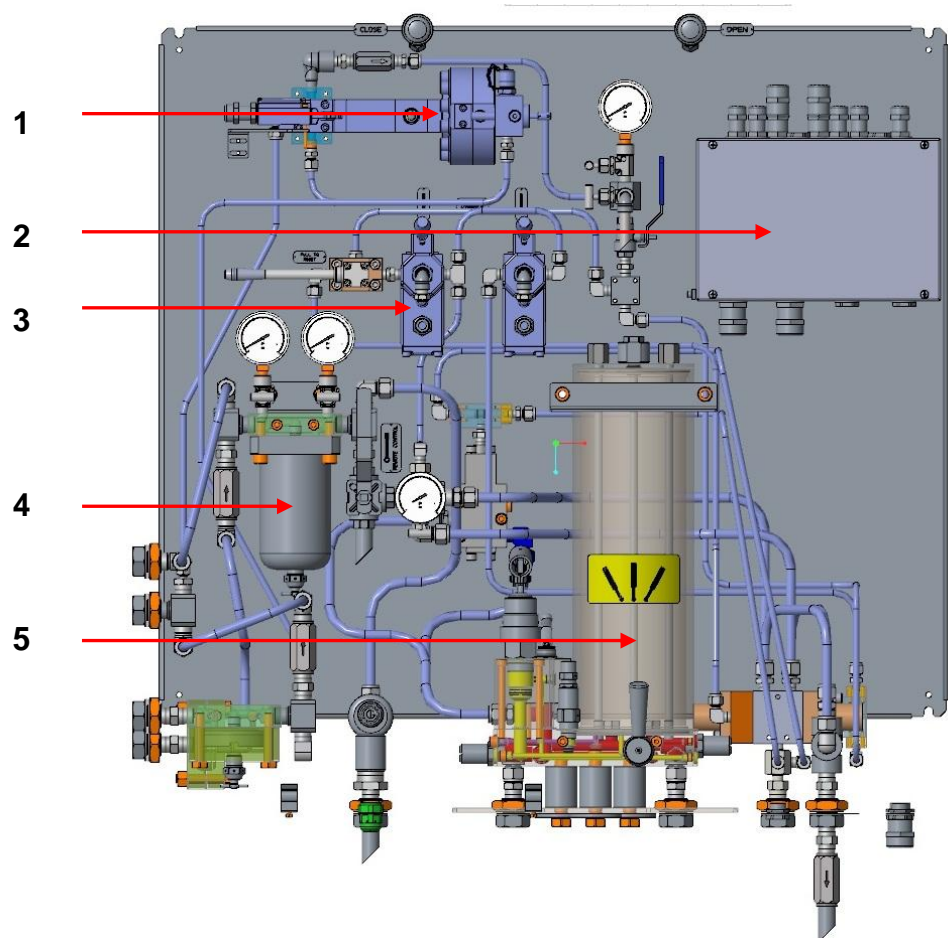


Fig. 7 – Control Cabinet main components

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

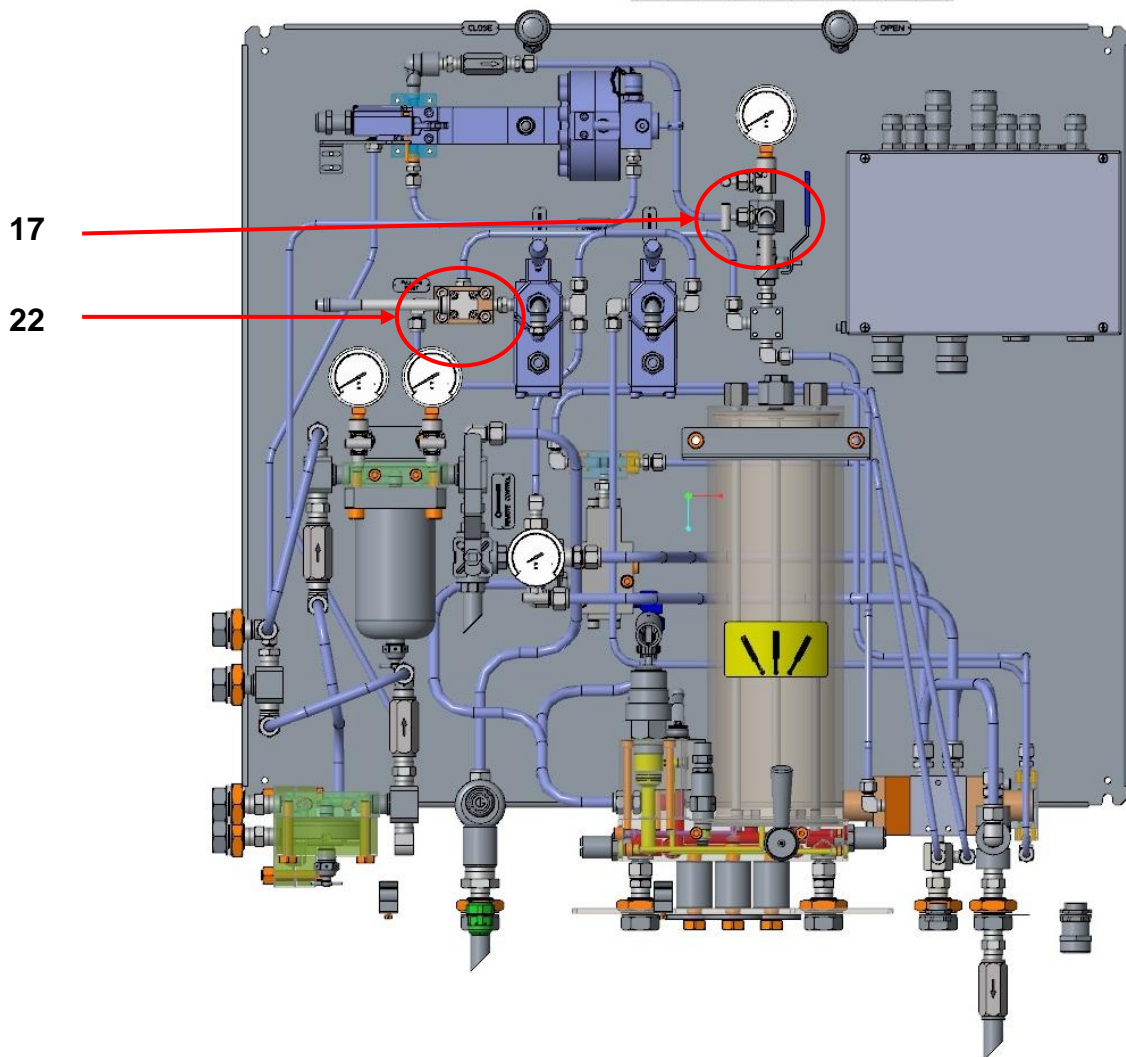


Fig. 8 – Line Break Reset instructions



## 5.7 Disassembling


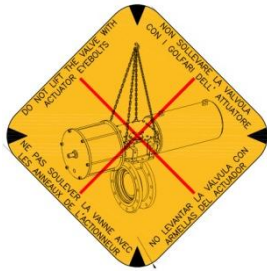
<p><b>Warning</b></p> 	<p><b>Before starting the disassembly operations it is mandatory to disconnect the gas supply and to exhaust the cylinder and any other pressure retaining component mounted on the actuator.</b></p> <p>Before removing the screws between actuator and valve or adaptor flange or mounting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



Fig. 9 – Disassembling of the actuator

## 6 OPERATION AND USE

### 6.1 Operation description

The RTQD series is hydraulic 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 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. 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.

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

<p><b>Warning</b></p> 	<p><b>The actuator has parts under pressure. Use the due caution. Use individual protections provided for by the laws and provisions in force.</b></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 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

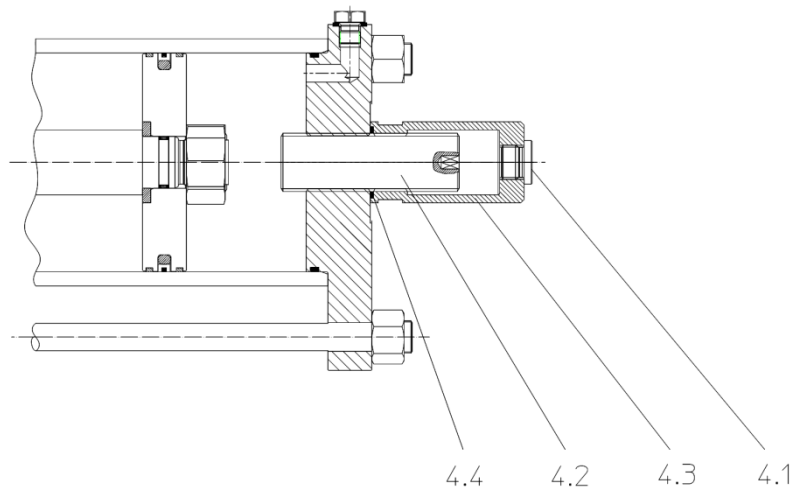
<p><b>Important</b></p> 	<p>It is recommended that the stroke adjustment is carried out in the workshop using low pressure air or manual hand pump to move the actuator.  <b>The use of manual hand pump is recommended for this operation.</b>          Following instructions are applicable when the actuator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

<p><b>Important</b></p> 	<p><b>Operate the actuator with gas supply to check that the actuator moves properly and that there are no leakages.</b></p>
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### 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.

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

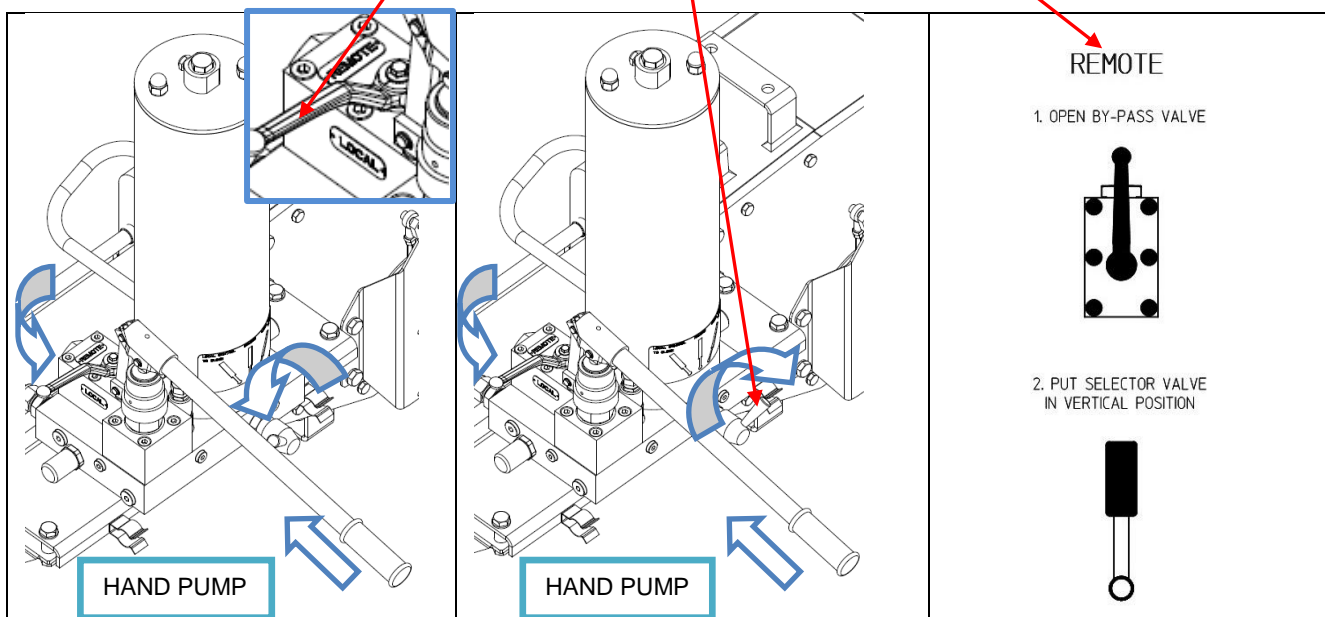



Fig. 11 – HP device


## 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.

<b>Warning</b> 	<p><b>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.</b></p>
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<b>Important</b> 	<p><b>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.</b></p> <p><b>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.</b></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 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.

### Important



**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

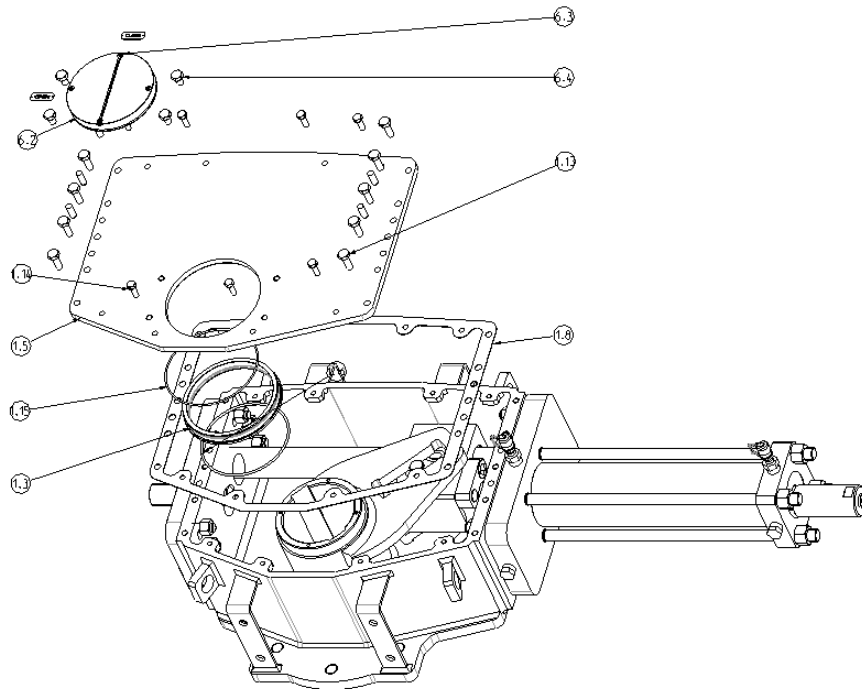


Fig. 12 – Scotch yoke mechanism seals replacement

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.

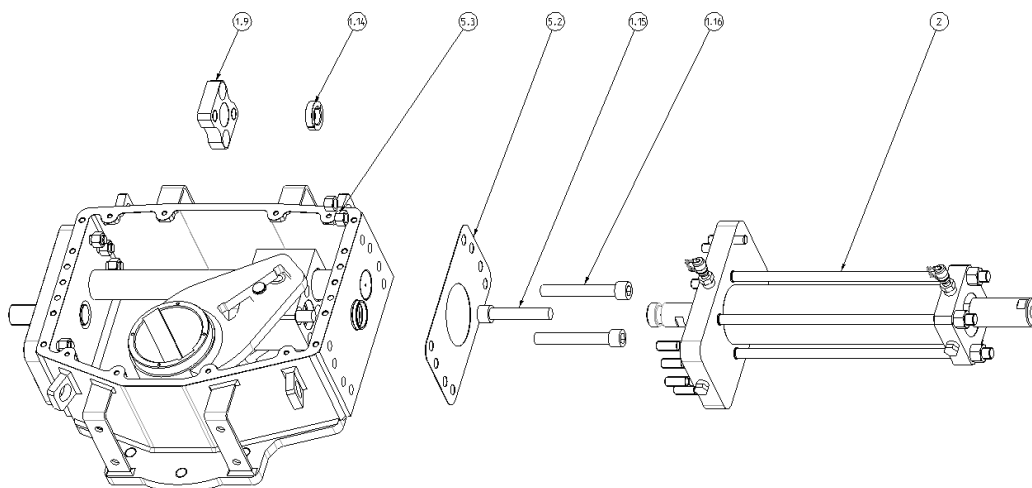
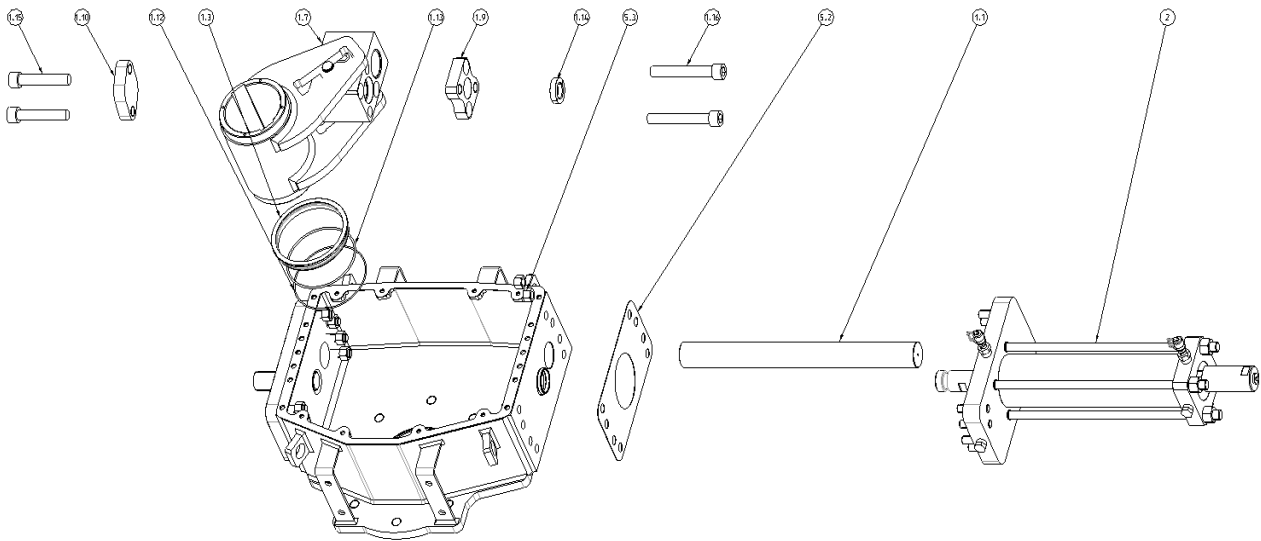


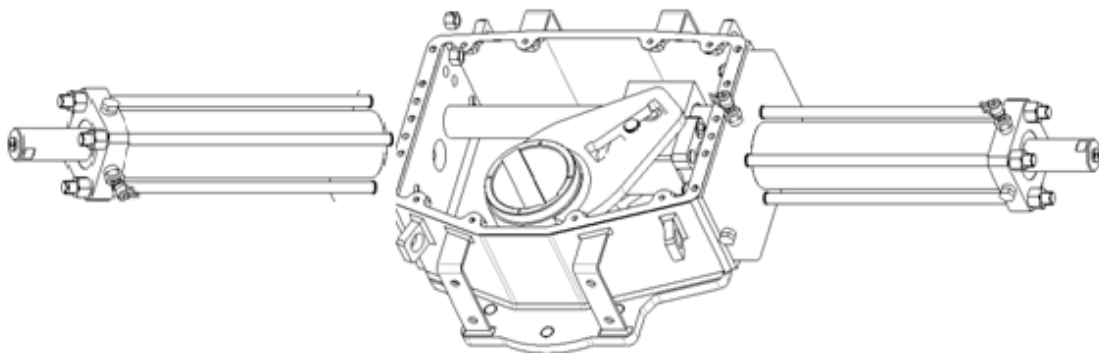
Fig. 13 – Scotch yoke mechanism seals replacement.

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.



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.

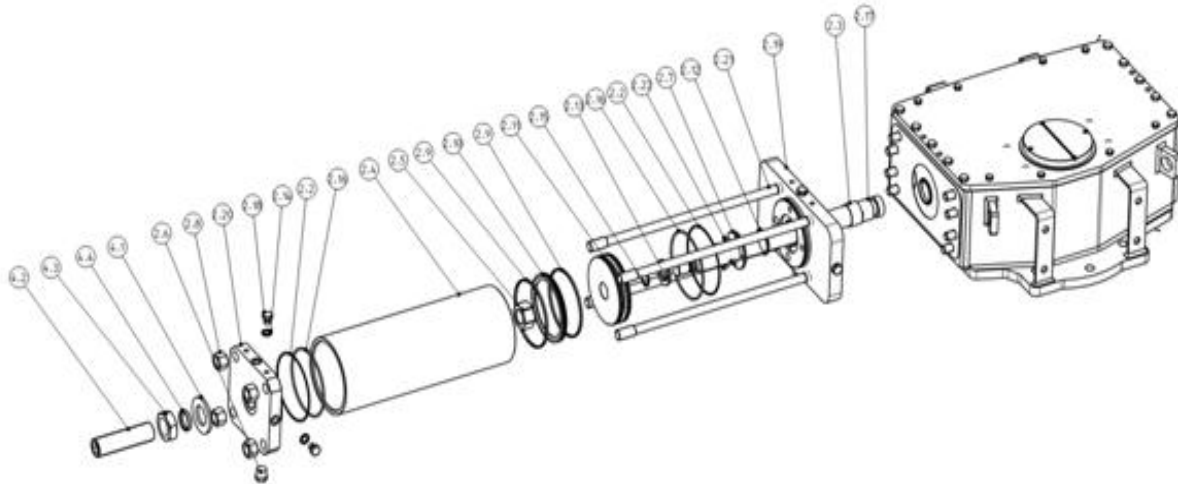


Fig. 15 – Gas/Hydraulic cylinder seals replacement

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-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.

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-assembly

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.

<p><b>Important</b></p> 	<p><b>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.</b></p>
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## 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.**

<b>AGIP MU EP 2 or equivalent</b>	<b>AEROSHELL GREASE 7 or equivalent</b>
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 <sup>2</sup> /s	Density : 966 kg/m <sup>3</sup> 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.**


<b>SHELL NATURELLE HF-E 15</b>	<b>Alternative: AGIP ARNICA 22</b>
To be used in standard temperature conditions (-20°C/+100°C)	To be used in standard temperature conditions (-20°C/+100°C)
Manufacturer: Shell	Manufacturer: Agip
Viscosity at 40°C: 14,1 cSt	Viscosity at 40°C: 22 cSt
Viscosity at 100°C: 4,20 cSt	Viscosity at 100°C: 4,94 cSt
Viscosity Index: 232	Viscosity Index: 157
Flash point COC: 202 °C	Flash point COC: 192 °C
Pour Point: < -54 °C	Pour Point: < -39 °C
Mass density at 15°C: 0,892 kg/l	Mass density at 15°C: 0,857 kg/l


## 9 TROUBLESHOOTING


Event	Possible cause	Remedy
Actuator doesn't work properly	Lack of pressure 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
	Exhaust port blocked	Remove and clean the exhaust port silencers and replace
	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 gas or 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 gas or 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

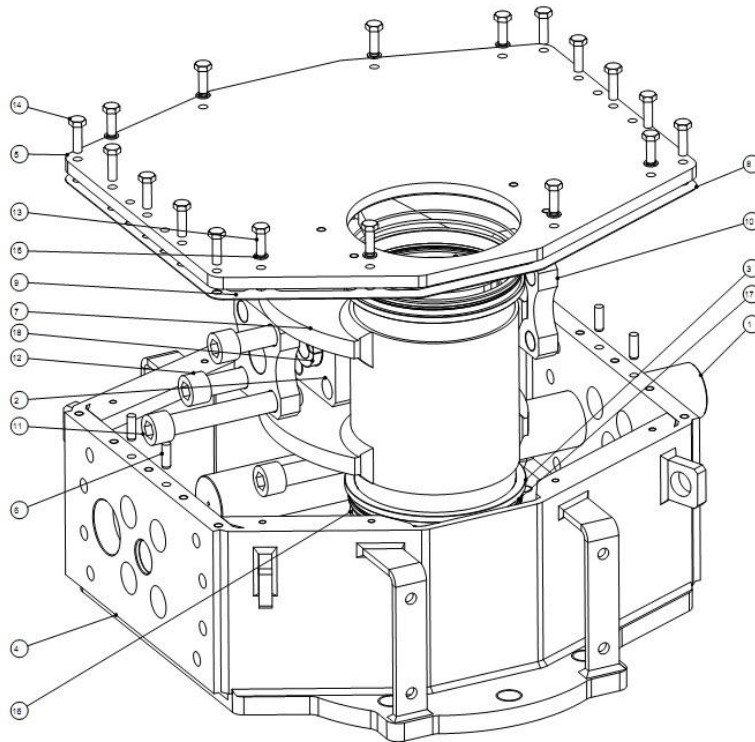
This section includes the drawings and parts lists of each component and subassembly of RTQD series.

<b>Important</b> 	<b>When ordering spare parts, please indicate the serial number embossed on the actuator nameplate.</b>
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<b>Important</b> 	<b>When ordering spare parts, please refer to the spare part kit on the attached drawings.</b>
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<b>Important</b> 	<b>When ordering spare parts, use ONLY original STI spare parts.</b>
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## 10.1 Scotch yoke mechanism



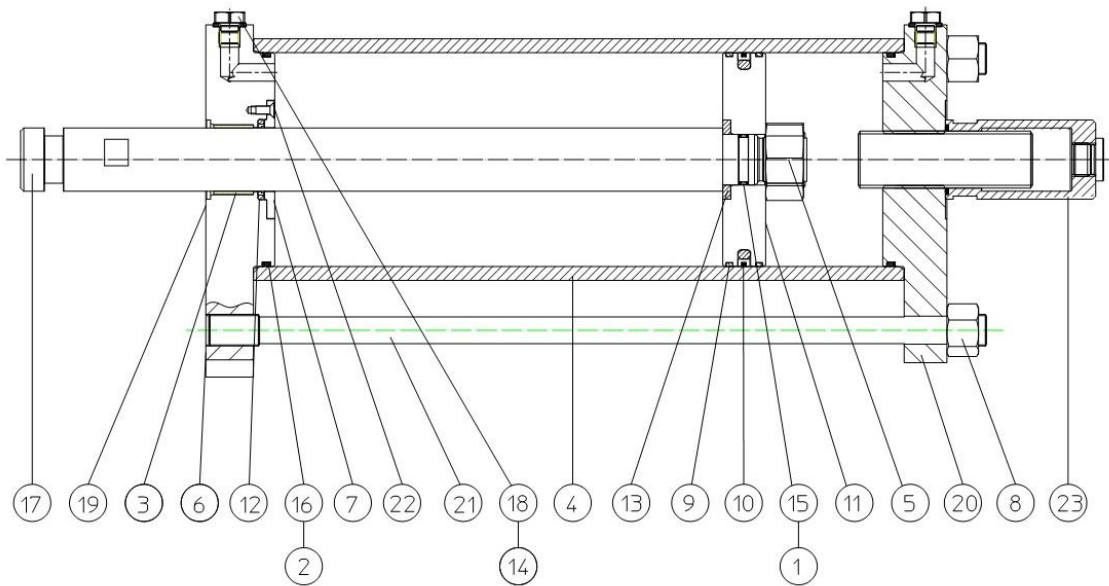
**Scotch yoke mechanism part list**

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



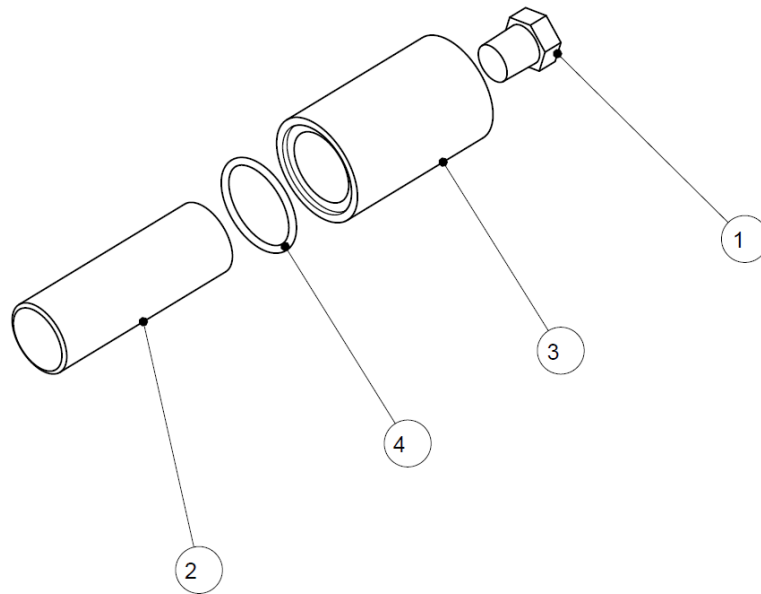
**Double acting gas/hydraulic cylinder part list**

Item	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

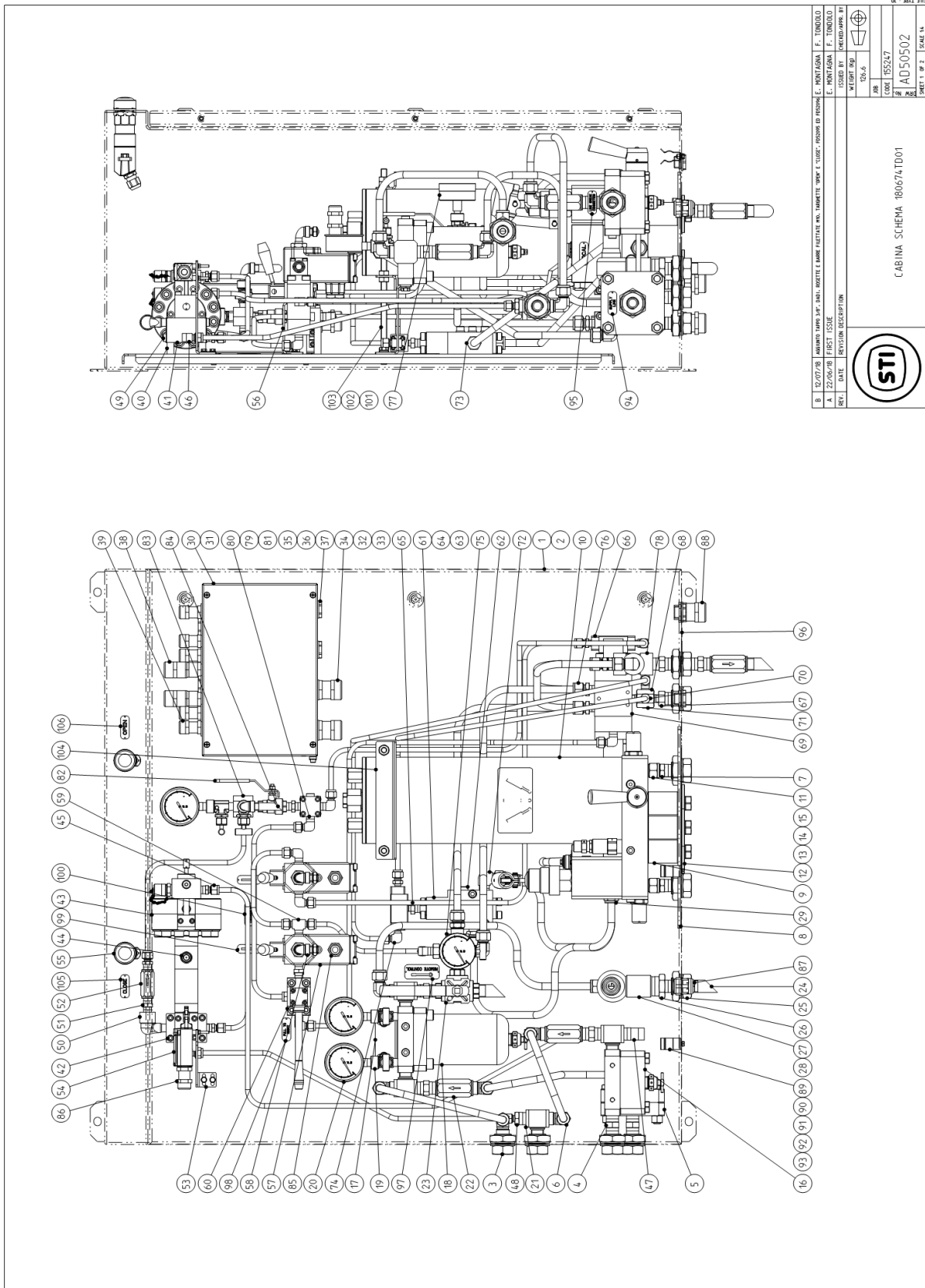


**Stop protection assembly part list**

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



REV.	DATE	REVISION DESCRIPTION	ISSUED BY	CHECKED BY
A	22/06/18	FIRST ISSUE	E. MONTAGNA	F. TONDOLO
B	12/07/18	ARRIVO NANO 3/4" ANALOGICHE E MANE PLETICHE IN TUBICAZIONE ID PRESSIONE	E. MONTAGNA	F. TONDOLO

W/FIGHT INQ.	106.6
JOB	CODE 155247
NO.	AD 50502
SCALE	SCALE 1:1
FILE TYPE	3D

CABINA SCHEMA 180674.TD01



DRAWING SIZE : A2-HORIZONTAL

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POS.	Q.TÀ	DESCRIZIONE	DIMENSIONI	MATERIALE	CODICE	N° DISEGNO	RICAMBIO
1	1	FORATURA CASSA ILINX 1000x1000x450	-	ASTM A240/A240M TP316L	-	F050501	
2	1	FORATURA PIASTRA INTERNA ILINX	-	ASTM A240/A240M TP316L	155127	F050500	
3	8	KIT PASSAPARETE 1/2" NPT-F 1/2" NPT-F (IDIELETRICO)	-	VEDI TABELLA	154914	ZD46578_1	
4	7	NIPPLINO INOXRIVA	1/2" NPT - AUX2807 CL.3000	AISI 316L	27253	-	
5	1	FILTRO MECCANICO GAS PN105	-	VEDI TABELLA	154913	AD51825	
6	10	Swagelok Elbow Fitting SS-12M0-2-8	Pipe 1/2"NPT-Tube Ø12mm	AISI 316	48195	-	
7	2	Swagelok straight adapter SS-16-MTA-1-8	Tube Ø16mm - Pipe 1/2" NPT	AISI 316	113373	-	
8	1	PIASTRA DI RINFORZO FONDO CASSA PER GRUPPO HP	-	ASTM A240/A240M TP316	155598	F052095	
9	3	DISTANZIALE D117 De40 H52	-	ASTM A276/A276M TP316	155208	F051979	
10	1	COMANDO MANUALE HP DM13 DE PREVALENZA REMOTA (ASSIEME)	-	VEDI TABELLA	153979	AD51782	
11	2	Swagelok elbow fitting SS-16M0-2-12	Tube Ø16mm - 3/4" male NPT	AISI 316	104272	-	
12	3	ROSETTA CON CAVA OR D117 De65 Sp.5	-	ASTM A240/A240M TP316	155209	F051980	
13	3	O-RING 3225	Ø 56,82 r2,62	-	NBR 70 SHORE	39174	□
14	3	Seal washer U16.70-24.00-1.50 (H16)	Øi=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 CONDENZA PN105 CONNESSIONI FILETTATE	-	VEDI TABELLA	154912	AD51829	
17	1	KIT STAFFA SUPPORTO FILTRO GAS STI	-	VEDI TABELLA	155211	ZD51989	
18	1	FILTRO DISIDRAT. / SEPAR. DI CONDENZA PN105 CONNESSIONI FILETTATE	-	VEDI TABELLA	154162	AD51805	
19	5	RUBINETTO A SPILLO - INDRA	MOD 015-BB-DLN-T	AISI 316	145893	-	
20	3	MANOMETRO D63 - 1/4" NPT	WIKA 232.50.063 0+100Bar	AISI 316	154723	-	
21	4	CONNECTOR	De 50 x 50	AISI 316	108157	FD35185	
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-H12-XX-00	AISI 316	154527	-	□
24	3	EXHAUST PIPE (INSTANCE FD20727_53)	1/2" x 53	AISI 316	125953	FD20727	
25	2	KIT PASSAPARETE 1/2" NPT-F 1/2" NPT-F	-	VEDI TABELLA	124308	ZD46578	
26	1	NIPPLINO INOXRIVA	1/2" NPT x 1" NPT - AUX2819	AISI 316L	44220	-	
27	1	VALVOLA DI SICUREZZA NGI	E10-LS 1/2"	AISI 316	154295	-	
28	1	PROLUNGA INOXRIVA	1/2" NPT - AUX3104 S.3000	AISI 316L	99224	-	
29	4	Swagelok Straight Fitting SS-12M0-1-8	Pipe 1/2"NPT-Tube Ø12mm	AISI 316	48194	-	
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	G125NY	NYLON PA6	109774	-	
33	4	DADO RCN	L 125 ON	OTTONE NICHELATO	114005	-	
34	2	PRESSACAVO RCN	KIT RN 25-125-EP-ON-IP66/68	OTTONE NICHELATO	153699	-	
35	13	GUARNIZIONE RCN	G120NY	NYLON PA6	109167	-	
36	13	DADO RCN	L 120 ON	OTTONE NICHELATO	110846	-	
37	6	MALE PLUG RCN mod. T-120-ON	H20x1,5	OTTONE NICHELATO	109490	-	
38	2	PRESSACAVO RCN	RAD-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	4	DISTANZIALE DA TUBO	De.12 Sp.1 L.20	ASTM A269/A269M TP316	121584	FD45675_1	
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	-	
44	5	SILENZIATORE 1/4" NPT (ASSIEME)	-	VEDI TABELLA	126808	AD46339	□
45	4	Swagelok Straight 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 fitting SS-8M0-2-8	Tube Ø8mm - Pipe 1/2"NPT	AISI 316	65725	-	
48	1	Swagelok Straight Fitting SS-8M0-1-8	Tube Ø8mm - Pipe 1/2"NPT	AISI 316	65650	-	
49	3	TAPPO	1/4" NPT AUX2352 PN350	AISI 316	62140	-	
50	1	INOXRIVA GOMITO 1/4" NPT	AUX1602 S.3000	AISI 316L	100463	-	
51	3	NIPPLINO INOXRIVA	1/4" NPT - AUX2803 CL.3000	AISI 316L	37320	-	
52	1	VALVOLA DI NON RITORNO - INOXRIVA	VRU-PG-110-N-0.1 1/4"	AISI 316	122294	-	
53	1	KIT SUPPORTO MICRO STAHL 8060	-	VEDI TABELLA	155212	ZD51985	
54	1	MICROINTERRUTTORE - STAHL	8060/2-2-WH-60	PLASTICA	153723	-	
55	2	LAMPADA - STAHL	8013/311-AL	PLASTICA	153724	-	
56	2	KIT SUPPORTO ELETTROVALVOLA ROTEX 30152	-	VEDI TABELLA	155217	ZD51987	
57	2	ELETTROVALVOLA 3/2NC - ROTEX	30152-0.8-2R-M4-24VDC-87NS-01-D10DE	ALLUMINIO	153322	-	
58	3	INOXRIVA GOMITO 1/4" NPT	RMX1102N	AISI 316	37319	-	
59	1	Swagelok Tee SS-8M0-3-4T1M	Tube Ø8mm - Pipe 1/4"NPT	AISI 316	48185	-	
60	1	VALVOLA 3/2 PILOT. PNEUM. - RIT. MANUALE ROTEX	GDAF9280-6.7-2R-52	ALLUMINIO-INOX	153444	-	
61	1	VALVOLA 2/2 PILOT. PNEUM. - RIT. MOLLA BIFOLD	FP15.H1.06/22/S/G	AISI 316L	153591	-	
62	1	TAPPO	3/8" NPT AUX2353 PN350	AISI 316	89219	-	
63	3	ROSETTA ELASTICA SPACCATA	Ø 8 UNI 1751-A	A4-70	50349	-	
64	3	VITE TCEI	M6x55 UNI 5931	A4-70	56058	-	
65	2	NIPPLINO INOXRIVA	1/8" NPT x 1/4" NPT - AUX2802	AISI 316L	17990	-	
66	2	VALVOLA SELETTORIE DI MASSIMA PRESSIONE	-	VEDI TABELLA	154147	AD51741	
67	3	RIDUZIONE INOXRIVA	1/2"x1/4"NPT AUX2010 CL.6000	AISI 316L	28304	-	
68	2	NIPPLINO 2x1/4"NPT-M + N"1x1/4"NPT-F + N"1x1/8"NPT-F	-	ASTM A276/A276M TP316	117340	FD42821	
69	2	VALVOLA 3/2 PILOT. PNEUM. - RIT. MOLLA ROTEX	GDAF9210-6.7-2R-52	ALLUMINIO-INOX	153335	-	
70	3	Swagelok Straight fitting SS-8-M0-1-2	Tube Ø8mm - Pipe 1/8" NPT	AISI 316	47757	-	
71	2	TAPPO	1/8" NPT AUX2351 PN350	AISI 316	67748	-	
72	1	Swagelok elbow fitting SS-12M0-2-6	Tube Ø12 - Pipe 3/8" NPT	AISI 316	152099	-	
73	1	Swagelok Straight Fitting SS-12M0-1-6	Tube Ø12 - Pipe 3/8" NPT	AISI 316	154915	-	
74	2	Swagelok elbow fitting SS-8-M0-2-2	Tube Ø8 - Pipe 1/8" NPT	AISI 316	47733	-	
75	1	BLOCCETTO	De 50 x 70	XSCNIMO T7-12-2 (TP316) EN 10088-1	56063	FD 10678	
76	4	Swagelok straight fitting SS-12M0-1-4	Tube Ø12mm - Pipe 1/4"NPT	AISI 316	51812	-	
77	1	MANOMETRO D63 - 1/4" NPT	WIKA 233.50.63	AISI 316	153629	-	□
78	1	RACCORDO T 1/2" NPT	AUX3504 S.3000	AISI 316L	154979	-	
79	4	DISTANZIALE DA TUBO	De.12 Sp.1 L.50	ASTM A269/A269M TP316	121946	FD45675_3	
80	1	BLOCCETTO CONNESSIONI N"4x1/4"NPT-F	-	ASTM A276/A276M TP316	146201	F050543	
81	4	VITE TCEI	M5x90 UNI 5931	A4-70	107677	-	
82	1	RUBINETTO A SFERA - IVR	mod.660 1/4" NPT	AISI 316	28998	-	
83	1	BLOCCETTO	CH.32 x 49	XSCNIMO T7-12-2 (TP316) EN 10088-1	56093	FD 10692	
84	1	EXHAUST PIPE	1/4" x 53	ASTM A269/A269M TP316	91501	FD23584	
85	2	PRESSACAVO RCN	RN 16-7-N20-EP-ON-IP66/68	OTTONE NICHELATO	151751	-	
86	1	PRESSACAVO RCN	RN 16-7-116-EP-ON-IP66/68	OTTONE NICHELATO	153721	-	
87	1	BREATHER GLAND STAHL	8162 M25x1,5	POLYAMIDE	87864	-	
88	2	PRESSACAVO RCN	RN 25-15.5-125-EP-ON-IP66/68	OTTONE NICHELATO	153391	-	
89	2	MOLLA A CLIP PER SUPPORTO LEVA COMANDO HP	-	ASTM A240/A240M TP316	110400	FD41059	
90	2	ROSETTA ELASTICA SPACCATA	Ø 5 UNI 1751-A	A4-70	50371	-	
91	2	DADO MEDIO	M5 UNI 5588-65	A4-70	64593	-	
92	2	Seal washer US.70-9.00-1.00 (M5)	Øi=5,7 - De=9 - Sp=1	-	SS316 + NBR	155222	□
93	2	VITE TE	M5x10 UNI 5739	-	A4-70	56037	-
94	1	TARGHETTA "SUPPLY LINE"	-	ASTM A240/A240M TP316	142038	FD45076	
95	1	TARGHETTA "LINE BREAK CONNECTION"	-	ASTM A240/A240M TP316	155218	F051990	
96	2	TARGHETTA ELECTRIC INLET	-	ASTM A240/A240M TP316	134699	FD46532_1	
97	1	TARGHETTA "REMOTE CONTROL"	-	ASTM A240/A240M TP316	155219	F051991	
98	1	TARGHETTA "PULL TO RESET"	-	ASTM A240/A240M TP316	155220	F051992	
99	2	TARGHETTA FRECCIA	-	ASTM A240/A240M TP316	110405	FD41085	
100	1	TARGHETTA "PUSH TO OVERRIDE"	-	ASTM A240/A240M TP316	155221	F051993	
101	6	ROSETTA ELASTICA SPACCATA	Ø 10 UNI 1751-A	A4-70	50379	-	
102	12	DADO MEDIO	M10 UNI 5588-65	A4-70	52314	-	
103	2	BARRA FILETTATA	M10x340	AISI 316	-	-	
104	2	STAFFA BLOCCAGGIO SERBATOIO HP	-	ASTM A240/A240M TP316	155599	F052096	
105	1	TARGHETTA "CLOSE"	-	ASTM A240/A240M TP316	110395	FD41082	
106	1	TARGHETTA "OPEN"	-	ASTM A240/A240M TP316	110394	FD41081	


## 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

<p><b>Warning</b></p> 	<p>The disassembling and further demolition of actuator parts should be made from specialized personnel.</p> <p>Before disassembling the actuator it is mandatory:</p> <ul style="list-style-type: none"> <li>- to close the gas supply lines,</li> <li>- to vent, through the proper vent valves, the gas storage tank and the gas reference tank,</li> <li>- to vent the gas cylinder and control unit through the vent valve mounted into the cabinet.</li> </ul> <p>The gas supply lines must remain close and the vent valves must remain open during all the disassembling operations.</p> <p>Refer to section 5.1 and section 5.3 to lifting and storage procedure.</p>
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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

<p><b>Warning</b></p> 	<p>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.</p>
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<p><b>Important</b></p> 	<p>In all cases check local authority regulations before disposal.</p>
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## 14 Appendix A

# 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 valve 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.



#### 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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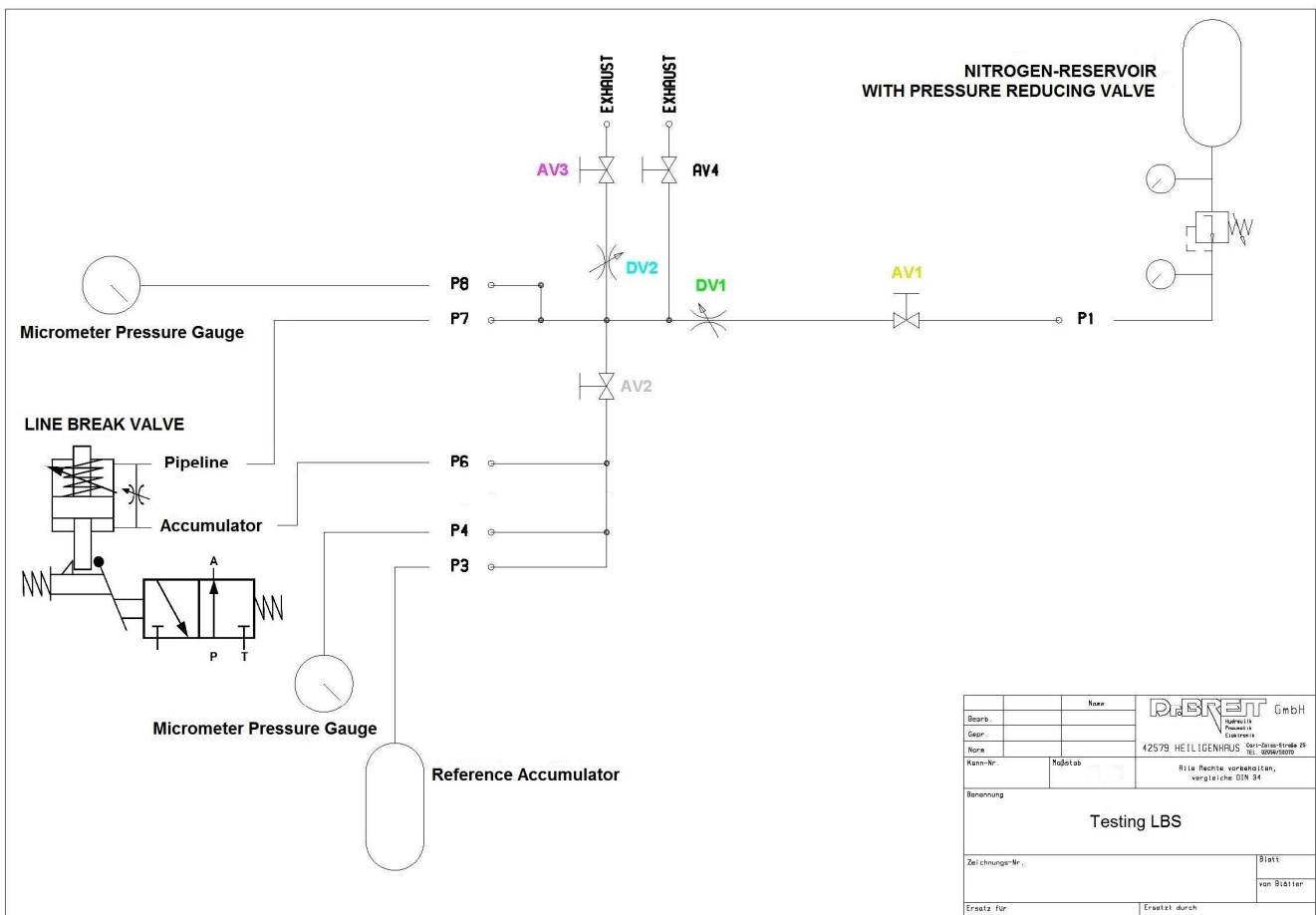
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Benennung			
Testing LBS			
Zeichnungs-Nr.			Blatt
			von Blätter
Erstellt für		Erstellt durch	

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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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