

MOUNTING AND  
OPERATING INSTRUCTIONS

**EB 8318 EN**

Translation of original instructions



Type RVXXXD Pneumatic Actuator



Type RVXXXR Pneumatic Actuator

**Pneumatic Actuator 3276**

**Type RV350D/R, Type RV370D/R, Type RV380D/R, Type RV390D/R**

Actuator area: 258, 387, 645 and 1032 cm<sup>2</sup>

## Note on these mounting and operating instructions

These mounting and operating instructions assist you in mounting and operating the device safely. The instructions are binding for handling RINGO devices. The images shown in these instructions are for illustration purposes only. The actual product may vary.

- For the safe and proper use of these instructions, read them carefully and keep them for later reference.
- If you have any questions about these instructions, contact RINGO's After-sales Service (Aftersales-ringo-es@samsongroup.com).

### Definition of signal words

#### **DANGER**

*Hazardous situations which, if not avoided, will result in death or serious injury*

#### **WARNING**

*Hazardous situations which, if not avoided, could result in death or serious injury*

#### **NOTICE**

*Property damage message or malfunction*

#### **Note**

*Additional information*

#### **Tip**

*Recommended action*

<b>1</b>	<b>Safety instructions and measures</b> .....	<b>1-1</b>
1.1	Notes on possible severe personal injury .....	1-3
1.2	Notes on possible personal injury .....	1-4
1.3	Notes on possible property damage .....	1-5
1.4	Warnings on the device.....	1-7
<b>2</b>	<b>Markings on the device</b> .....	<b>2-1</b>
2.1	Actuator nameplate.....	2-1
<b>3</b>	<b>Design and principle of operation</b> .....	<b>3-1</b>
3.1	Direction of action.....	3-1
3.2	Fail-safe action .....	3-8
3.3	Versions .....	3-8
3.4	Accessories .....	3-8
3.5	Technical data .....	3-10
<b>4</b>	<b>Shipment and on-site transport</b> .....	<b>4-1</b>
4.1	Accepting the delivered goods .....	4-1
4.2	Removing the packaging from the actuator .....	4-1
4.3	Transporting and lifting the actuator .....	4-1
4.3.1	Transporting the actuator.....	4-2
4.3.2	Lifting the actuator .....	4-2
4.4	Storing the actuator.....	4-4
<b>5</b>	<b>Installation</b> .....	<b>5-1</b>
5.1	Preparation for installation.....	5-1
5.2	Mounting the device.....	5-1
5.2.1	Pneumatic connection.....	5-2
5.2.2	Setting the actuator .....	5-2
5.2.3	Mounting the actuator onto the valve.....	5-3
<b>6</b>	<b>Operation</b> .....	<b>6-1</b>
6.1	Throttling service.....	6-1
6.2	Manual mode (versions with top-mounted or side-mounted handwheel only) ...	6-1
6.2.1	Neutral position of top-mounted handwheel.....	6-2
6.2.2	Neutral position of side-mounted handwheel.....	6-2
<b>7</b>	<b>Malfunctions</b> .....	<b>7-1</b>
7.1	Troubleshooting .....	7-1
7.2	Emergency action .....	7-2

## Contents

<b>8</b>	<b>Servicing.....</b>	<b>8-1</b>
8.1	Periodic testing .....	8-2
8.1	Service work preparations .....	8-2
8.2	Installing the valve after service work.....	8-3
8.3	Service work.....	8-3
8.3.1	Replacing the diaphragm .....	8-3
8.3.2	Replacing the gaskets (Type RVXXXR/fail-close only).....	8-5
8.4	Ordering spare parts and operating supplies .....	8-8
<b>9</b>	<b>Decommissioning .....</b>	<b>9-1</b>
<b>10</b>	<b>Removal .....</b>	<b>10-1</b>
10.1	Removing the actuator from the valve .....	10-2
10.2	Relieving the spring compression in the actuator.....	10-2
<b>11</b>	<b>Repairs .....</b>	<b>11-1</b>
11.1	Returning devices to RINGO .....	11-1
<b>12</b>	<b>Disposal.....</b>	<b>12-1</b>
<b>13</b>	<b>Appendix.....</b>	<b>13-1</b>
13.1	Tightening torques, lubricants and tools .....	13-1
13.2	Spare parts .....	13-11
13.3	After-sales service .....	13-16

# 1 Safety instructions and measures

## Intended use

The Types RV350D/R, RV370D/R, RV380D/R and RV390D/R Pneumatic Actuators are designed for operating a mounted globe valve. In combination with the valve, the actuators are used to shut off the flow of liquids, gases or vapors in the pipeline. Depending on the version, the actuators are suitable for throttling or on/off service. The actuators can be used in processing and industrial plants.

The actuators are designed to operate under exactly defined conditions (e.g. thrust, travel). Therefore, operators must ensure that the actuators are only used in operating conditions that meet the specifications used for sizing the actuators at the ordering stage. In case operators intend to use the actuators in applications or conditions other than those specified, contact RINGO.

RINGO does not assume any liability for damage resulting from the failure to use the device for its intended purpose or for damage caused by external forces or any other external factors.

→ Refer to the technical data and nameplate for limits and fields of application as well as possible uses.

## Reasonably foreseeable misuse

The actuator is not suitable for the following applications:

- Use outside the limits defined during sizing and by the technical data
- Use outside the limits defined by the accessories connected to the actuator

Furthermore, the following activities do not comply with the intended use:

- Use of non-original spare parts
- Performing service and repair work not described

## Qualifications of operating personnel

The actuator must be mounted, started up, serviced and repaired by fully trained and qualified personnel only; the accepted industry codes and practices must be observed. According to these mounting and operating instructions, trained personnel refers to individuals who are able to judge the work they are assigned to and recognize possible hazards due to their specialized training, their knowledge and experience as well as their knowledge of the applicable standards.

## Safety instructions and measures

Explosion-protected versions of this device must be operated only by personnel who has undergone special training or instructions or who is authorized to work on explosion-protected devices in hazardous areas.

### Personal protective equipment

RINGO recommends wearing the following personal protective equipment when handling the pneumatic actuator:

- Protective gloves and safety footwear when mounting or removing the actuator
  - Eye protection and hearing protection while the actuator is operating.
- ➔ Check with the plant operator for details on further protective equipment.

### Revisions and other modifications

Revisions, conversions or other modifications of the product are not authorized by RINGO. They are performed at the user's own risk and may lead to safety hazards, for example. Furthermore, the product may no longer meet the requirements for its intended use.

### Safety features

There are two versions of the Types RV350D/R, RV370D/R, RV380D/R and RV390D/R Pneumatic Actuators with different fail-safe action.

The actuator stem of the version D (direct-acting) retracts upon the air supply failure and pulls the plug or piston stem of the mounted globe valve upward.

The actuator stem of the version R (reverse-acting) extends upon the air supply failure. It pushes the plug or piston stem of the mounted globe valve downward.

The fail-safe action is specified on the actuator nameplate.

### Warning against residual hazards

To avoid personal injury or property damage, plant operators and operating personnel must prevent hazards that could be caused in the actuator by the signal pressure, stored spring energy or moving parts by taking appropriate precautions. Plant operators and operating personnel must observe all hazard statements, warnings and caution notes in these mounting and operating instructions.

Hazards resulting from the special working conditions at the installation site of the actuator must be identified in a risk assessment and prevented through the corresponding safety instructions drawn up by the operator.

### Responsibilities of the operator

Operators are responsible for proper use and compliance with the safety regulations. Operators are obliged to provide these mounting and operating instructions as well as the referenced documents to the operating personnel and to instruct them in proper operation. Furthermore, operators must ensure that operating personnel or third parties are not exposed to any danger.

### Responsibilities of operating personnel

Operating personnel must read and understand these mounting and operating instructions as well as the referenced documents and observe the specified hazard statements, warnings and caution notes. Furthermore, operating personnel must be familiar with the applicable health, safety and accident prevention regulations and comply with them.

### Referenced standards, directives and regulations

According to the ignition hazard assessment performed in accordance with Clause 5.2 of ISO 80079-36, the non-electrical actuators do not have their own potential ignition source even in the rare incident of an operating fault. As a result, they do not fall within the scope of Directive 2014/34/EU.

→ For connection to the equipotential bonding system, observe the requirements specified in Clause 6.4 of EN 60079-14 (VDE 0165-1).

### Referenced documents

The following documents apply in addition to these mounting and operating instructions:

- Mounting and operating instructions for the valve on which it is mounted
- Mounting and operating instructions for mounted valve accessories (positioner, solenoid valve etc.)

## 1.1 Notes on possible severe personal injury

### DANGER

#### Risk of bursting in the actuator.

Actuators are pressurized. Improper opening can lead to actuator components bursting.

→ Before starting any work on the actuator, depressurize all plant sections affected and the actuator.

## 1.2 Notes on possible personal injury

### WARNING

#### **Crush hazard arising from moving parts.**

The actuator contains moving parts (actuator stem), which can injure hands or fingers if inserted into the actuator.

- Do not touch the actuator stem or insert hands or finger into the yoke or beneath the actuator stem while the air supply is connected to the actuator.
- While working on the actuator, disconnect and lock the pneumatic air supply as well as the control signal.
- Do not impede the movement of the actuator stem by inserting objects into the yoke.
- Before unblocking the actuator stem after it has become blocked (e.g. due to seizing up after remaining in the same position for a long time), release any stored energy in the actuator (e.g. spring compression). See section 'Relieving the spring compression in the actuator' in the 'Removal' chapter.

#### **Risk of personal injury when the actuator vents.**

The actuator is operated with air. As a result, air is vented during operation.

- Install the control valve in such a way that vent openings are not located at eye level and the actuator does not vent at eye level in the work position <sup>1)</sup>.
- Use suitable mufflers and vent plugs.
- Wear eye and hearing protection when working near the actuator.

#### **Risk of personal injury due to the preloaded spring.**

Actuators with preloaded spring are under tension.

- Only open the actuator housing to safely relieve the energy of the spring compression following the instructions in this document. See section 'Relieving the spring compression in the actuator' in the 'Removal' chapter.

<sup>1)</sup> If not described otherwise in the valve documentation, the work position for the control valve is the front view looking onto the operating controls (including valve accessories).



**⚠ WARNING****Exposure to hazardous substances poses a serious risk to health.**

Certain lubricants and cleaning agents are classified as hazardous substances. These substances have a special label and a material safety data sheet (MSDS) issued by the manufacturer.

- Make sure that an MSDS is available for any hazardous substance used. If necessary, contact the manufacturer to obtain an MSDS.
- Inform yourself about the hazardous substances and their correct handling.

**Risk of personal injury due to incorrect operation, use or installation as a result of information on the actuator being illegible.**

Over time, markings, labels and nameplates on the actuator may become covered with dirt or become illegible in some other way. As a result, hazards may go unnoticed and the necessary instructions not followed. There is a risk of personal injury.

- Keep all relevant markings and inscriptions on the device in a constantly legible state.
- Immediately renew damaged, missing or incorrect nameplates or labels.

## 1.3 Notes on possible property damage

**ⓘ NOTICE****Risk of actuator damage due to incorrectly attached slings.**

- Do not attach load-bearing slings to the handwheel or any other mounting parts.

**Risk of actuator damage due to over- or under-torquing.**

Observe the specified torques when tightening actuator components. Excessive tightening torques lead to parts wearing out more quickly. Parts that are not tightened far enough may loosen.

- Observe the specified tightening torques.

**Risk of actuator damage due to the use of unsuitable tools.**

Certain tools are required to work on the actuator.

- Only use tools approved by RINGO.

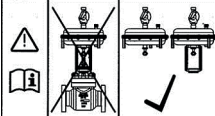
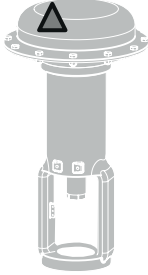

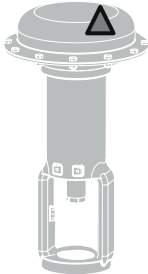
### NOTICE

#### **Risk of actuator damage due to the use of unsuitable lubricants.**

The lubricants to be used depend on the actuator material. Unsuitable lubricants may corrode and damage surfaces.

→ Only use lubricants approved by RINGO.

## 1.4 Warnings on the device

Warning symbols	Meaning of the warning	Location on the device
	<p>Warning against the incorrect use of the lifting eyelet/eyebolt or swivel hoist on the actuator. Only attach load-bearing slings to them to vertically lift the actuator on its own (without the valve).</p> <p>Do not use the lifting eyelets/eyebolts and the swivel hoist to vertically lift the entire control valve assembly.</p>	
	<p>Warning to indicate that the spring in the actuator is preloaded.</p> <p>Actuators with preloaded spring are under tension. Incorrect opening of the actuator can lead to personal injury due to the sudden and uncontrolled projection of parts.</p> <p>Before starting any work on the actuator, relieve the compression from the preloaded springs. See section 'Relieving the spring compression in the actuator' in the 'Removal' chapter.</p>	



## 2 Markings on the device

The nameplate shown was up to date at the time of publication of this document. The nameplate on the device may differ from the one shown.

### 2.1 Actuator nameplate

The nameplate is affixed to the valve body. It includes all details required to identify the device:

- 1 Type number
- 2 Data Matrix code
- 3 Number code
- 4 Country of origin
- 5 Actuator area
- 6 Diaphragm material
- 7 Bench range in psi
- 8 Bench range in bar
- 9 Thread between actuator stem and valve stem
- 10 Connecting thread
- 11 Permissible supply pressure  $p_{max}$  in psi
- 12 Permissible supply pressure  $p_{max}$  in bar
- 13 Operating travel in mm
- 14 Manufacturer specifications

Icons representing actuator versions:

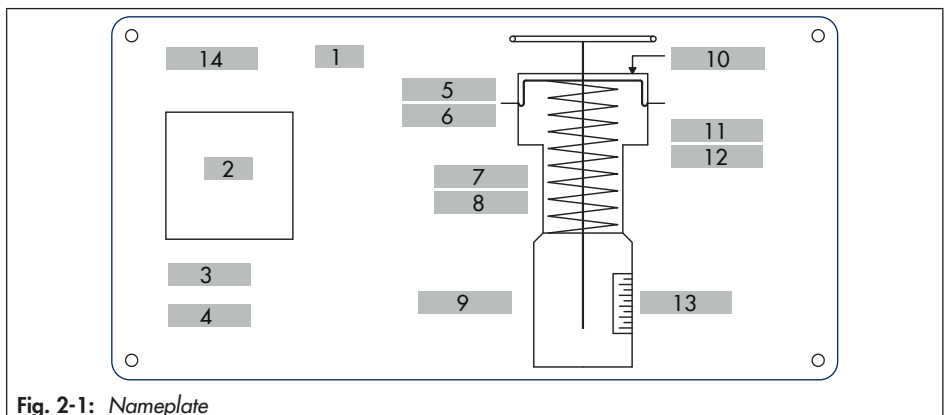
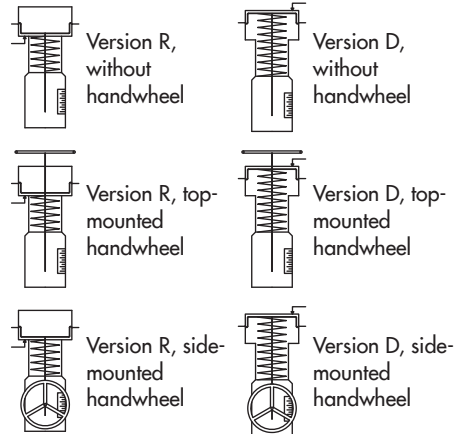


Fig. 2-1: Nameplate



### 3 Design and principle of operation

See Fig. 3-1 to Fig. 3-5

The Types RV350D/R, RV370D/R, RV380D/R and RV390D/R Pneumatic Actuators are mounted to Series 590 Valves (globe valves).

The actuator mainly consists of a housing with yoke (40), top (850) and bottom (900) diaphragm cases, diaphragm (911) with diaphragm plate (901), spring (595) with spring plate (904) as well as actuator stem (61).

The signal pressure  $p_{st}$  creates the force  $F = p_{st} \cdot A$  at the diaphragm surface  $A$ , which is opposed by the spring in the actuator. The bench range is determined by the spring and its compression, taking into account the rated travel. The travel is proportional to the signal pressure  $p_{st}$ . The direction of action of the actuator stem (fail-safe action) depends on the actuator version.

The stem connector (907) connects the actuator stem with the plug stem of the globe valve.

#### 3.1 Direction of action

There are two versions of the pneumatic actuators, which have a different direction of action. The direction of action is determined by the actuator design.

- **Version D (direct-acting, actuator stem retracts)**

With fail-safe action "actuator stem retracts", the compressed air is applied to

the signal pressure connection on the top diaphragm case (850) of the actuator.

- **Version R (reverse-acting, actuator stem extends)**

With fail-safe action "actuator stem extends", the compressed air is applied to the signal pressure connection on the bottom diaphragm case (900) of the actuator.

#### Signal pressure routing

In the version D ("actuator stem retracts"), the signal pressure is routed through the signal pressure connection (S) on the top diaphragm case (850) into the actuator and moves the actuator stem (61) downward opposing the spring force.

In the version R ("actuator stem extends"), the signal pressure is routed through the signal pressure connection (S) on the bottom diaphragm case (900) into the actuator and moves the actuator stem (61) upward opposing the spring force.

## Design and principle of operation

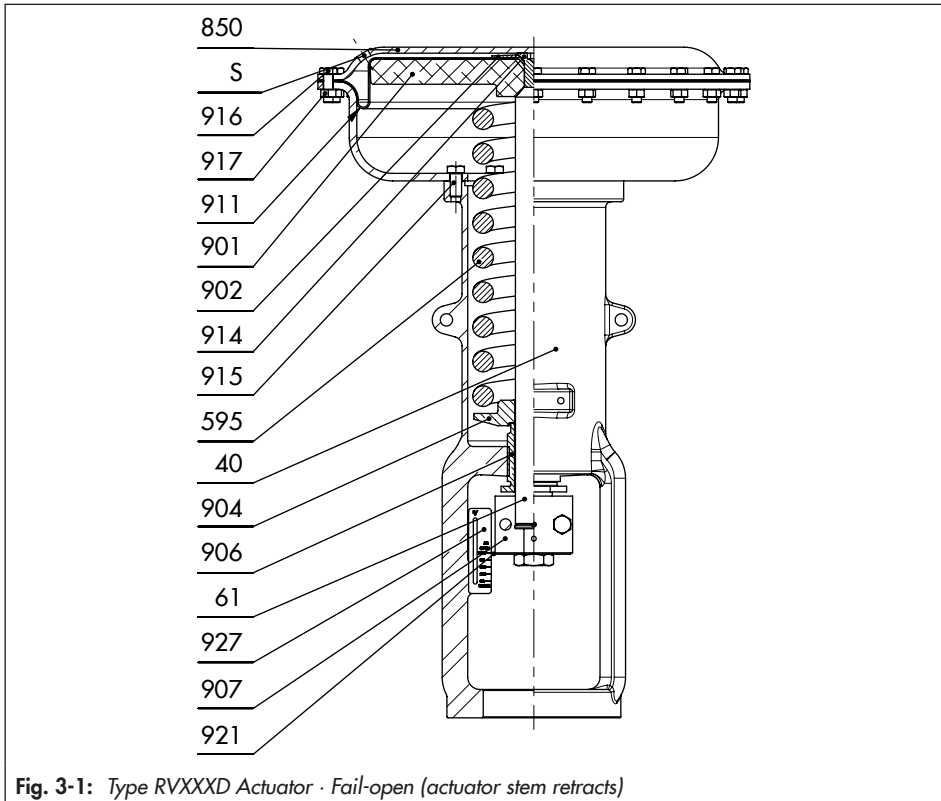
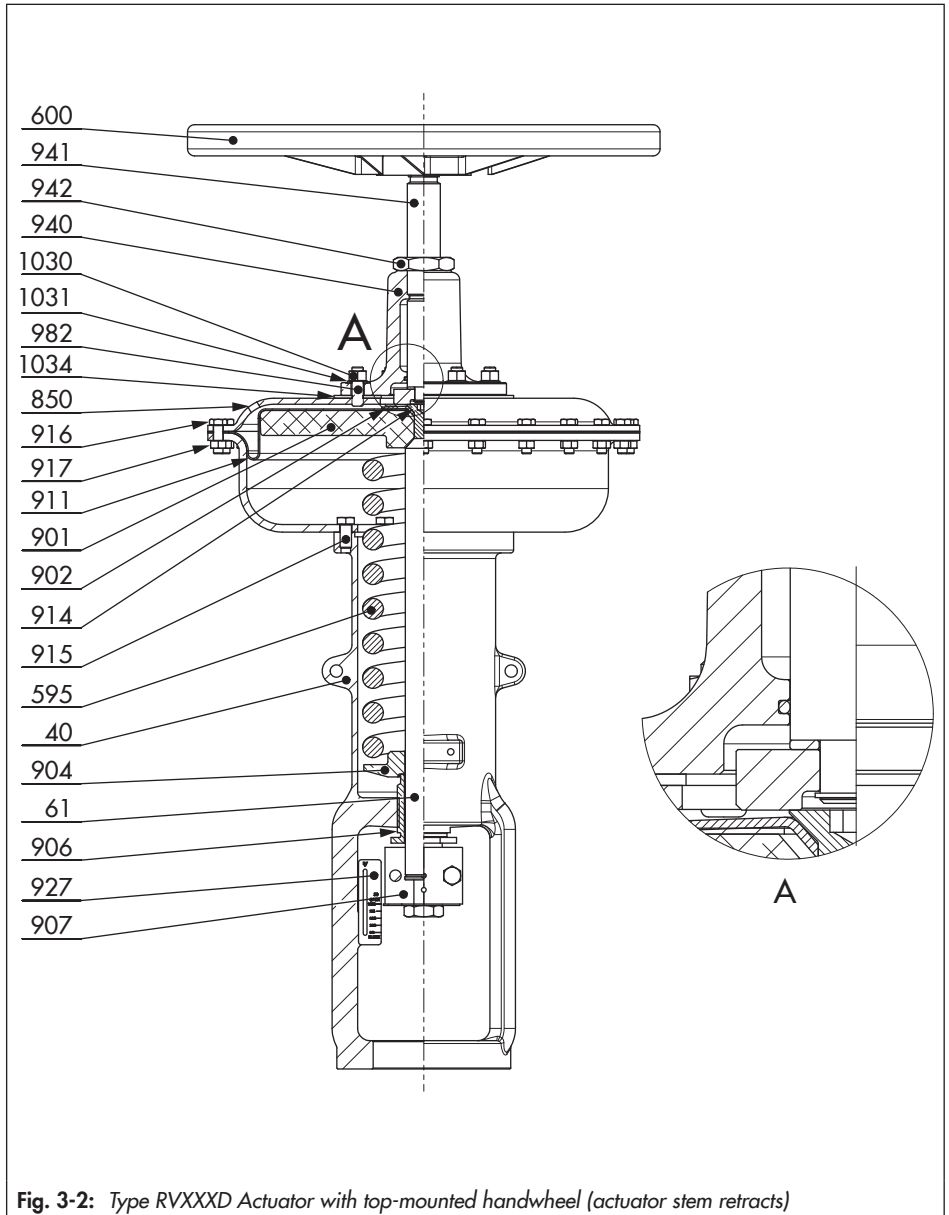


Fig. 3-1: Type RVXXD Actuator · Fail-open (actuator stem retracts)

### Legend for Fig. 3-1 and Fig. 3-2

40	Housing with yoke	914	Screw (to fasten diaphragm base and cover)	982	Diaphragm stud (top-mounted handwheel)
61	Actuator stem	915	Screw (bottom diaphragm case)	1030	Housing nut (top-mounted handwheel)
595	Spring	916	Bolt (diaphragm case)	1031	Housing washer (top-mounted handwheel)
600	Handwheel	917	Nut (diaphragm case)	1034	Seal (top diaphragm case for top-mounted handwheel)
850	Top diaphragm case	921	Travel indicator	S	Signal pressure connection
901	Diaphragm plate	927	Travel indicator		
902	Diaphragm holder	940	Handwheel housing		
904	Spring plate	941	Drive (handwheel)		
906	Spring adjuster	942	Drive nut		
907	Stem connector				
911	Diaphragm				





## Design and principle of operation

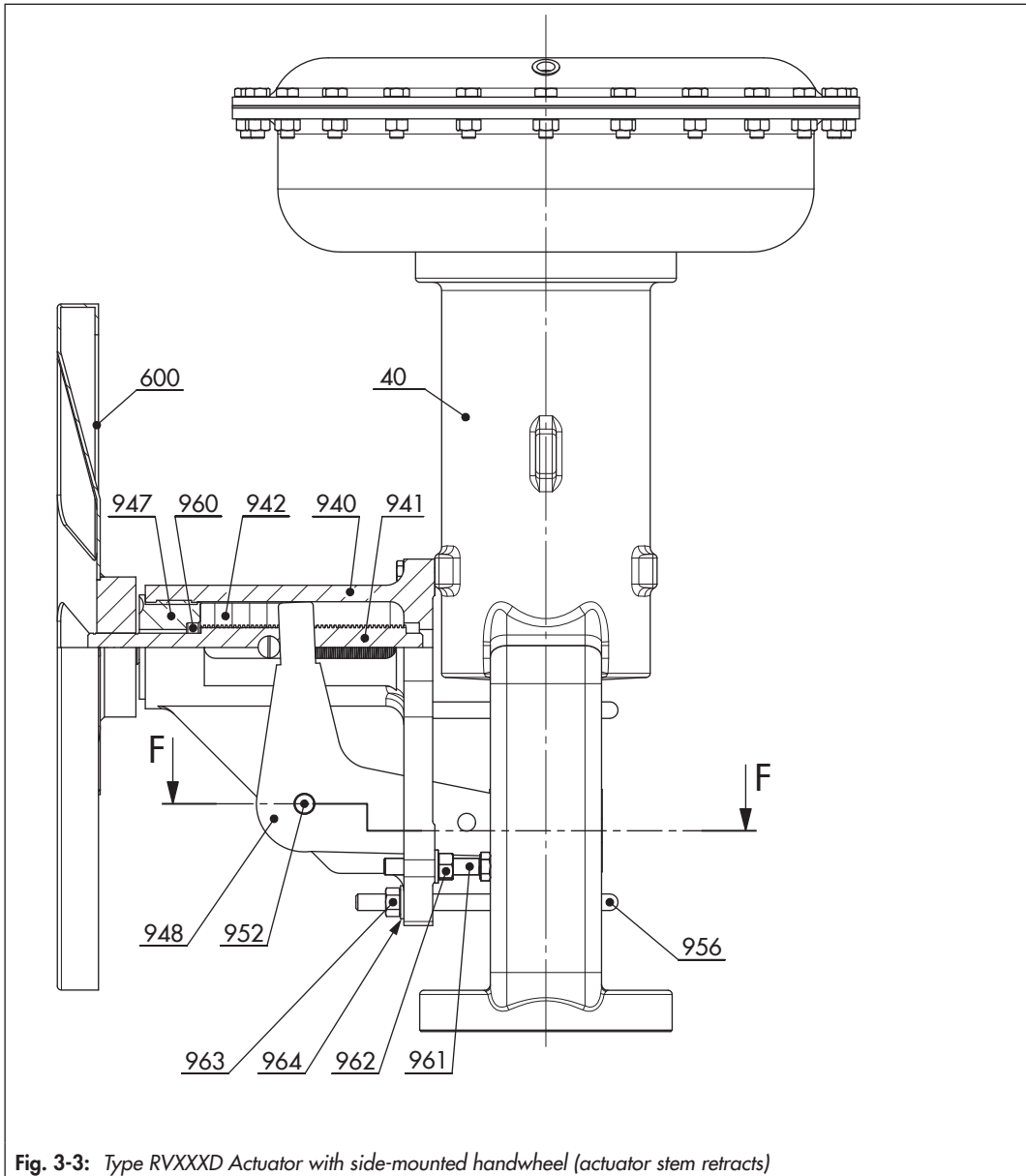
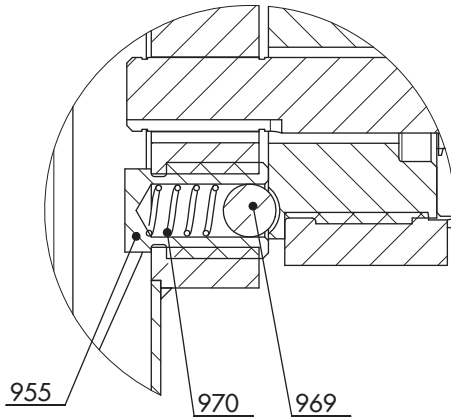
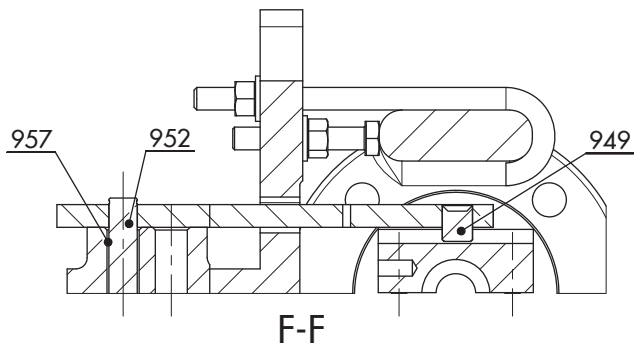


Fig. 3-3: Type RVXXXD Actuator with side-mounted handwheel (actuator stem retracts)



**Legend**

- 40 Housing with yoke
- 600 Handwheel
- 940 Handwheel housing
- 941 Drive (handwheel)
- 942 Drive nut
- 947 Bearing bushing (handwheel)
- 948 Lever arm
- 949 Drive pin (lever arm)
- 952 Pivot pin (lever arm)
- 955 Clamping bolt
- 956 Screw
- 957 Bushing for pivot pin (lever arm)
- 960 Bearing
- 961 Stop bolt (side-mounted handwheel)
- 962 Stop nut (side-mounted handwheel)
- 963 Nut
- 964 Washer
- 969 Ball
- 970 Spring



## Design and principle of operation

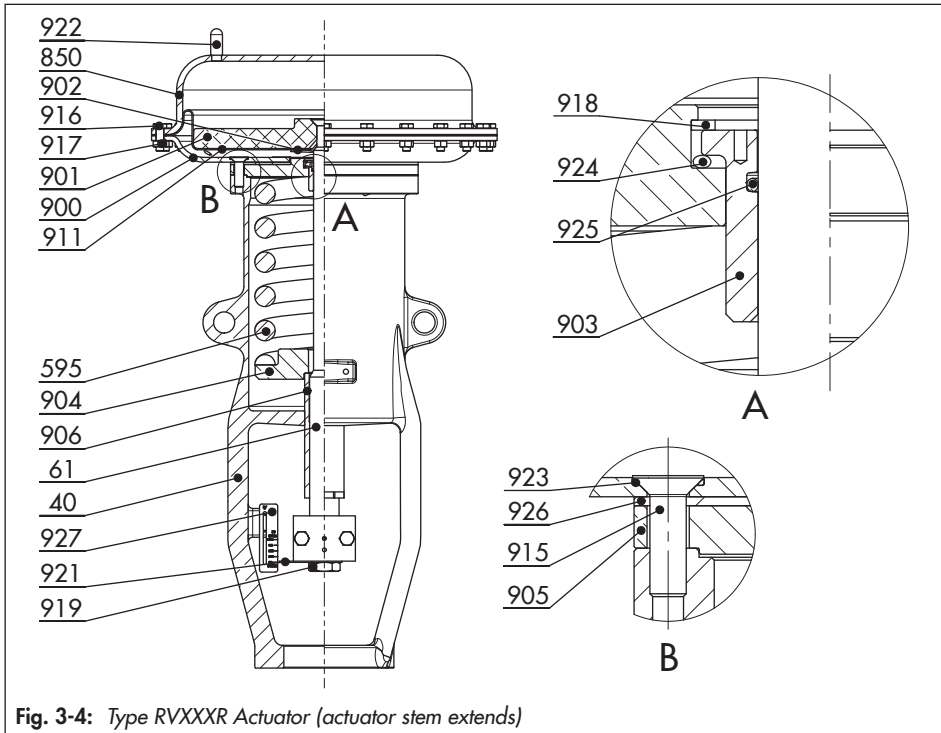


Fig. 3-4: Type RVXXXR Actuator (actuator stem extends)

### Legend for Fig. 3-4 and Fig. 3-5

40	Housing with yoke	905	Yoke flange	926	Seal (bottom diaphragm case)
61	Actuator stem	906	Spring adjuster	927	Travel indicator
352	Adjustment screw	907	Stem connector	940	Handwheel housing
557	Washer	911	Actuator diaphragm	941	Drive (handwheel)
595	Spring	915	Screw (bottom diaphragm case)	942	Drive nut
600	Handwheel	916	Bolt (diaphragm case)	1027	Anti-rotation fixture
770	Handwheel pin	917	Nut (diaphragm case)	1029	Housing bolt (top-mounted handwheel)
824	Actuator stem guard	918	Retaining ring (bushing)	1030	Housing nut (top-mounted handwheel)
825	Handwheel cap	919	Travel indicator nut		
850	Top diaphragm case	921	Travel indicator		
900	Bottom diaphragm case	922	Vent plug		
901	Diaphragm plate	923	O-ring (bottom diaphragm case)		
902	Diaphragm holder	924	Internal O-ring (bushing)		
903	Bushing	925	External O-ring (bushing)		
904	Spring plate				

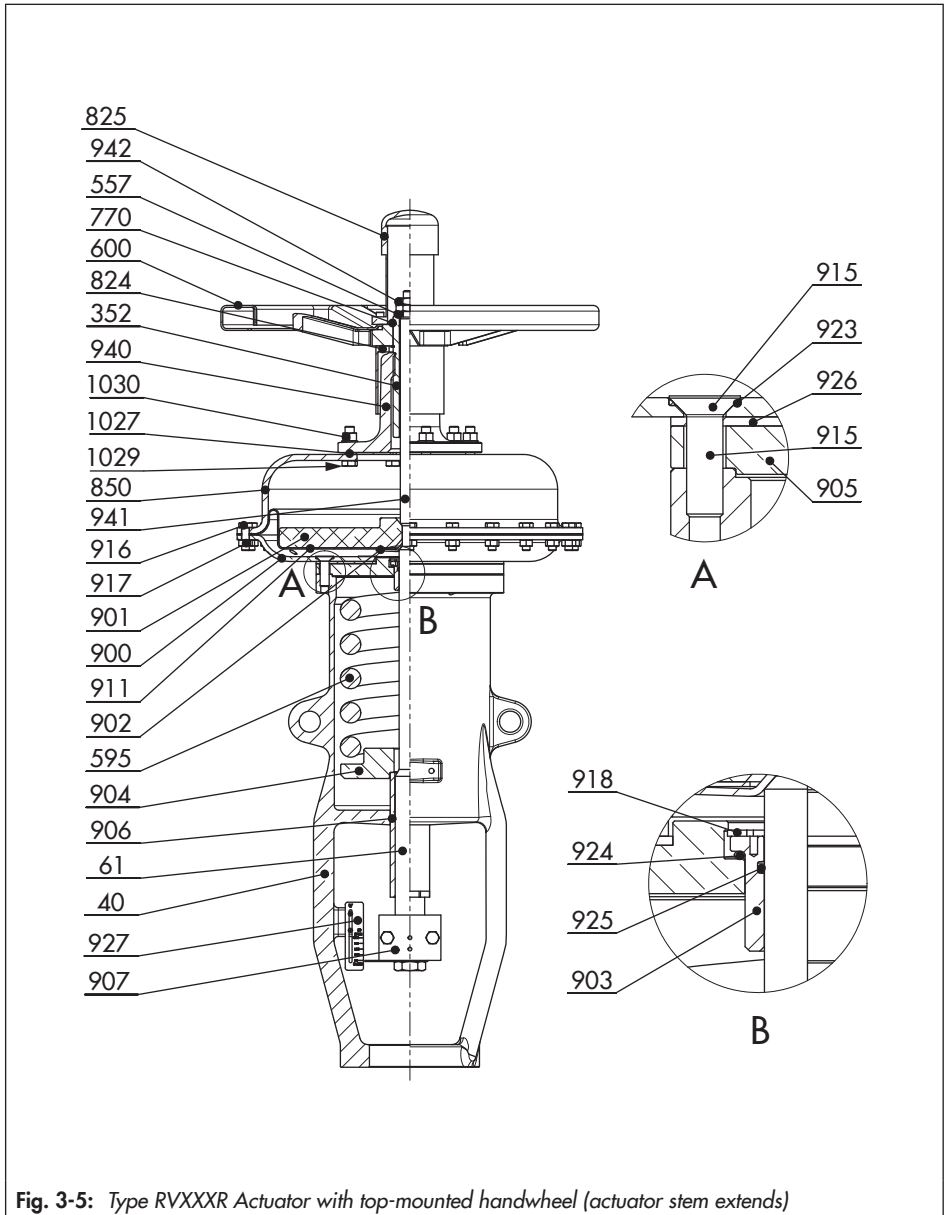


Fig. 3-5: Type RVXXXR Actuator with top-mounted handwheel (actuator stem extends)

### 3.2 Fail-safe action

---

**i Note**

*The listed fail-safe actions apply to SAMSON Series 590 Valves (globe valves).*

---

When the signal pressure is reduced or the supply air fails, the actuator version determines the direction of action and, as a result, the fail-safe position of the valve.

**Version with handwheel:** in the active manual mode (the handwheel is not in the neutral position), the valve is not moved to the fail-safe position even upon failure of the supply air.

#### **Actuator stem extends (version R, reverse-acting)**

When the signal pressure is reduced or the control signal fails, the spring moves the actuator stem downward and closes the globe valve. The valve opens when the signal pressure is increased enough to overcome the spring force.

#### **Actuator stem retracts (version D, direct-acting)**

When the signal pressure is reduced or the control signal fails, the spring moves the actuator stem upward and opens the globe valve. The valve closes when the signal pressure is increased enough to overcome the spring force.

### 3.3 Versions

The Type RV350..., Type RV370..., Type RV380... and Type RV390... Pneumatic Actuators are available in the version D or R with 258, 387, 645 or 1032 cm<sup>2</sup> actuator areas.

#### **Version with handwheel**

All versions can be fitted with an additional top-mounted handwheel (see Fig. 3-2 and Fig. 3-5) or an additional side-mounted handwheel (see Fig. 3-3). The actuator stem position can be adjusted using the handwheel.

### 3.4 Accessories

---

**i Note**

*Refer to the mounting and operating instructions of the valve accessories to be mounted for more details on their attachment.*

---

#### **Vent plugs**

Vent plugs are screwed into the exhaust air ports of pneumatic and electropneumatic devices. They ensure that any exhaust air that forms can be vented to the atmosphere (to avoid excess pressure in the device). Furthermore, the vent plugs allow air intake to prevent a vacuum from forming in the device (▶ AB 07).

Version R actuators are delivered with vent plugs.



### 3.5 Technical data

The nameplate provides information on the actuator version (see the 'Markings on the device' chapter).

**i Note**

More information is available in Data Sheet  
 ► T 8318.

**Table 3-1:** *Technical data*

Type RV350..., Type RV370..., Type RV380..., Type RV390...	Version D	Version R
Maximum permissible signal pressure	80 psi (5.5 bar)	
Actuator area	258 cm <sup>2</sup> · 387 cm <sup>2</sup> · 645 cm <sup>2</sup> · 1032 cm <sup>2</sup>	
No. of springs	1	
Permissible temperatures	-40 to +120 °C <sup>1)</sup>	

<sup>1)</sup> The temperature range depends on the diaphragm material used (see Table 3-2)

**Table 3-2:** *Materials*

Type RV350..., Type RV370..., Type RV380..., Type RV390...	Version D	Version R
Yoke	A352 LCC	
Diaphragm case	Carbon steel	
Actuator stem	A105	AISI 304
Seals	-	NBR
Diaphragm	NBR (-40 to +90 °C) · EPDM (-40 to +120 °C)	



**Table 3-3:** Maximum effective thrusts in N

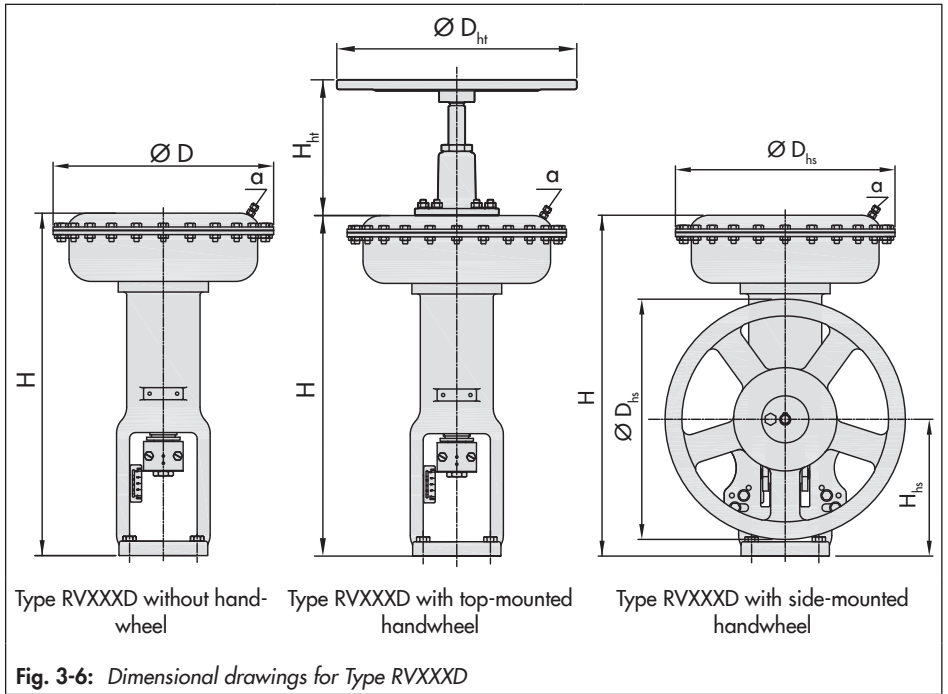
Version	Actuator area (cm <sup>2</sup> )	Bench range (bar)	Travel (mm)				
			26	51	75	95	127
Type RVXXXD	258	0.2 to 1	11594 <sup>1)</sup>	–	–	–	–
		0.4 to 2	8918 <sup>1)</sup>	–	–	–	–
	387	0.2 to 1	17390 <sup>1)</sup>	–	–	–	–
		0.4 to 2	13377 <sup>1)</sup>	–	–	–	–
	645	0.2 to 1	31660 <sup>1)</sup>	28984 <sup>1)</sup>	–	–	–
		0.4 to 2	27646 <sup>1)</sup>	22295 <sup>1)</sup>	–	–	–
	1032	0.2 to 1	52082 <sup>1)</sup>	49228 <sup>1)</sup>	46375 <sup>1)</sup>	–	–
		0.4 to 2	47088 <sup>1)</sup>	41380 <sup>1)</sup>	35673 <sup>1)</sup>	–	–
		0.2 to 1	53509 <sup>1)</sup>	51369 <sup>1)</sup>	49942 <sup>1)</sup>	48515 <sup>1)</sup>	46375 <sup>1)</sup>
		0.4 to 2	49228 <sup>1)</sup>	45661 <sup>1)</sup>	42807 <sup>1)</sup>	39953 <sup>1)</sup>	35673 <sup>1)</sup>
Type RVXXXR	258	0.2 to 1	535	–	–	–	–
		0.4 to 2	1070	–	–	–	–
		1.4 to 2.8	3567	–	–	–	–
	387	0.2 to 1	803	–	–	–	–
		0.4 to 2	1605	–	–	–	–
		1.4 to 2.8	5351	–	–	–	–
	645	0.2 to 1	4013	1338	–	–	–
		0.4 to 2	8026	2675	–	–	–
		1.4 to 2.8	13377	8918	–	–	–
	1032	0.2 to 1	7848	4994	2140	–	–
		0.4 to 2	15696	9988	4281	–	–
		1 to 3.1	24971	17836	10702	–	–
		0.2 to 1	9275	7135	5708	4281	2140
		0.4 to 2	17836	14269	11415	8561	4281
		0.9 to 3.5	29965	24971	19977	15696	9275

<sup>1)</sup> With a signal pressure of 80 psi (5.5 bar)

## Design and principle of operation

**Table 3-4:** See Fig. 3-6 and Fig. 3-8 for dimensions and weights of Type RVXXXD

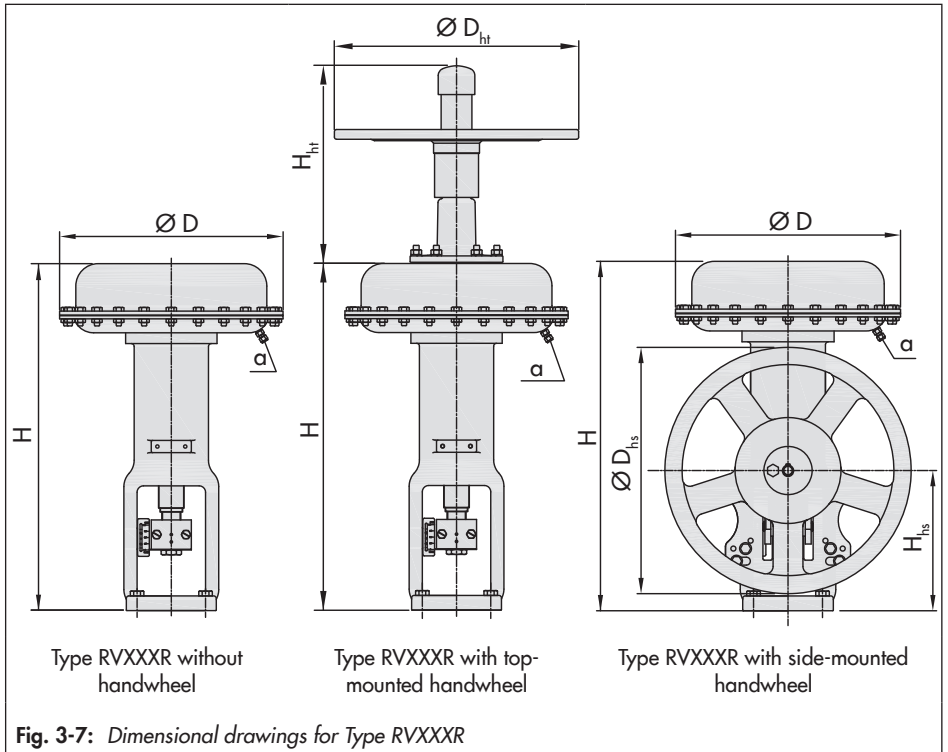
Version		Type RV...						
		320D	330D	350D	350D	380D	390D	
Actuator area [cm <sup>2</sup> ]		258	387	645		1032		
Travel (mm)		26	26	51		75	127	
Weight [kg]	Without handwheel	19	24	51	56	68	107	
	Handwheel (top)	24	29	63	67	84	108	
	With side-mounted handwheel	34	39	87	92	94	133	
Pneumatic connection (NPT)		<sup>a</sup> (std)	¼	¼	¼	¼	¼	
		α2	–	½	¾ · ½	¾ · ½	1 · ¾ · ½	1 · ¾ · ½
Dimensions (mm)	General	∅ D	254	292	384	384	457	457
		H	380	434	705	690	709	864
	Handwheel (top)	∅ D <sub>ht</sub>	250	250	500	500	500	500
		H <sub>ht</sub>	169	169	388	283	283	402
	Side-mounted handwheel	∅ D <sub>hs</sub>	300	300	500	500	500	500
		H <sub>hs</sub>	203	203	285	285	285	341
	Actuator stem	∅ D <sub>s</sub>	¾" - 16 UNF	1 ⅛" - 12 UNF	1 ⅛" - 12 UNF	1 ⅛" - 12 UNF	M39x3	M39x3
		H <sub>s</sub>	135	160	190	190	220	280
		t <sub>b</sub>	25	18	18	30	30	30
	Housing connections	∅ D <sub>b1</sub>	75.1	75.1	75.1	107.1	107.1	107.1
		∅ D <sub>b2</sub>	116	116	116	140	140	140
		∅ D <sub>b3</sub>	140	140	140	184	184	184
		N	4	4	4	4	4	4
		Screw	M12x35	M12x35	M12x35	M16x60	M16x60	M16x60



## Design and principle of operation

**Table 3-5:** See Fig. 3-7 and Fig. 3-8 for dimensions and weights of Type RVXXXR

Version		Type RV...						
		320R	330R	350R	350R	380R	390R	
Actuator area [cm <sup>2</sup> ]		258	387	645		1032		
Travel (mm)		26	26	51		75	127	
Weight [kg]	Without handwheel	23	29	53	57	100	118	
	Handwheel (top)	28	33	68	69	111	132	
	With side-mounted handwheel	38	44	89	93	126	144	
Pneumatic connection (NPT)	$\frac{a}{\text{(std)}}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	
	$a_2$	–	$\frac{1}{2}$	$\frac{3}{4} \cdot \frac{1}{2}$	$\frac{3}{4} \cdot \frac{1}{2}$	$1 \cdot \frac{3}{4} \cdot \frac{1}{2}$	$1 \cdot \frac{3}{4} \cdot \frac{1}{2}$	
Dimensions (mm)	General	$\varnothing D$	254	292	384	384	457	457
		H	405	447	691	677	809	931
	Handwheel (top)	$\varnothing D_{ht}$	250	250	500	500	500	500
		$H_{ht}$	231	231	389	283	405	569
	Side-mounted handwheel	$\varnothing D_{hs}$	300	300	500	500	500	500
		$H_{hs}$	187	187	285	285	341	341
	Actuator stem	$\varnothing D_s$	$\frac{3}{4}$ " - 16 UNF	$1 \frac{1}{8}$ " - 12 UNF	M39x3	M39x3	M39x3	M39x3
		$H_s$	135	160	190	200	260	280
	Housing connections	$t_b$	25	18	18	30	30	30
		$\varnothing D_{b1}$	75.1	75.1	75.1	107.1	107.1	107.1
		$\varnothing D_{b2}$	116	116	116	140	140	140
		$\varnothing D_{b3}$	140	140	140	184	184	184
		N	4	4	4	4	4	4
		Screw		M12x35	M12x35	M12x35	M16x60	M16x60



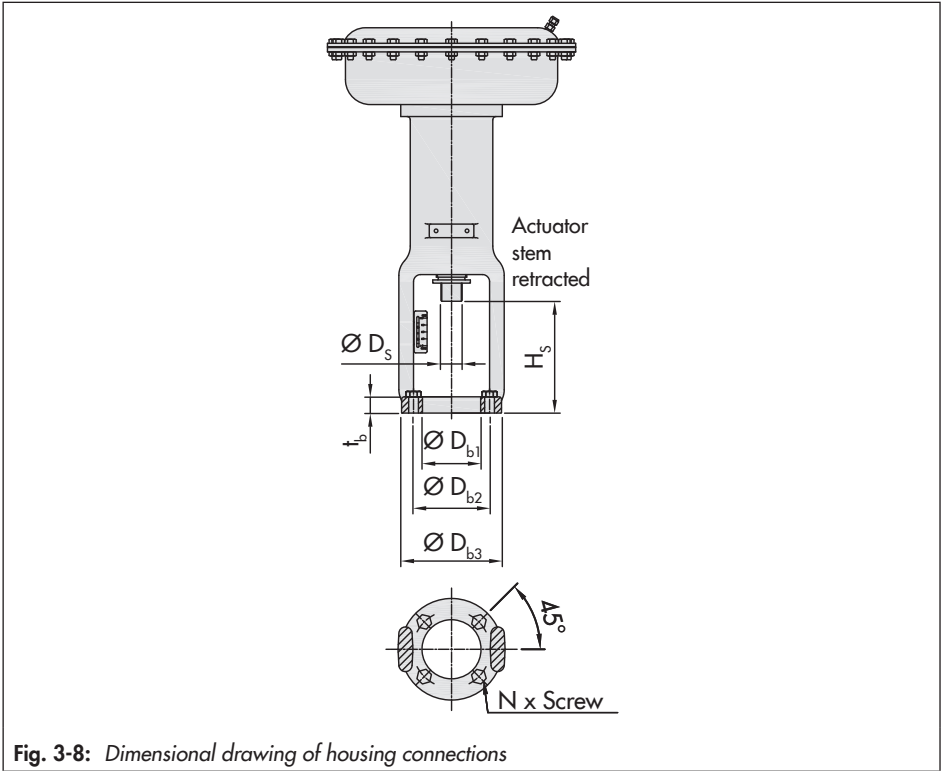


Fig. 3-8: Dimensional drawing of housing connections

## 4 Shipment and on-site transport

The work described in this chapter is to be performed only by personnel appropriately qualified to carry out such tasks.

### 4.1 Accepting the delivered goods

After receiving the shipment, proceed as follows:

1. Check the scope of delivery. Check that the specifications on the actuator nameplate match the specifications in the delivery note. See the 'Markings on the device' chapter for nameplate details.
2. Check the shipment for transportation damage. Report any damage to RINGO and the forwarding agent (refer to delivery note).
3. Determine the weight and dimensions of the units to be lifted and transported in order to select the appropriate lifting equipment and lifting accessories. Refer to the transport documents and the 'Technical data' chapter.

### 4.2 Removing the packaging from the actuator

Observe the following sequence:

- Do not open or remove the packaging until immediately before mounting the actuator.

- Leave the actuator in its transport container or on the pallet to transport it on site.
- Dispose and recycle the packaging in accordance with the local regulations.

### 4.3 Transporting and lifting the actuator

---

#### **⚠ DANGER**

***Danger due to suspended loads falling.***

- *Stay clear of suspended or moving loads.*
  - *Close off and secure the transport paths.*
- 

#### **⚠ WARNING**

***Risk of lifting equipment tipping over and risk of damage to lifting accessories due to exceeding the rated lifting capacity.***

- *Only use approved lifting equipment and accessories whose minimum lifting capacity is higher than the weight of the actuator (including any packaging).*
- 

#### **⚠ WARNING**

***Risk of injury due to incorrect lifting without the use of lifting equipment.***

*Lifting the actuator without the use of lifting equipment may lead to injuries (back injury in particular) depending on the weight of the actuator.*

- *Observe the occupational health and safety regulations valid in the country of use.*
-

---

### NOTICE

#### **Risk of actuator damage due to incorrectly attached slings.**

Only use the lifting eyelets/eyebolts or swivel hoist on the actuators to lift the actuator without the valve. Do not use these lashing points to lift the entire control valve assembly.

- ➔ When lifting the control valve, make sure that the slings attached to the valve body bear the entire load.
- ➔ Do not attach load-bearing slings to the handwheel or any other mounting parts.
- ➔ Observe lifting instructions (see Chapter 4.3.2).

---

### Tip

Our after-sales service can provide more detailed transport and lifting instructions on request.

## 4.3.1 Transporting the actuator

The actuator can be transported using lifting equipment (e.g. crane or forklift).

- ➔ Leave the actuator in its transport container or on the pallet to transport it.
- ➔ Observe the transport instructions.

### Transport instructions

- Protect the actuator against external influences (e.g. impact).
- Do not damage the corrosion protection (paint, surface coatings). Repair any damage immediately.

- Protect the actuator against moisture and dirt.
- Observe permissible temperatures (see section 'Technical data' in the 'Design and principle of operation' chapter).

## 4.3.2 Lifting the actuator

To mount large actuators onto the valve, use lifting equipment (e.g. crane or forklift) to lift it.

### Lifting instructions

- Use a hook with safety latch to secure the slings from slipping off the hook during lifting and transporting (see Fig. 4-1).
- Secure slings on the object to be transported against slipping.
- Make sure the slings can be removed from the actuator once it has been mounted on the valve.
- Prevent the actuator from tilting or tipping.
- Do not leave loads suspended when interrupting work for longer periods of time.

### a) Lifting the actuator (without valve)

See Fig. 4-1

1. Replace two bolts on opposite sides of the diaphragm case with eyebolts or swivel hoists.



2. Attach the sling to these lifting eyelets and to the rigging equipment (e.g. hook) of the crane or forklift.
3. Carefully lift the actuator. Check whether the lifting equipment and accessories can bear the weight.
4. Move the actuator at an even pace to the mounting site.
5. Mount the actuator onto the valve (see the 'Installation' chapter).
6. Remove slings after mounting.

ging equipment (hook, shackle etc.) must not bear any load. The slings only protect the control valve from tilting while being lifted. Before lifting the control valve, tighten the slings.

➔ See associated valve documentation for instructions on how to lift a control valve.

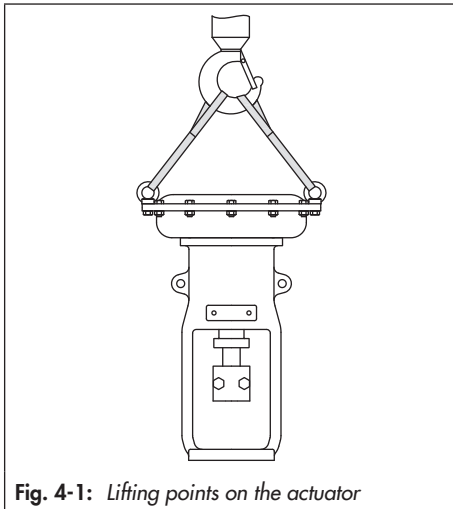


Fig. 4-1: Lifting points on the actuator

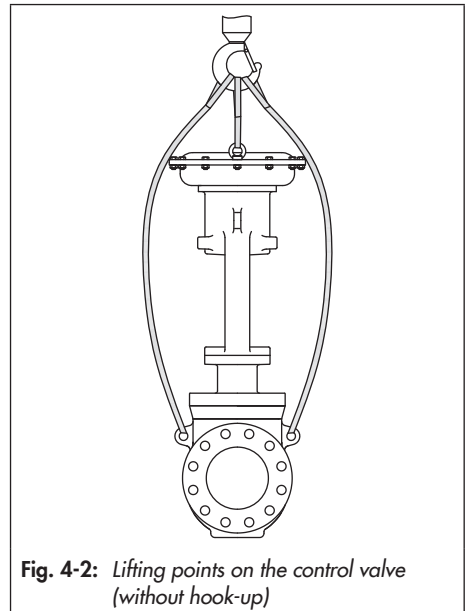
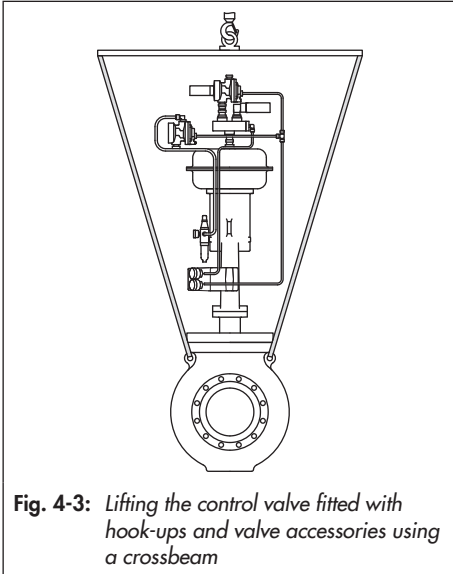


Fig. 4-2: Lifting points on the control valve (without hook-up)

## b) Lifting the entire control valve assembly

See Fig. 4-2 and Fig. 4-3

In order to lift an entire control valve assembly, the slings attached to the valve body must bear the entire load. The slings between the lashing points on the actuator and rig-



**Fig. 4-3:** *Lifting the control valve fitted with hook-ups and valve accessories using a crossbeam*

## 4.4 Storing the actuator

### **NOTICE**

#### **Risk of actuator damage due to improper storage.**

- ➔ *Observe the storage instructions.*
- ➔ *Avoid long storage times.*
- ➔ *Contact RINGO in case of different storage conditions or longer storage periods.*

### **i Note**

*RINGO recommends to regularly check the actuator and the prevailing storage conditions during long storage times.*

### **Storage instructions**

- When the valve and actuator are already assembled, observe the storage conditions for control valves. See associated valve documentation.
- Protect the actuator against external influences (e.g. impact).
- Secure the actuator in the stored position against slipping or tipping over.
- Do not damage the corrosion protection (paint, surface coatings). Repair any damage immediately.
- Protect the actuator against moisture and dirt. Store it at a relative humidity of less than 75 %. In damp spaces, prevent condensation. If necessary, use a drying agent or heating.
- Make sure that the ambient air is free of acids or other corrosive media.
- Observe permissible temperatures (see section 'Technical data' in the 'Design and principle of operation' chapter).
- Do not place any objects on the actuator.

### **Special storage instructions for elastomers**

Elastomer, e.g. actuator diaphragm

- To keep elastomers in shape and to prevent cracking, do not bend them or hang them up.
- RINGO recommends a storage temperature of 15 °C for elastomers.
- Store elastomers away from lubricants, chemicals, solutions and fuels.



*Our after-sales service can provide more detailed storage instructions on request.*

---



## 5 Installation

The work described in this chapter is to be performed only by personnel appropriately qualified to carry out such tasks.

### 5.1 Preparation for installation

Before mounting, make sure the following conditions are met:

- The actuator is not damaged.
- The type designation, material and temperature range of the actuator match the ambient conditions (temperatures etc.). See the 'Markings on the device' chapter for nameplate details.

Proceed as follows:

- Lay out the necessary material and tools to have them ready during mounting.
- Check that the vent plugs to be used are not blocked.
- Check any pressure gauges mounted on valve accessories to make sure they function properly.
- When the valve and actuator are already assembled, check the tightening torques of the bolted joints. Components may loosen during transport.

### 5.2 Mounting the device

See images in the 'Design and principle of operation' section

Depending on the version, SAMSON control valves are either delivered with the actuator already mounted on the valve or the valve and actuator are delivered separately. When

delivered separately, the valve and actuator must be assembled together on site. Proceed as follows to mount the actuator and before start-up.

---

#### **⚠ WARNING**

***Risk of personal injury due to exhaust air being vented.***

*The actuator is operated with air. As a result, air is vented during operation.*

- *During mounting make sure that vent openings are not located at eye level in the work position of the control valve and the actuator does not vent at eye level in the work position.*
  - *Wear eye and hearing protection when working near the actuator.*
- 

#### **⚠ WARNING**

***Crush hazard arising from the moving actuator stem.***

- *Do not touch the actuator stem or insert hands or finger into the yoke while the air supply is connected to the actuator.*
- *Before working on the actuator, disconnect and lock the pneumatic air supply as well as the control signal.*
- *Do not impede the movement of the actuator stem by inserting objects into the yoke.*
- *After unblocking the actuator stem after it has become blocked (e.g. due to seizing up after remaining in the same position for a long time), release any stored energy in the actuator (e.g. spring compression). See section 'Relieving the*

*spring compression in the actuator' in the 'Removal' chapter.*

---

### ! NOTICE

#### **Risk of actuator damage due to over- or under-torquing.**

*Observe the specified torques when tightening actuator components. Excessive tightening torques lead to parts wearing out more quickly. Parts that are not tightened far enough may loosen.*

→ *Observe the specified tightening torques.*

---

### ! NOTICE

#### **Risk of actuator damage due to the use of unsuitable tools.**

→ *Only use tools approved by RINGO.*

---

## 5.2.1 Pneumatic connection

### a) Version D, fail-open (actuator stem retracts)

1. Apply a signal pressure that corresponds to the upper signal pressure range value to the connection on the top diaphragm case (850) to extend the actuator stem.

### b) Version R, fail-close (actuator stem extends)

1. Apply a signal pressure that corresponds to the lower signal pressure range value to the connection on the bottom diaphragm case (900) to retract the actuator stem.
2. Screw the vent plug into the exhaust port.

## 5.2.2 Setting the actuator

The bench range is set before mounting the actuator onto the valve.

If the actuator travel and the valve travel are the same, the lower signal pressure range value is the same as the minimum value of the bench range or operating range. The upper signal pressure range value is the same as the maximum value of the bench range or operating range.

If the valve travel is smaller than the actuator travel, the values for the bench range are different. Version D: the upper signal pressure range value is lower. Version D: the lower signal pressure range value is higher.

These details are specified on the nameplate (see the 'Markings on the device' chapter).

Before setting, make sure the following conditions are met:

- The spring adjuster (906) is unthreaded to the point at which the actuator spring (595) is not loaded.
- The air is connected but no air is applied to the diaphragm chamber.

### Determine the lower and upper signal pressure range values

1. Turn the spring adjuster (906) clockwise until loading of the actuator spring (595) starts.
2. Carefully raise the air supply to the point at which the actuator stem (61) starts to move.
3. Maintain this supply pressure and read off the pressure value.
4. If this pressure reading is the same as the lower signal pressure range value, continue as described in step 5.

If this pressure reading is not the same as the lower signal pressure range value, reduce the air pressure to the diaphragm chamber to zero.

Readjust the spring adjuster (906):

- If the pressure reading is **below** the lower signal pressure range value, turn the spring adjuster (906) clockwise slightly. Continue as described in step 2.
  - If the pressure reading is **above** the lower signal pressure range value, turn the spring adjuster (906) counterclockwise slightly. Continue as described in step 2.
5. To check the upper signal pressure range value, continue to raise the supply pressure applied to the diaphragm chamber.

---

#### NOTICE

**Risk of actuator damage due to excessively high supply pressure.**

➔ Do not allow the supply pressure to exceed the maximum permissible limit of 80 psi (5.5 bar).

---

The movement of the actuator stem (61) must be linear and smooth.

6. Stop increasing the supply pressure at the point where the travel indicator indicates the maximum permissible travel. The travel is specified on the nameplate (see the 'Markings on the device' chapter).
7. Read off the supply pressure value. This supply pressure value corresponds to the upper signal pressure range value.

---

## 5.2.3 Mounting the actuator onto the valve

#### Tip

*The valve and actuator are assembled with special attention paid to the actuator's bench range and direction of action. These details are specified on the actuator nameplate (see the 'Markings on the device' chapter).*

---

### a) Version D

1. Close the valve by firmly pushing the plug together with the plug stem down.

## Installation

2. Thread the lock nut and travel indicator (921) downward on the plug stem of the valve.
3. Place the actuator with the yoke first vertically onto the valve bonnet while aligning the holes on the valve bonnet and actuator yoke with each other.
4. Fasten the valve bonnet and actuator yoke together. Observe tightening torques.
5. Connect the signal pressure (see Chapter 5.2.1).
6. Extend the actuator stem (61) by applying a signal pressure until the distance to the plug stem is 15 mm.
7. Position the clamps of the stem connector (907) on the actuator and plug stems and screw them tight. Observe tightening torques.
8. Lock the travel indicator (921) in place with the nut on the stem connector (907).
9. Align and fasten the travel indicator scale (927).
4. Fasten the valve bonnet and actuator yoke together. Observe tightening torques.
5. Connect the signal pressure (see Chapter 5.2.1).
6. Retract the actuator stem (61) as far as it will go by applying a signal pressure.
7. Extend the actuator stem (61) by applying a signal pressure until the distance to the plug stem is 15 mm.
8. Position the clamps of the stem connector (907) on the actuator and plug stems and screw them tight. Observe tightening torques.
9. Lock the travel indicator (921) in place with the nut on the stem connector (907).
10. Align and fasten the travel indicator scale (927).

## b) Version R

1. Close the valve by firmly pushing the plug together with the plug stem down.
2. Thread the lock nut and travel indicator (921) downward on the plug stem of the valve.
3. Place the actuator with the yoke first vertically onto the valve bonnet while aligning the holes on the valve bonnet and actuator yoke with each other.



## 6 Operation

The work described in this chapter is to be performed only by personnel appropriately qualified to carry out such tasks.

### **⚠ WARNING**

#### **Risk of personal injury due to exhaust air being vented.**

The actuator is operated with air. As a result, air is vented during operation.

- Wear eye and hearing protection when working near the actuator.

### **⚠ WARNING**

#### **Crush hazard arising from the moving actuator stem.**

- Do not insert hands or finger into the yoke while the air supply is connected to the actuator.
- Before working on the actuator, disconnect and lock the pneumatic air supply as well as the control signal.
- Do not impede the movement of the actuator stem by inserting objects into the yoke.
- Before unblocking the actuator stem after it has become blocked (e.g. due to seizing up after remaining in the same position for a long time), release any stored energy in the actuator (e.g. spring compression). See section 'Relieving the spring compression in the actuator' in the 'Removal' chapter.

### **⚠ WARNING**

#### **Risk of personal injury due to incorrect operation, use or installation as a result of incorrect information on the actuator.**

After any adjustment or conversion work, the details on the actuator nameplate may no longer be correct.

- Immediately renew any nameplates or labels with incorrect or outdated information.
- Add any new values to the nameplate. If necessary, contact RINGO to obtain a new nameplate.

## 6.1 Throttling service

- The Types RV350D/R, RV370D/R, RV380D/R and RV390D/R Pneumatic Actuators are designed for a maximum supply pressure of 80 psi (5.5 bar) when used for throttling service.
- During normal operation, the handwheel in actuator versions with a top-mounted or side-mounted handwheel must be placed in the neutral position to allow the actuator to move through its entire travel range in throttling or on/off service.

## 6.2 Manual mode (versions with top-mounted or side-mounted handwheel only)

In the manual mode, the valve is opened and closed by the handwheel. The valve position is independent of the signal pressure or actuator spring.

### 6.2.1 Neutral position of top-mounted handwheel

#### Version D

The handwheel is in the neutral position when it is turned to the top position (see Fig. 3-2 in the 'Design and principle of operation' chapter).

#### Version R

The handwheel is in the neutral position when it is turned to the lowest position (see Fig. 3-5 in the 'Design and principle of operation' chapter).

### 6.2.2 Neutral position of side-mounted handwheel

#### Version D

The handwheel is in the neutral position when the drive nut of the handwheel is located in the nearest position to the handwheel (see Fig. 3-3 in the 'Design and principle of operation' chapter).

#### Version R

The handwheel is in the neutral position when the drive nut of the handwheel is located in the position furthest away from the handwheel.

## 7 Malfunctions

Read hazard statements, warnings and caution notes in the 'Safety instructions and measures' chapter.

### 7.1 Troubleshooting

Malfunction	Possible reasons	Recommended action
Actuator stem does not move on demand.	Actuator is blocked.	Put the control valve out of operation (see the 'Decommissioning' chapter) and remove the blockage. <b>WARNING!</b> A blocked actuator (e.g. due to seizing up after remaining in the same position for a long time) can suddenly start to move uncontrollably. Injury to hands or fingers is possible if they are inserted into the actuator or valve. Before trying to unblock the actuator stem, disconnect and lock the pneumatic air supply as well as the control signal. Before unblocking the actuator stem, release any stored energy in the actuator (e.g. spring compression). See section 'Relieving the spring compression in the actuator' in the 'Removal' chapter.
	Insufficient signal pressure	Check the signal pressure. Check the signal pressure line for leakage.
	Diaphragm in the actuator defective	See 'Replacing the diaphragm' in the 'Servicing' chapter.
	Handwheel is not in the neutral position.	See 'Manual mode' in the 'Operation' chapter.
Actuator stem does not stroke through its complete travel range.	Handwheel is not in the neutral position.	See 'Manual mode' in the 'Operation' chapter.
	Insufficient signal pressure	Check the signal pressure. Check the signal pressure line for leakage.
	Incorrect setting of valve accessories.	Check the actuator without valve accessories. Check the settings of the valve accessories.

#### **i** Note

Contact our after-sales service for malfunctions not listed in the table.

## **7.2 Emergency action**

Plant operators are responsible for emergency action to be taken in the plant.

## 8 Servicing

The work described in this chapter is to be performed only by personnel appropriately qualified to carry out such tasks.

### **⚠ DANGER**

#### **Risk of bursting due to incorrect opening of pressurized equipment or components.**

Pneumatic actuators are pressure equipment that may burst when handled incorrectly. Flying projectile fragments or components can cause serious injury or even death.

Before working on the actuator:

- Depressurize all plant sections concerned and the actuator. Release any stored energy.

### **⚠ WARNING**

#### **Risk of personal injury due to the pre-loaded spring.**

Actuators with preloaded spring are under tension.

- Only open the actuator following the instructions in this document. See section 'Relieving the spring compression in the actuator' in the 'Removal' chapter.

### **⚠ WARNING**

#### **Risk of personal injury due to exhaust air being vented.**

The actuator is operated with air. As a result, air is vented during operation.

- Wear eye and hearing protection when working near the actuator.

### **⚠ WARNING**

#### **Crush hazard arising from the moving actuator stem.**

- Do not insert hands or finger into the yoke while the air supply is connected to the actuator.
- Before working on the actuator, disconnect and lock the pneumatic air supply as well as the control signal.
- Do not impede the movement of the actuator stem by inserting objects into the yoke.
- Before unblocking the actuator stem after it has become blocked (e.g. due to seizing up after remaining in the same position for a long time), release any stored energy in the actuator (e.g. spring compression). See section 'Relieving the spring compression in the actuator' in the 'Removal' chapter.

### **⚠ WARNING**

#### **Risk of personal injury due to incorrect operation, use or installation as a result of incorrect information on the actuator.**

After any adjustment or conversion work, the details on the actuator nameplate may no longer be correct.

- Immediately renew any nameplates or labels with incorrect or outdated information.
- Add any new values to the nameplate. If necessary, contact RINGO to obtain a new nameplate.

---

### NOTICE

#### **Risk of actuator damage due to over- or under-torquing.**

Observe the specified torques when tightening actuator components. Excessive tightening torques lead to parts wearing out more quickly. Parts that are not tightened far enough may loosen.

→ Observe the specified tightening torques.

---

### NOTICE

#### **Risk of actuator damage due to the use of unsuitable tools.**

→ Only use tools approved by RINGO.

---

### NOTICE

#### **Risk of actuator damage due to the use of unsuitable lubricants.**

→ Only use lubricants approved by RINGO.

---

### Note

- The product warranty becomes void if service or repair work not described in these instructions is performed without prior agreement by RINGO's after-sales service.
  - Only use original spare parts by RINGO, which comply with the original specifications.
- 

## 8.1 Periodic testing

Depending on the operating conditions, check the actuator at certain intervals to prevent possible failure before it can occur. Plant operators are responsible for drawing up an inspection and test plan.

---

### Tip

Our after-sales service can support you in drawing up an inspection and test plan for your plant.

---

## 8.1 Service work preparations

1. Lay out the necessary material and tools to have them ready for the intended work.
2. Put the actuator out of operation (see the 'Decommissioning' chapter).
3. Remove the actuator from the valve (see the 'Removal' chapter).
4. Relieve the compression from the pre-loaded springs in the actuator. See section 'Relieving the spring compression in the actuator' in the 'Removal' chapter.
5. Unthread and remove the bolts (916) and nuts (917) including shims from around the diaphragm case. Keep the parts in a safe place for later use.

The following service work can be performed after preparation is completed:

- Replace the diaphragm (see Chapter 8.3.1)
- Replace the gaskets (Type RVXXXR). See Chapter 8.3.2.

## 8.2 Installing the valve after service work

→ Mount the actuator onto the valve (see the 'Installation' chapter).

## 8.3 Service work

See images in the 'Design and principle of operation' section

### 8.3.1 Replacing the diaphragm

#### a) Type RVXXXD, fail-open (actuator stem retracts)

##### All versions

1. Unscrew the spring adjuster (906) from the actuator yoke (40).
2. Lift off the top diaphragm case (850).  
**Version with top-mounted handwheel:** lift off top diaphragm case (850) including the handwheel assembly.
3. Pull the diaphragm plate assembly consisting of the diaphragm holder (902), screw (914), actuator stem (61), diaphragm plate (901) and diaphragm (911) out of the bottom diaphragm case (900).
4. Firmly clamp the actuator stem (61) in the area above the thread for the spring adjuster into a vise using protective jaws. Make sure that the actuator stem is not damaged.

5. Unscrew the screw (914) from the actuator stem (61).
6. Remove silicone and take the diaphragm holder (902), diaphragm (911) and diaphragm plate (901) off the actuator stem (61).
7. Clean the parts and renew the diaphragm.
8. Place the parts on the actuator stem in the specified order:
  - Diaphragm plate (901)
  - New diaphragm (911)
  - Diaphragm holder (902) with silicone
9. Use the screw (914) to fasten the parts onto the actuator stem (61). Observe tightening torque.
10. Insert the newly assembled diaphragm plate assembly into the bottom diaphragm case (900).
11. Apply a suitable lubricant to the thread of the actuator stem (61).
12. Thread the spring adjuster (906) onto the actuator stem (61) and into the actuator housing (40) to the point at which it rests on the spring plate (904).
13. Place on the top diaphragm case (850) and fasten it to the bottom diaphragm case (900) using the nuts (917), bolts (916) and washers. Observe tightening torques.
14. Check the operating range (see 'Setting the actuator' in the 'Installation' section).

### b) Type RVXXXR, fail-close (actuator stem extends)

#### Version without handwheel and version with side-mounted handwheel

1. Unscrew the spring adjuster (906) and remove it from the actuator stem (61).
2. Lift off the top diaphragm case (850).
3. Pull the diaphragm plate assembly consisting of the diaphragm plate (901), screw (914), actuator stem (61), diaphragm (911) and diaphragm holder (902) into the top position.
4. Remove the retaining ring (918) and then the bushing (903) including the O-rings (924, 925).
5. Pull the diaphragm plate assembly consisting of the diaphragm plate assembly out of the bottom diaphragm case (900).
6. Firmly clamp the actuator stem (61) in the area above the thread for the spring adjuster into a vise using protective jaws. Make sure that the actuator stem is not damaged.
7. Unscrew the screw (914) from the actuator stem (61).
8. Take the diaphragm plate (901), diaphragm (911) and diaphragm holder (902) off the actuator stem (61). Remove the silicone from the diaphragm holder (902).
9. Clean the parts and renew the diaphragm.
10. Insert the actuator stem (61) into the bottom diaphragm case (900).

11. Mount the bushing (903) including the O-rings (924, 925) and the retaining ring (918).
12. Place the parts on the actuator stem in the specified order:
  - Diaphragm holder (902) with silicone
  - New diaphragm (911)
  - Diaphragm plate (901)
13. Use the screw (914) to fasten the parts onto the actuator stem (61). Observe tightening torque.
14. Apply a suitable lubricant to the spring adjuster (906).
15. Thread the spring adjuster (906) onto the actuator stem (61) and into the actuator housing (40) to the point at which it rests on the spring plate (904).
16. Place on the top diaphragm case (850) and fasten it to the bottom diaphragm case (900) using the nuts (917), bolts (916) and washers. Observe tightening torques.

#### Version with top-mounted handwheel

1. Unscrew the spring adjuster (906) and remove it from the actuator stem (61).
2. Unthread the screws (836) from the handwheel cap (825) and remove it.
3. Undo the nuts (942) from the handwheel drive (825) and remove the assembly together with all the washers (557).
4. Unscrew the nuts (1030) from the handwheel housing (940) and remove the top handwheel assembly.
5. Remove the anti-rotation fixture (1027).



6. Lift off the top diaphragm case (850).
7. Pull the diaphragm plate assembly consisting of the diaphragm plate (901), screw (914), actuator stem (61), diaphragm (911) and diaphragm holder (902) into the top position.
8. Remove the retaining ring (918) and then the bushing (903) including the O-rings (924, 925).
9. Pull the diaphragm plate assembly consisting of the diaphragm plate assembly out of the bottom diaphragm case (900).
10. Firmly clamp the actuator stem (61) in the area above the thread for the spring adjuster into a vise using protective jaws. Make sure that the actuator stem is not damaged.
11. Unscrew the screw (914) from the actuator stem (61).
12. Take the diaphragm plate (901), diaphragm (911) and diaphragm holder (902) off the actuator stem (61). Remove the silicone from the diaphragm holder (902).
13. Clean the parts and renew the diaphragm.
14. Insert the actuator stem (61) into the bottom diaphragm case (900).
15. Mount the bushing (903) including the O-rings (924, 925) and the retaining ring (918).
16. Place the parts on the actuator stem in the specified order:
  - Diaphragm holder (902) with silicone
  - New diaphragm (911)
  - Diaphragm plate (901)
17. Use the screw (914) to fasten the parts onto the actuator stem (61). Observe tightening torque.
18. Apply a suitable lubricant to the spring adjuster (906).
19. Thread the spring adjuster (906) onto the actuator stem (61) and into the actuator housing (40) to the point at which it rests on the spring plate (904).
20. Place on the top diaphragm case (850) and fasten it to the bottom diaphragm case (900) using the nuts (917), bolts (916) and washers. Observe tightening torques.

### 8.3.2 Replacing the gaskets (Type RVXXXR/fail-close only)

---

**NOTICE**

**Risk of leakage due to missing or damaged gaskets.**

➔ *Check all gaskets before use to ensure they are undamaged and insert the gaskets described at all required places.*

---

**Version without handwheel and version with side-mounted handwheel**

1. Unscrew the spring adjuster (906) and remove it from the actuator stem (61).
2. Lift off the top diaphragm case (850).
3. Pull the diaphragm plate assembly consisting of the diaphragm plate (901), screw (914), actuator stem (61), dia-

## Servicing

- phragm (911) and diaphragm holder (902) into the top position.
- Remove the retaining ring (918) and then the bushing (903) including the O-rings (924, 925).
  - Pull the diaphragm plate assembly consisting of the diaphragm plate assembly out of the bottom diaphragm case (900).
  - Firmly clamp the actuator stem (61) in the area above the thread for the spring adjuster into a vise using protective jaws. Make sure that the actuator stem is not damaged.
  - Unscrew the two screws (915) opposite each other on the bottom diaphragm case (900) and replace them with longer screws, which stick out of the actuator housing (40) by approx. 50 mm.
  - Unscrew the remaining short screws (915).
  - Gradually unthread the two longer screws that you have just inserted in a crisscross pattern to safely relieve any possible compression of the spring (595).
  - Lift off the bottom diaphragm case (850) from the housing (40).
  - Remove seal (926) and yoke flange (905) from the housing (40).
  - Renew the seal (926).
  - Replace the seals on the screws (915). Apply silicone to the screws and insert them into the bottom diaphragm case (900) and housing (40). Tighten the screws (915) in a crisscross pattern. Observe tightening torques.
  - Unscrew the screw (914) from the actuator stem (61).
  - Take the diaphragm plate (901), diaphragm (911) and diaphragm holder (902) off the actuator stem (61). Remove the silicone from the diaphragm holder (902).
  - Clean all parts that have been removed.
  - Insert the actuator stem (61) into the bottom diaphragm case (900).
  - Renew O-rings (924, 925).
  - Mount the bushing (903) including the new O-rings (924, 925) and the retaining ring (918).
  - Place the parts on the actuator stem in the specified order:
    - Diaphragm holder (902) with silicone
    - Diaphragm (911)
    - Diaphragm plate (901)
  - Apply silicone to screw (914) and insert it.
  - Use the screw (914) to fasten the parts onto the actuator stem (61). Observe tightening torque.
  - Apply a suitable lubricant to the thread of the actuator stem (61).
  - Thread the spring adjuster (906) onto the actuator stem (61) and into the actuator housing (40) to the point at which it rests on the spring plate (904).

---

### **i** Note

*The spring adjuster (906) takes on a dual function:*

- It guides the spring (595) and actuator stem (61) in the actuator housing (40).
  - It loads the spring (see 'Setting the actuator' in the 'Installation' section).
- 

25. Place on the top diaphragm case (850) and fasten it to the bottom diaphragm case (900) using the nuts (917), bolts (916) and washers. Observe tightening torques.

**Version with top-mounted handwheel**

1. Unscrew the spring adjuster (906) and remove it from the actuator stem (61).
2. Unthread the screws (836) from the handwheel cap (825) and remove it.
3. Undo the nuts (942) from the handwheel drive (825) and remove the assembly together with all the washers (557).
4. Unscrew the nuts (1030) from the handwheel housing (940) and remove the top handwheel assembly.
5. Remove the anti-rotation fixture (1027).
6. Lift off the top diaphragm case (850).
7. Pull the diaphragm plate assembly consisting of the diaphragm plate (901), screw (914), actuator stem (61), diaphragm (911) and diaphragm holder (902) into the top position.
8. Remove the retaining ring (918) and then the bushing (903) including the O-rings (924, 925).
9. Pull the diaphragm plate assembly consisting of the diaphragm plate assembly out of the bottom diaphragm case (900).

10. Firmly clamp the actuator stem (61) in the area above the thread for the spring adjuster into a vise using protective jaws. Make sure that the actuator stem is not damaged.
11. Unscrew the two screws (915) opposite each other on the bottom diaphragm case (900) and replace them with longer screws, which stick out of the actuator housing (40) by approx. 50 mm.
12. Unscrew the remaining short screws (915).
13. Gradually unthread the two longer screws that you have just inserted in a crisscross pattern to safely relieve any possible compression of the spring (595).
14. Lift off the bottom diaphragm case (850) from the housing (40).
15. Remove seal (926) and yoke flange (905) from the housing (40).
16. Renew the seal (926).
17. Replace the seals on the screws (915). Apply silicone to the screws and insert them into the bottom diaphragm case (900) and housing (40). Tighten the screws (915) in a crisscross pattern. Observe tightening torques.
18. Unscrew the screw (914) from the actuator stem (61).
19. Take the diaphragm plate (901), diaphragm (911) and diaphragm holder (902) off the actuator stem (61). Remove the silicone from the diaphragm holder (902).
20. Clean all parts that have been removed.

## Servicing

21. Insert the actuator stem (61) into the bottom diaphragm case (900).
22. Renew O-rings (924, 925).
23. Mount the bushing (903) including the new O-rings (924, 925) and the retaining ring (918).
24. Place the parts on the actuator stem in the specified order:
  - Diaphragm holder (902) with silicone
  - Diaphragm (911)
  - Diaphragm plate (901)
25. Apply silicone to screw (914) and insert it.
26. Use the screw (914) to fasten the parts onto the actuator stem (61). Observe tightening torque.
27. Apply a suitable lubricant to the thread of the actuator stem (61).
28. Thread the spring adjuster (906) onto the actuator stem (61) and into the actuator housing (40) to the point at which it rests on the spring plate (904).

---

### **i** Note

*The spring adjuster (906) takes on a dual function:*

- *It guides the spring (595) and actuator stem (61) in the actuator housing (40).*
  - *It loads the spring (see 'Setting the actuator' in the 'Installation' section).*
- 

29. Place on the top diaphragm case (850) and fasten it to the bottom diaphragm case (900) using the nuts (917), bolts (916) and washers. Observe tightening torques.

## 8.4 Ordering spare parts and operating supplies

Contact your nearest SAMSON subsidiary or RINGO's after-sales service for information on spare parts, lubricants and tools.

## 9 Decommissioning

The work described in this chapter is to be performed only by personnel appropriately qualified to carry out such tasks.

### **⚠ DANGER**

#### **Risk of bursting due to incorrect opening of pressurized equipment or components.**

Pneumatic actuators are pressure equipment that may burst when handled incorrectly. Flying projectile fragments or components can cause serious injury or even death.

Before working on the actuator:

- Depressurize all plant sections concerned and the actuator. Release any stored energy.

### **⚠ WARNING**

#### **Risk of personal injury due to the pre-loaded spring.**

Actuators with preloaded spring are under tension.

- Only open the actuator following the instructions in this document. See section 'Relieving the spring compression in the actuator' in the 'Removal' chapter.

### **⚠ WARNING**

#### **Risk of personal injury due to exhaust air being vented.**

The actuator is operated with air. As a result, air is vented during operation.

- Wear eye and hearing protection when working near the actuator.

### **⚠ WARNING**

#### **Crush hazard arising from the moving actuator stem.**

- Do not insert hands or finger into the yoke while the air supply is connected to the actuator.
- Before working on the actuator, disconnect and lock the pneumatic air supply as well as the control signal.
- Do not impede the movement of the actuator stem by inserting objects into the yoke.
- Before unblocking the actuator stem after it has become blocked (e.g. due to seizing up after remaining in the same position for a long time), release any stored energy in the actuator (e.g. spring compression). See section 'Relieving the spring compression in the actuator' in the 'Removal' chapter.

To decommission the actuator for service work or before removing it from the valve, proceed as follows:

1. Put the control valve out of operation. See associated valve documentation.
2. Disconnect the pneumatic air supply to depressurize the actuator.



## 10 Removal

The work described in this chapter is to be performed only by personnel appropriately qualified to carry out such tasks.

### **⚠ DANGER**

#### **Risk of bursting due to incorrect opening of pressurized equipment or components.**

Pneumatic actuators are pressure equipment that may burst when handled incorrectly. Flying projectile fragments or components can cause serious injury or even death.

Before working on the actuator:

- Depressurize all plant sections concerned and the actuator. Release any stored energy.

### **⚠ WARNING**

#### **Risk of personal injury due to the pre-loaded spring.**

Actuators with preloaded spring are under tension.

- Only open the actuator following the instructions described in Chapter 10.2.

### **⚠ WARNING**

#### **Risk of personal injury due to exhaust air being vented.**

The actuator is operated with air. As a result, air is vented during operation.

- Wear eye and hearing protection when working near the actuator.

### **⚠ WARNING**

#### **Crush hazard arising from the moving actuator stem.**

- Do not touch the actuator stem or insert hands or finger into the yoke while the air supply is connected to the actuator.
- Before working on the actuator, disconnect and lock the pneumatic air supply as well as the control signal.
- Do not impede the movement of the actuator stem by inserting objects into the yoke.
- Before unblocking the actuator stem after it has become blocked (e.g. due to seizing up after remaining in the same position for a long time), release any stored energy in the actuator (e.g. spring compression). See section 'Relieving the spring compression in the actuator' in the 'Removal' chapter.

Before removing the valve, make sure the following conditions are met:

- The actuator is put out of operation (see the 'Decommissioning' chapter).

## Removal

### 10.1 Removing the actuator from the valve

See images in the 'Design and principle of operation' section

1. Remove all valve accessories mounted on the actuator.
  2. Pressurize the actuator until the valve reaches 25 % travel.
  3. Undo the nut of the travel indicator (919) at the stem connector clamp (907) on the plug stem.
  4. Unfasten and remove the stem connector clamp (907) from the actuator and plug stems.
  5. Unfasten the screw connection between the valve bonnet and actuator yoke.
  6. Lift off the entire actuator upwards off the valve (see section 'Lifting the actuator (without valve)' in the 'Shipment and on-site transport' chapter).
1. Unscrew the two screws (915) opposite each other on the bottom diaphragm case (900) and replace them with longer screws, which stick out of the actuator housing (40) by approx. 50 mm.
  2. Unscrew the remaining short screws (915).
  3. Gradually unthread the two longer screws that you have just inserted in a crisscross pattern to safely relieve any possible compression of the spring (595).

### 10.2 Relieving the spring compression in the actuator

To relieve the compression of the springs in the actuator, proceed as follows:

- Completely unscrew the spring adjuster (906) on the actuator stem (61) out of the actuator housing (40).

#### **Additional instructions for Type RVXXXR, fail-close (actuator stem extends)**

After opening the diaphragm case and removing the diaphragm plate assembly, carry out the following additional steps:



## 11 Repairs

If the actuator does not function properly according to how it was originally sized or does not function at all, it is defective and must be repaired or exchanged.

### ! NOTICE

***Risk of actuator damage due to incorrect service or repair work.***

- *Do not perform any repair work on your own.*
- *Contact RINGO's after-sales service for repair work.*

The declaration form can be downloaded from our website at ► [www.samsongroup.com](http://www.samsongroup.com) > Service > After-sales Service > Returning goods

### 11.1 Returning devices to RINGO

Defective devices can be returned to RINGO for repair.

- Before returning devices, contact RINGO's after-sales service first to clarify the procedure to return devices. The procedure to be agreed upon depends on the version and application of the control valve to be returned. On contacting the after-sales service, provide the following details:
  - Type
  - Article number
  - Original order

The device must be decontaminated before returning it. Fill in and sign the Declaration on Decontamination. Send it in advance to the after-sales service and attach it to the shipment.



## 12 Disposal

- Observe local, national and international refuse regulations.
- Do not dispose of components, lubricants and hazardous substances together with your household waste.



## 13 Appendix

### 13.1 Tightening torques, lubricants and tools

#### Tightening torques

**Table 13-1:** Type RV330D

Item	Designation	Qty.	Material	Thread	Tightening torque in Nm Target value (max. value)		
					Without handwheel	With top-mounted handwheel	With side-mounted handwheel
365	Threaded pin	4	GR 8.8	M12	49.31 (98.61)		
908	Stem connector screw	2	GR 8.8	M10	30.23 (60.46)	-	
914	Screw (to fasten diaphragm base and cover)	1	GR 8.8	M12	49.31 (98.61)		
915	Screw (bottom diaphragm case)	6	GR 8.8	M8	14.50 (28.99)		
916	Bolt (diaphragm case)	10	GR 18.8	M8	14.02 (18.23)		
954	Pin (threaded bushing)	2	A479 T410	M14	-	50 (54)	
955	Clamping bolt	1	F-114	7/8"	-	152.14 (304.27)	
956	Screw	4	F-112	M10	-	9.35 (18.70)	
961	Stop bolt	2	GR 8.8	M10	-	30.23 (60.46)	
965	Threaded pin (handwheel housing)	1	GR 8.8	M6	-	6.06 (12.13)	
966	Spacer bolt (lever arm)	1	GR 8.8	M10	-	30.23 (60.46)	
971	Housing bolt (side-mounted handwheel)	2	GR 8.8	M8	-	14.50 (28.99)	
982	Diaphragm stud	6	GR 8.8	M12	-	49.31 (98.61)	-

## Appendix

Item	Designation	Qty.	Material	Thread	Tightening torque in Nm Target value (max. value)		
					Without handwheel	With top-mounted handwheel	With side-mounted handwheel
987	Stem connector screw	2	GR 8.8	M10	-		30.23 (60.46)
1951	Ring bolt	2	GR 18.8	M8	14.02 (18.23)		

**Table 13-2:** Type RV350D

Item	Designation	Qty.	Material	Thread	Tightening torque in Nm Target value (max. value)		
					Without handwheel	With top-mounted handwheel	With side-mounted handwheel
365	Threaded pin	4	GR 8.8	M16	118.58 (237.15)		
908	Stem connector screw	2	GR 8.8	M10	30.23 (60.46)		-
914	Screw (to fasten diaphragm base and cover)	1	GR 8.8	M20	231.59 (463.18)		
915	Screw (bottom diaphragm case)	6	GR 8.8	M12	49.31 (98.61)		
916	Bolt (diaphragm case)	10	GR 18.8	M10	29.24 (38.01)		
954	Pin (threaded bushing)	2	A479 T410	M16	-		71 (78)
955	Clamping bolt	1	F-114	7/8"	-		152.14 (304.27)
956	Screw	4	F-112	M12	-		15.90 (31.80)
961	Stop bolt	2	GR 8.8	M12	-		49.31 (98.61)
965	Threaded pin (handwheel housing)	1	GR 8.8	M6	-		6.06 (12.13)
966	Spacer bolt (lever arm)	1	GR 8.8	M12	-		49.31 (98.61)

Item	Designation	Qty.	Material	Thread	Tightening torque in Nm Target value (max. value)		
					Without handwheel	With top-mounted handwheel	With side-mounted handwheel
971	Housing bolt (side-mounted handwheel)	2	GR 8.8	M8	-		14.50 (28.99)
982	Diaphragm stud	6	GR 8.8	M12	-	49.31 (98.61)	-
987	Stem connector screw	4	GR 8.8	M8	-		14.50 (28.99)
1951	Ring bolt	2	GR 18.8	M10	29.24 (38.01)		

Table 13-3: Type RV380D

Item	Designation	Qty.	Material	Thread	Tightening torque in Nm Target value (max. value)		
					Without handwheel	With top-mounted handwheel	With side-mounted handwheel
365	Threaded pin	4	GR 8.8	M16	118.58 (237.15)		
908	Stem connector screw	2	GR 8.8	M10	30.23 (60.46)		-
914	Screw (to fasten diaphragm base and cover)	1	GR 8.8	M20	231.59 (463.18)		
915	Screw (bottom diaphragm case)	6	GR 8.8	M12	49.31 (98.61)		
916	Bolt (diaphragm case)	22	GR 18.8	M10	29.24 (38.01)		
954	Pin (threaded bushing)	2	A479 T410	M16	-		71 (78)
955	Clamping bolt	1	F-114	7/8"	-		152.14 (304.27)
956	Screw	4	F-112	M12	-		15.90 (31.80)
961	Stop bolt	2	GR 8.8	M12	-		49.31 (98.61)

## Appendix

Item	Designation	Qty.	Material	Thread	Tightening torque in Nm Target value (max. value)		
					Without handwheel	With top-mounted handwheel	With side-mounted handwheel
965	Threaded pin (handwheel housing)	1	GR 8.8	M6	-		6.06 (12.13)
966	Spacer bolt (lever arm)	1	GR 8.8	M12	-		49.31 (98.61)
971	Housing bolt (side-mounted handwheel)	2	GR 8.8	M8	-		14.50 (28.99)
982	Diaphragm stud	6	GR 8.8	M12	-	49.31 (98.61)	-
987	Stem connector screw	4	GR 8.8	M8	-		14.50 (28.99)
1951	Ring bolt	2	GR 18.8	M10	29.24 (38.01)		

**Table 13-4:** Type RV390D

Item	Designation	Qty.	Material	Thread	Tightening torque in Nm Target value (max. value)		
					Without handwheel	With top-mounted handwheel	With side-mounted handwheel
365	Threaded pin	4	GR 8.8	M16	118.58 (237.15)		
908	Stem connector screw	2	GR 8.8	M10	30.23 (60.46)		-
914	Screw (to fasten diaphragm base and cover)	1	GR 8.8	M20	231.59 (463.18)		
915	Screw (bottom diaphragm case)	6	GR 8.8	M12	49.31 (98.61)		
916	Bolt (diaphragm case)	22	GR 18.8	M10	29.24 (38.01)		
954	Pin (threaded bushing)	2	A479 T410	M16	-		71 (78)
955	Clamping bolt	1	F-114	7/8"	-		152.14 (304.27)



Item	Designation	Qty.	Material	Thread	Tightening torque in Nm Target value (max. value)		
					Without handwheel	With top-mounted handwheel	With side-mounted handwheel
956	Screw	4	F-112	M12	-		15.90 (31.80)
961	Stop bolt	2	GR 8.8	M12	-		49.31 (98.61)
965	Threaded pin (handwheel housing)	1	GR 8.8	M6	-		6.06 (12.13)
966	Spacer bolt (lever arm)	1	GR 8.8	M12	-		49.31 (98.61)
971	Housing bolt (side-mounted handwheel)	2	GR 8.8	M8	-		14.50 (28.99)
982	Diaphragm stud	6	GR 8.8	M12	-	49.31 (98.61)	-
987	Stem connector screw	4	GR 8.8	M8	-		14.50 (28.99)
1951	Ring bolt	2	GR 18.8	M10	29.24 (38.01)		

Table 13-5: Type RV330R

Item	Designation	Qty.	Material	Thread	Tightening torque in Nm Target value (max. value)		
					Without handwheel	With top-mounted handwheel	With side-mounted handwheel
365	Threaded pin	4	GR 8.8	M12	49.31 (98.61)		
908	Stem connector screw	2	GR 8.8	M10	30.23 (60.46)		–
914	Screw (to fasten diaphragm base and cover)	1	GR 8.8	M12	49.31 (98.61)	–	–
			GR 18.8		–		47.69 (95.37)
915	Screw (bottom diaphragm case)	6	GR 8.8	M8	14.50 (28.99)		
916	Bolt (diaphragm case)	10	GR 18.8	M8	14.02 (18.23)		–
			GR 8.8		–	14.50 (18.84)	
954	Pin (threaded bushing)	2	A479 T410	M14	–	–	50 (54)
955	Clamping bolt	1	F-114	7/8"	–	–	152.14 (304.27)
956	Screw	4	F-112	M10	–	–	9.35 (18.70)
961	Stop bolt	2	GR 8.8	M10	–	–	30.23 (60.46)
965	Threaded pin (handwheel housing)	1	GR 8.8	M6	–	–	6.06 (12.13)
966	Spacer bolt (lever arm)	1	GR 8.8	M10	–	–	30.23 (60.46)
971	Housing bolt (side-mounted handwheel)	2	GR 18.8	M8	–	–	14.02 (28.04)
982	Diaphragm stud	6	GR 8.8	M12	–	49.31 (98.61)	–
987	Stem connector screw	2	GR 8.8	M10	–		30.23 (60.46)
1029	Bolt (housing)	6	GR 8.8	M10	–	30.23 (60.46)	–

Item	Designation	Qty.	Material	Thread	Tightening torque in Nm Target value (max. value)		
					Without handwheel	With top-mounted handwheel	With side-mounted handwheel
1951	Ring bolt	2	GR 18.8	M8	14.02 (18.23)		–
			GR 8.8		–	14.50 (18.84)	

Table 13-6: Type RV350R

Item	Designation	Qty.	Material	Thread	Tightening torque in Nm Target value (max. value)		
					Without handwheel	With top-mounted handwheel	With side-mounted handwheel
365	Threaded pin	4	GR 8.8	M16	118.58 (237.15)		
908	Stem connector screw	2	GR 8.8	M10	30.23 (60.46)		–
914	Screw (to fasten diaphragm base and cover)	1	GR 8.8	M20	231.59 (463.18)	–	231.59 (463.18)
915	Screw (bottom diaphragm case)	6	GR 8.8	M12	49.31 (98.61)		
916	Bolt (diaphragm case)	10	GR 18.8	M10	29.24 (38.01)		9.68 (12.59)
954	Pin (threaded bushing)	2	A479 T410	M16	–	–	71 (78)
955	Clamping bolt	1	F-114	7/8"	–	–	152.14 (304.27)
956	Screw	4	F-112	M12	–	–	15.90 (31.80)
961	Stop bolt	2	GR 8.8	M12	–	–	49.31 (98.61)
965	Threaded pin (handwheel housing)	1	GR 8.8	M6	–	–	6.06 (12.13)
966	Spacer bolt (lever arm)	1	GR 8.8	M12	–	–	49.31 (98.61)

## Appendix

Item	Designation	Qty.	Material	Thread	Tightening torque in Nm Target value (max. value)		
					Without handwheel	With top-mounted handwheel	With side-mounted handwheel
971	Housing bolt (side-mounted handwheel)	2	GR 8.8	M8	-		14.50 (28.99)
982	Diaphragm stud	6	GR 8.8	M12	-	49.31 (98.61)	-
987	Stem connector screw	4	GR 8.8	M8	-		14.50 (28.99)
1029	Bolt (housing)	6	GR 8.8	M12	-	49.31 (98.61)	-
1951	Ring bolt	2	GR 18.8	M10	29.24 (38.01)		9.68 (12.59)

**Table 13-7:** *Type RV380R*

Item	Designation	Qty.	Material	Thread	Tightening torque in Nm Target value (max. value)		
					Without handwheel	With top-mounted handwheel	With side-mounted handwheel
365	Threaded pin	4	GR 8.8	M16	118.58 (237.15)		
908	Stem connector screw	2	GR 8.8	M10	30.23 (60.46)		-
914	Screw (to fasten diaphragm base and cover)	1	GR 8.8	M20	231.59 (463.18)	-	231.59 (463.18)
915	Screw (bottom diaphragm case)	6	GR 8.8	M12	49.31 (98.61)		
916	Bolt (diaphragm case)	22	GR 18.8	M10	29.24 (38.01)		
954	Pin (threaded bushing)	2	A479 T410	M16	-		71 (78)
955	Clamping bolt	1	F-114	7/8"	-		152.14 (304.27)
956	Screw	4	F-112	M12	-		15.90 (31.80)

Item	Designation	Qty.	Material	Thread	Tightening torque in Nm Target value (max. value)		
					Without handwheel	With top-mounted handwheel	With side-mounted handwheel
961	Stop bolt	2	GR 8.8	M12	-		49.31 (98.61)
965	Threaded pin (handwheel housing)	1	GR 8.8	M6	-		6.06 (12.13)
966	Spacer bolt (lever arm)	1	GR 8.8	M12	-		49.31 (98.61)
971	Housing bolt (side-mounted handwheel)	2	GR 8.8	M8	-		231.59 (463.18)
982	Diaphragm stud	6	GR 8.8	M12	-	49.31 (98.61)	-
987	Stem connector screw	4	GR 8.8	M8	-		231.59 (463.18)
1029	Bolt (housing)	6	GR 8.8	M12	-	49.31 (98.61)	-
1951	Ring bolt	2	GR 18.8	M10	29.24 (38.01)		

Table 13-8: Type RV390R

Item	Designation	Qty.	Material	Thread	Tightening torque in Nm Target value (max. value)		
					Without handwheel	With top-mounted handwheel	With side-mounted handwheel
365	Threaded pin	4	GR 8.8	M16	118.58 (237.15)		
908	Stem connector screw	2	GR 8.8	M10	30.23 (60.46)		-
914	Screw (to fasten diaphragm base and cover)	1	GR 8.8	M20	231.59 (463.18)	-	231.59 (463.18)
915	Screw (bottom diaphragm case)	6	GR 8.8	M12	49.31 (98.61)		
916	Bolt (diaphragm case)	22	GR 18.8	M10	29.24 (38.01)		

## Appendix

Item	Designation	Qty.	Material	Thread	Tightening torque in Nm Target value (max. value)		
					Without handwheel	With top-mounted handwheel	With side-mounted handwheel
954	Pin (threaded bushing)	2	A479 T410	M16	-		71 (78)
955	Clamping bolt	1	F-114	7/8"	-		152.14 (304.27)
956	Screw	4	F-112	M12	-		15.90 (31.80)
961	Stop bolt	2	GR 8.8	M12	-		49.31 (98.61)
965	Threaded pin (handwheel housing)	1	GR 8.8	M6	-		6.06 (12.13)
966	Spacer bolt (lever arm)	1	GR 8.8	M12	-		49.31 (98.61)
971	Housing bolt (side-mounted handwheel)	2	GR 8.8	M8	-		14.50 (28.99)
982	Diaphragm stud	6	GR 8.8	M12	-	49.31 (98.61)	-
987	Stem connector screw	4	GR 8.8	M8	-		14.50 (28.99)
1029	Bolt (housing)	6	GR 8.8	M12	-	49.31 (98.61)	-
1951	Ring bolt	2	GR 18.8	M10	29.24 (38.01)		

### Lubricant

Contact RINGO's After-sales Service for more information on suitable lubricants.

### Tools

In addition to the standard tool, special tools are required to assemble and remove some parts. Use adjustable torque wrenches with a stop signal or that indicate the torque being applied to achieve the right tightening torques. Valves in large nominal sizes often require tightening torques that can only be achieved through additional torque multiplication by using a torque multiplier or hydraulic power tool.

The required special tools can be purchased from RINGO.

➔ Contact our after-sales service.

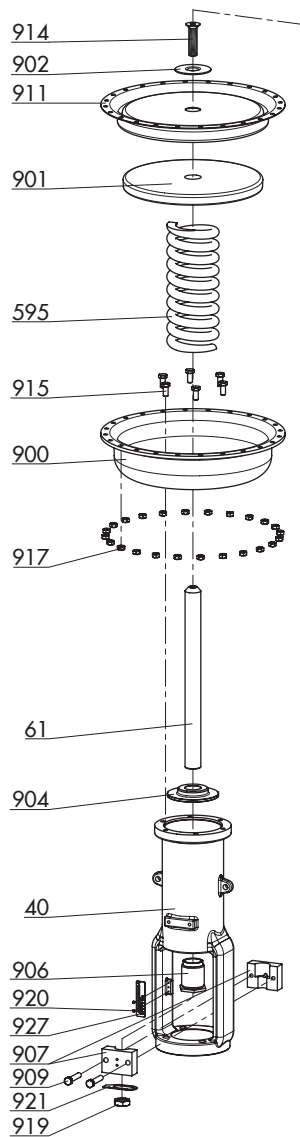
## 13.2 Spare parts

40	Housing with yoke	918	Retaining ring (bushing)
61	Actuator stem	919	Travel indicator nut
352	Adjustment screw	920	Screw (travel indicator)
365	Threaded pin	921	Travel indicator
506	Key drive	922	Vent plug
557	Washer	923	O-ring (bottom diaphragm case)
595	Spring	924	Internal O-ring (bushing)
600	Handwheel	925	External O-ring (bushing)
655	Lifting eyelet	926	Seal (bottom diaphragm case)
770	Handwheel pin	927	Travel indicator scale
824	Actuator stem guard	940	Handwheel housing
825	Handwheel cap	941	Drive (handwheel)
850	Top diaphragm case	942	Drive nut
900	Bottom diaphragm case	947	Bearing bushing (handwheel)
901	Diaphragm plate	950	Handwheel pin assembly (right)
902	Diaphragm holder	948	Lever arm
903	Bushing	949	Drive pin (lever arm)
904	Spring plate	951	Handwheel pin assembly (left)
905	Yoke flange	948	Lever arm
906	Spring adjuster	949	Drive pin (lever arm)
907	Stem connector	952	Pivot pin (lever arm)
938	Stem connector clamp (right)	953	Spacer (lever arm)
939	Stem connector clamp (left)	954	Pin (threaded bushing)
987	Screw (stem connector clamps)	955	Clamping bolt
911	Actuator diaphragm	956	Screw
914	Screw (to fasten diaphragm base and cover)	957	Bushing for pivot pin (lever arm)
915	Screw (bottom diaphragm case)	958	Retaining ring
916	Bolt (diaphragm case)	959	Retaining ring
917	Nut (diaphragm case)	960	Bearing
		961	Stop bolt (side-mounted handwheel)
		962	Stop nut (side-mounted handwheel)

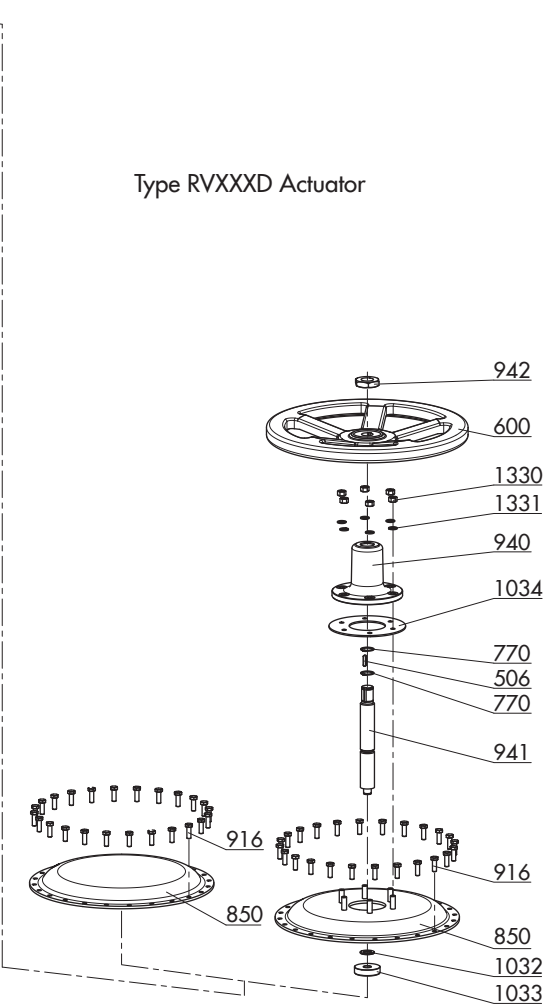
## Appendix

963	Nut	2250	Washer (bottom diaphragm case)
964	Washer		
965	Threaded pin (handwheel housing)		
966	Spacer bolt (lever arm)		
967	Spacer nut (lever arm)		
968	Spacer washer (lever arm)		
969	Ball		
970	Spring		
971	Housing bolt (side-mounted handwheel)		
972	Housing washer (side-mounted handwheel)		
982	Diaphragm stud (top-mounted handwheel)		
1007	Spacer (yoke)		
1027	Anti-rotation fixture		
1029	Housing bolt (top-mounted handwheel)		
1030	Housing nut (top-mounted handwheel)		
1031	Housing washer (top-mounted handwheel)		
1032	Sleeve washer (top-mounted handwheel)		
1033	Base plate (top-mounted handwheel)		
1034	Seal (top diaphragm case for top-mounted handwheel)		
1035	Retaining ring for base plate (top-mounted handwheel)		
1036	O-ring (top-mounted handwheel)		
1240	Top protector bolt (top-mounted handwheel)		
1241	Bottom protector bolt (top-mounted handwheel)		
1338	Lever arm assembly		
1951	Ring bolt		

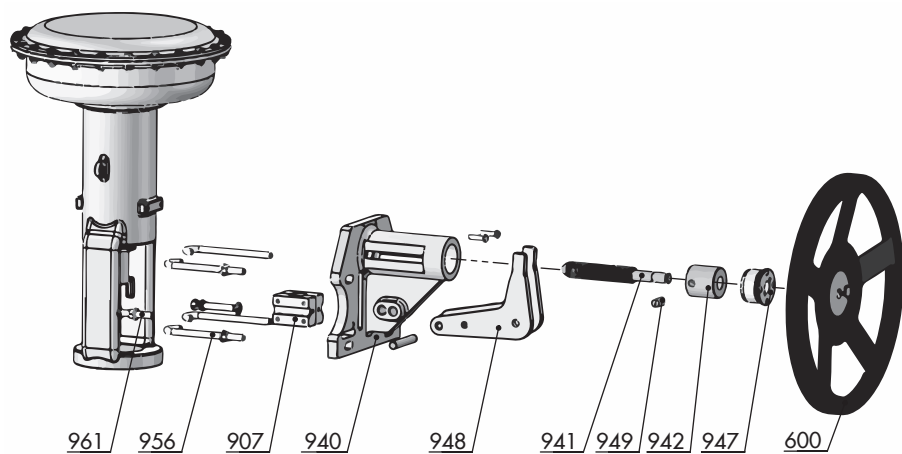


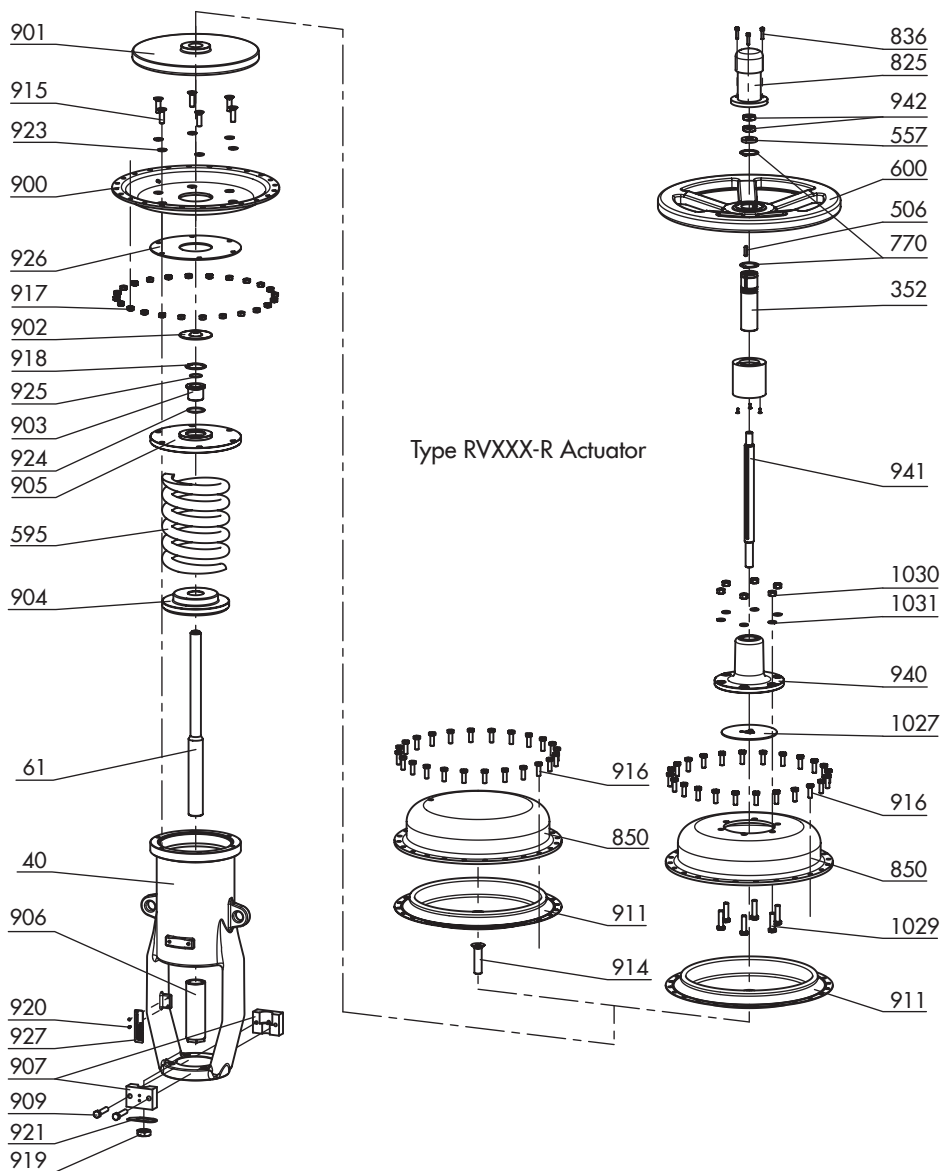


Type RVXXXD Actuator



Version with side-mounted handwheel





### 13.3 After-sales service

Contact our after-sales service for support concerning service or repair work or when malfunctions or defects arise.

#### E-mail address

You can reach our after-sales service at [Aftersales-ringo-es@samsongroup.com](mailto:Aftersales-ringo-es@samsongroup.com).

#### Address of manufacturer

RINGO VÁLVULAS S.L.  
Calle Romero N°6 Polígono Industrial  
Empresarium  
50720 Zaragoza · Spain

#### Addresses of SAMSON AG and its subsidiaries

The addresses of SAMSON AG, its subsidiaries, representatives and service facilities worldwide can be found on our website ([www.samsongroup.com](http://www.samsongroup.com)) or in all SAMSON product catalogs.

#### Required specifications

Please submit the following details:

- Order number and position number in the order
- Type, model number, actuator area, travel, direction of action and bench range (e.g. 0.2 to 1 bar) or the operating range of the actuator
- Type designation of mounted valve (if applicable)
- Installation drawing







**EB 8318 EN**

**SAMSON RINGO**

RINGO VÁLVULAS S.L.

Calle Romero N°6 Poligono Industrial Empresarium

50720 Zaragoza · Spain

Phone: +34 976 45 49 40 · email: [info-ring-es@samsongroup.com](mailto:info-ring-es@samsongroup.com)

Internet: [www.ringospain.com](http://www.ringospain.com)