

RC265

Pneumatic Actuators

Instruction

Type and Design

DA = Double Acting. Actuator with pneumatic operation in both directions.
SR = Spring Return. Actuator with spring return.

Operating Medium

If the operating medium is instrument air, it shall be dust and oil-free. Accepted operating medium: Non-dangerous fluids (group 2 according to directive 97/23/EC). The dew point shall be equal to $-20\text{ }^{\circ}\text{C}$ or, at least, $10\text{ }^{\circ}\text{C}$ below the ambient temperature. The maximum particle size must not exceed $40\text{ }\mu\text{m}$. The exhaust air must pass through a filter silencer before it is let out into the workshop.

The Application of the Scotch Yoke Construction

The Scotch Yoke of the RC 265 actuators has canted slots. Thus the actuator can be given different function depending on how the pistons are mounted in the actuator.

The standard, Double Acting (DA) and Spring Return Fail open (SRF) actuators are mounted as shown in Fig 1, page 4. This design allows for highest torque at "closed" valve position.

Spring Return Fail close (SR) and Double Acting Turned Piston (DATP) actuators are mounted as shown in Fig. 1a, page 4. This gives an increase of the torque towards the end of the rotary motion, although the spring force is diminished.

The possibility to turn the pistons can be used in several ways in order to suit the actuators to the customer's requirements.

Installation and Adjustment

All types of actuators can be mounted in various positions, i.e. vertical or horizontal. When mounting on a valve, ensure that the actuator shaft and the valve stem are centered, and that an axial play of $0,5\text{--}1\text{ mm}$ exists between shaft and driving bush. Ensure especially that actuator and driving bush are mounted correctly in relation to each other, considering that the actuator shaft has an octagonal hole and that a faulty mounting of 45° is possible. This naturally also applies to direct mounting on a valve. After mounting, it may be necessary to adjust the turning angle of the actuator.

Manual Operation

WARNING!

It is very risky to try to operate the actuator manually by using the key grip on the driving shaft. The accumulated energy inside the actuator may instantaneously be set free.

The actuator can be equipped with a handwheel for manual operation, RC-M. Other solutions on request.

WARNING!

All manual operations must be carried out with a pressureless actuator.

Limit and Adjustment

RC265-DA and -SR can be adjusted $\pm 4^{\circ}$ in "closed" and "open" valve position in the standard design. Adjustment can be carried out by removing the pressed protective cover (pos. 70 page 4 not fitted on the high temp actuator) on the right side of the actuator seen from the air connection side and loosen the lock nut (2). The adjustment screws can be screwed inwards or outwards in order to adjust "closed" and "open" position. The actuator can be pressurized during adjustment, but the adjustment screw must be unaffected from the stop ring (71). Tighten the lock nuts after the adjustment, see the torque table on page 8, and fit the protective cover.

The actuator is supplied with an indicator on the drive shaft. The indicator can be mounted in two optional positions for different valve functions, mounting directions etc.

Tightening torques for lock nuts on page 8.

Dismantling actuator from valve

1. Check that the operating medium and the possible power supply are disconnected, and the actuator is pressureless. Make sure that there is no load between the actuator drive shaft and the valve stem.
2. Unscrew the screws between actuator and valve/mounting bracket.

WARNING!

RC actuators must only be used as actuators on valves. Levers, racks and similar cannot be used to transmit movement without protective equipment. Pinch risk in the valve opening when test trimming non-installed valves.

Specific condition of use

Actuators intended to be used in hazardous areas are limited in accordance with the Ex marking on actuator sticker. Avoid placing actuator in direct sunlight, due to the risk of increased temperature. Especially for actuator in hazardous areas.

The temperature of the actuator control medium shall be the same as the ambient temperature in hazardous areas.

If actuator is used on equipment with heavy dynamic parts without built in mechanical stop, the energy transmitted to the actuator has to be considered. If used in hazardous areas the system must be in consideration with respect to the limitations for impact energy according to valid Ex standards.

Mechanical generated spark, avoid any accidental impact on the equipment or friction in the equipment parts containing light metals.

The actuator shall not have any dust layers during its normal operation and expected malfunction

Operating medium, see page 1.

For RC...-SR... actuators, filter-dust excluder IP6X must be mounted for the venting side of the actuator, either in the venting port or in the direct mounted solenoid valves venting port.

Note

Dust and debris accumulated on the actuator will slow down its cooling and contribute to increase of its external temperature.

Prevent electrostatic discharge

Do not polish/rub nonmetallic surface with a dry cloth. The tools and the cleaning procedures must not produce sparks or create adverse condition in the environment during maintenance operations, so as to prevent potential explosion hazards. Prevent electrostatic charges in potentially explosive areas.

ELECTROSTATIC RISK









There is a potential electrostatic charging hazard associated with nonconductive paint and therefore actuator must only be cleaned with a damp cloth.

Prevent electrostatic charges in potentially explosive areas – do not polish/rub nonconductive surfaces with a dry cloth, the operator's clothes must not be electrostatically charged. The tools and cleaning procedures must not produce sparks or create adverse conditions in the environment during maintenance operations, so as to prevent potential explosion hazards. The user must ensure that the operating environment and any materials surrounding the actuator cannot lead to a reduction in the safe use of, or the protection afforded by, the actuator.

Where appropriate the user must ensure the actuator is suitably protected against its operating environment.

The user must plan a regular equipment surface cleaning maintenance for example with a damp cloth every 6 month as minimum, recommended due to the dustiness of the environment, if possible decrease the cleaning frequency.

Actuator type							
Standard RC -20 °C to 75 °C		Viton -15 °C to 75 °C		High temp 0 °C to 105 °C		Low temp -25°C to 55 °C	
T amb (°C)	T Class	T amb (°C)	T Class	T amb (°C)	T Class	T amb (°C)	T Class
55	T6	55	T6	55	T6	55	T6
75	T5	75	T5	70	T5		
				105	T4		
Actuator with manual override M1 max ambient temperature 70° C							

IECEX DNV 21.0039X / DNV 21 ATEX 94178X		
RC	  0470	II 2 G Ex h IIC Gb Ta -20°C / T6 (55°C) / T5 (75°C) II 2 D Ex h IIIC Db Ta -20°C / T6 (55°C) / T5 (75°C)
RC V	  0470	II 2 G Ex h IIC Gb Ta -15°C / T6 (55°C) / T5 (75°C) II 2 D Ex h IIIC Db Ta -15°C / T6 (55°C) / T5 (75°C)
RC HT	  0470	II 2 G Ex h IIC Gb Ta 0°C / T6 (55°C) / T5 (70°C) / T4 (105°C) II 2 D Ex h IIIC Db 0°C / T6 (55°C) / T5 (70°C) / T4 (105°C)
RC LT	  0470	II 2 G Ex h IIC Gb Ta -25°C / T6 (55°C) II 2 D Ex h IIIC Db Ta -25°C / T6 (55°C)

Note! When actuator is equipped with manual override M1 Max ambient temperature 70 °C is allowed.

Lubrication

RC actuators are permanently lubricated, and additional lubrication is normally not required. However, during frequent operation and heavy load it's recommended to use oil mist lubrication or regrease once every year / or 100 000 cycles whatever appears first.

For oil mist lubrication is a mineral oil type ISO VG32 according to DIN 51524HLP recommended. Oil mist lubricator should be set at lowest possible value that allows effective lubrication of the actuator. Commenced oil mist lubrication must continue.

To regrease actuator, follow the instruction "Service of RC265" page 4.

Note! If external accessories like pneumatic or electro-pneumatic positioner etc. is mounted to the actuator, check the accessories data sheet if oil mist is allowed.

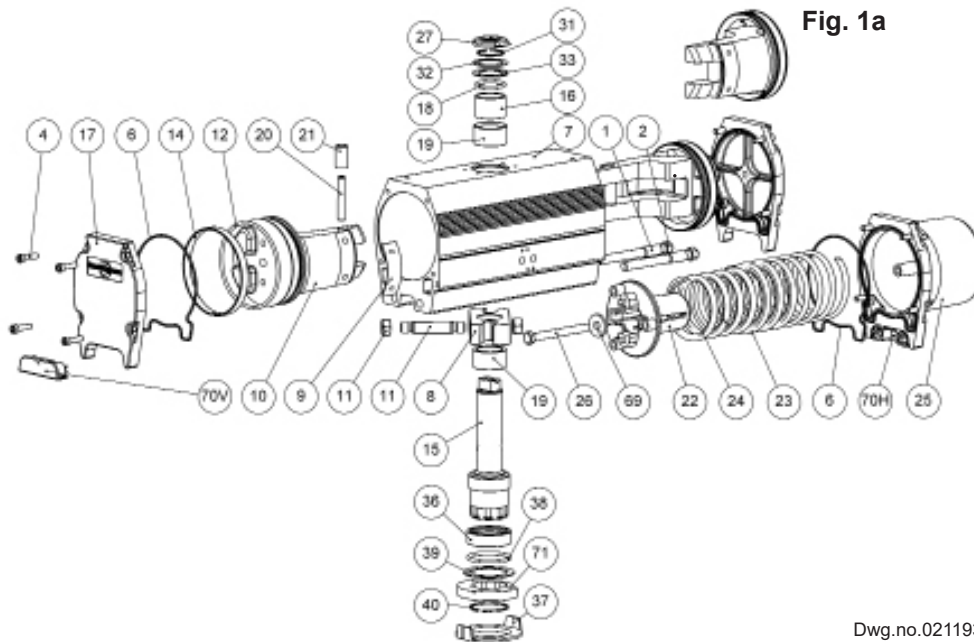
Recommended Lubrication Grease

Cylinder bore and drive shaft with shaft sealings	Grease
RC265 Standard	Klübersynth AR 34-402
RC265 high temp	Klübertemp HM 83-402
RC265 low temp	Klüber Isoflex Topas NCA 52

Piston roller (21) + bearing	Grease
All RC265	Cargo Red Grease

Oil mist lubrication and grease containing polyglycole, ester or other aggressive additives shall be avoided.

Fig. 1



Dwg.no.021193

Service of RC265

WARNING!

Before dismantling the actuator, check that the possible power supply and the operating medium are disconnected, and the actuator is pressureless.

Dismantling of SR unit, see instruction on page 6.

Dismantling of SR unit with manual operation unit type M1, see instruction on page 6.

Exchange of Piston Sealings and Support Elements

1. Please read the warning above!
2. Dismantle the actuator from the console / valve.
3. Dismantle the end plate (17) or the spring packs (25).
4. Fasten the actuator shaft between soft jaws in a vice. Screw out the limit adjustment screws to obtain sufficient rotation. Turn the actuator until the pistons reach the cylinder end. Check how the pistons are mounted. Then place two rods in the holes on the top of the piston. Press together and pull these rods simultaneously to dismantle the piston from the cylinder.
5. Replace the piston O-ring (12) if it is worn.
6. Replace the support ring (14) if it is worn.
7. Replace the support element (9) if it is worn.
8. Grease the cylinder surfaces with a grease according to the lubrication on page 3.
9. Mount the pistons in the same position as originally.
10. Fit the limit adjustment screws (1).
11. Mount the end plates or the spring packs and adjust the limit positions.

Exchange of Shaft Sealings and Support Washers

The O-rings (18) and (38) and the support washers (33) and (39) can easily be replaced as below.

1. Please read the warning on the left!
2. Dismantle the actuator from the console.
3. Dismantle the circlip upper (31) and (40) around the shaft.
4. Note the stop rings position against the shaft, then dismantle this.
5. Dismantle the worn details.
6. Fit the new O-rings (18) and (38).
7. Fit new washers under the circlips.
8. Use a grease according to the lubrication list on page 3 when mounting.
9. Fit the new circlips. Do not stretch them more than necessary.
10. Check that the circlips are tightly fitted without play in their grooves.

Exchange of Shaft Bearings

The bearings (16) and (36) and also the support ring (19) are of sliding rotating type. When the pistons and shaft sealings are dismantled, the bearings and support rings shall be checked and replace if they are worn.

For repair kits all sizes and variants contact the supplier.

Material Table for RC265³

Part No	Description	Number DA	Number SR	Material ³	Surface treatment
1	Adjusting screw	2	2	Stainless Steel	-
2	Lock nut	2	2	Stainless Steel	-
4	Screw	8	8	Steel	-
6	Sealing ²	2	2	Nitrile, HNBR	-
7	Cylinder	1	1	Aluminum	Anodized
8	Scotch Yoke	1	1	Steel	-
9	Scotch Yoke	2	2	Polysulphone	-
10	Scotch Yoke	2	2	Aluminum	-
11	Screw	1	1	Steel	-
11	Lock nut	2	2	Steel	Zinc plated
12	O-ring ²	2	2	Nitrile	Low friction treated
14	Support ring ²	2	2	PTFE, filled	-
15	Driving shaft	1	1	Steel	Yellow chromated
16	Bearing, upper	1	1	Polymer material	-
17	End plate	2	-	Aluminum	Chromated + powder coated
18	O-ring, upper ²	1	1	Nitrile	-
19	Support ring	2	2	Polymer material	-
20	Piston pin	2	2	Steel	-
21	Piston roller	2	2	Steel	-
22	Spring guide	-	2	Aluminum	-
23	Spring external	-	2	Alloyed spring steel	Corrosion protected
24	Spring internal ¹	-	2	Alloyed spring steel	Corrosion protected
25	Spring packs	-	2	Aluminum	Chromated + powder coated
26	Pre-tensioning screw	-	2	Steel	Zinc plated
27	Indicator	1	1	Polymer material	-
31	Circlip upper ²	1	1	Spring steel	Corrosion protected
32	Middle washer ²	1	1	Steel	-
33	Support washer upper ²	1	1	Polymer material, chemically resitant	-
36	Bearing lower	1	1	Bearing bronze	-
37	Guide ring	1	1	Polymer material	-
38	O-ring lower ²	1	1	Nitrile	-
39	Support washer, lower ²	1	1	Polymer material, chemically resitant	-
40	Circlip lower ²	1	1	Spring steel	Corrosion protected
69	Washer	-	2	Steel	Zinc plated
70H	Adjust, screw cover R	1	1	Polymer material	-
70V	Adjust, screw cover L	1	1	Polymer material	-
71	Stop ring	1	1	Steel	-

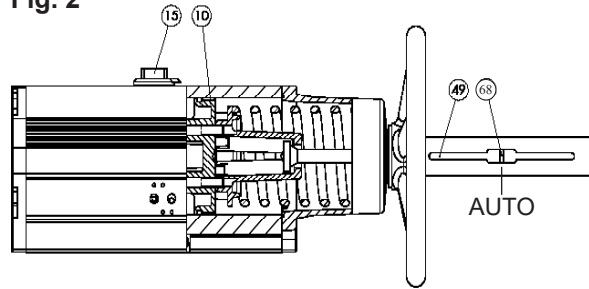
1) Only for certain spring configurations. 2) Included in seal kit 3) For standard versions, for other versions consult Rotork

Converting to SR Actuators

All DA actuators can be changed into SR actuators by adding spring conversion kits according to the following:

1. Please read the warning on page 4!
2. Dismantle the end plates.
3. Dismantle the pistons. See the text under "Exchange of piston sealings and support elements".
4. Mount the pistons according to Fig 1a on page 4.
5. The SR units must be turned so that one of the three support points locates between the bosses on the piston (10).
6. Mount the SR unit when the pistons are in their innermost position.
7. The spring guide (22) is centered towards the piston with the aid of 2 pins.
8. Fit the screws (4). When tightening the screws, the spring force is transmitted from the tensioning screw (26) to these screws.
Tightening torques according to table on page 8.
9. Adjust the turning angle of the actuators, see the limit and adjustment on page 1.

Fig. 2



Dwg.no.000497

Instructions for Dismantling the Manual override unit type M1 from RC265 actuators

WARNING!

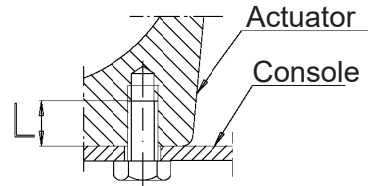
Do not remove the protective tube (Fig. 3 pos 50) from the spring housing as long as the springs are tensioned. This procedure must be followed for safe dismantling of pre-tensioned spring housings.

1. The actuator must be pressureless.
2. Disconnect possible power supply.
3. Relieve the adjustments screws with the manual override before loosening them (1 and 2, Figure 1) so that they don't obstruct the shaft (15, Figure 2) movement.
4. Check that the shaft is in closed (fail close) or open (fail open) position, i.e. the springs have pressed the pistons (10, figure 2) into their inner position.
5. Turn the handwheel so that the yellow indication ring (68, figure 3) moves towards the actuator. Turn until it stops. The indication ring can now be seen through the plastic tube (49, figure 3) through the inner part of the window.
6. Check under the actuator that the cam does not lie against the adjustment screws.
7. Turn back the handwheel until the indication ring has passed "AUTO"-position and there is resistance. This unloads the screws (4, figure 1) in the spring housing from the spring force.
8. Dismantle the manual override by loosening the screws (4) of the spring housing and turning the hand wheel several turns in the direction which gives the least resistance.

Dismantling must be carried out in the above order with the utmost care. In the case of the slightest uncertainty - contact the supplier!

Tightening Torques for Screws and Lock Nuts

The actuators must be screwed onto the console with the correct tightening torque in order to remain stable during operation.
Please use as long screws as possible without the threads grounding.



"L" is the screw-in length according to drawing.

Tightening Torques in Nm		
Actuator	Screw (4)	Lock nut (2)
RC265	4	17

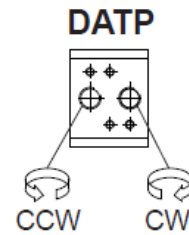
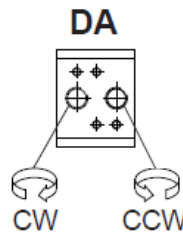
Resistance class min. 8.8. Lightly oiled screws.

Tightening Torques in Nm													
Actuator	DIN flange	Thread	L max (mm)	Screw-in length (mm)									
				8	10	12	14	16	18	20	24	28	32
	F12	M12	25	-	-	-	60	70	75	75	-	-	-

We reserve the right to alterations without previous notice.

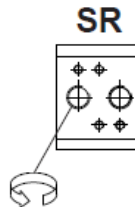
Air Connections

Double Acting

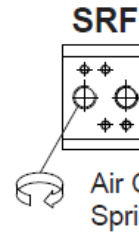


Reversed direction of rotation

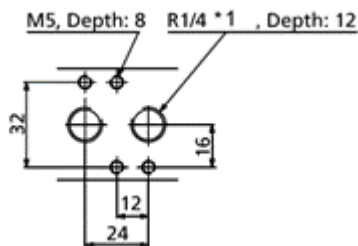
Single Acting with Spring Return



Air CCW rotation
Spring CW rotation



Air CW rotation
Spring CCW rotation

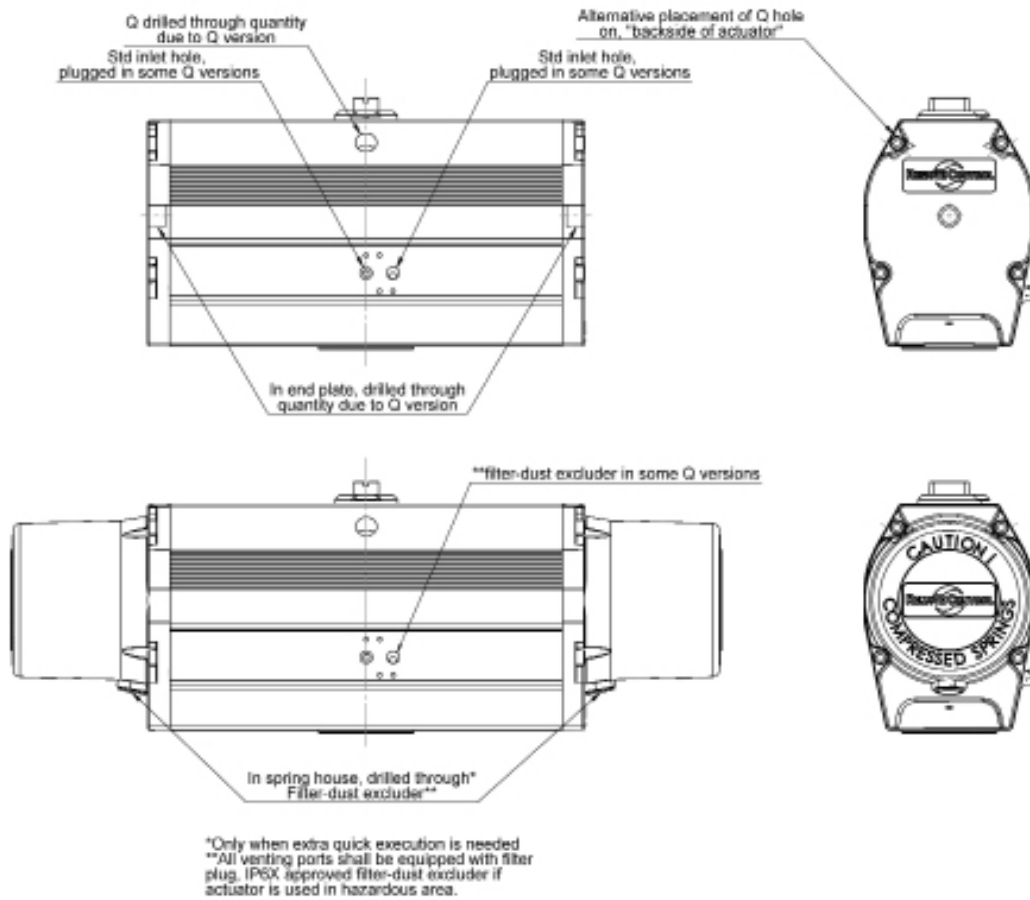


Hole pattern for solenoid valves acc. To EN 15714-3

*1 BSP threads standard, NPT threads indicated with letter N on the actuator sticker for RC200 with all other threads metric.

RC... Quick actuator

RC...-Q.. actuator is used there faster operating time is requested. The version with larger connections, has extra holes in cylinder, endplates or spring house depending on actuator function, see figure below.



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Dimension, thread type and number of hole for medium connection can be found on the RC...-...Q actuator sticker.

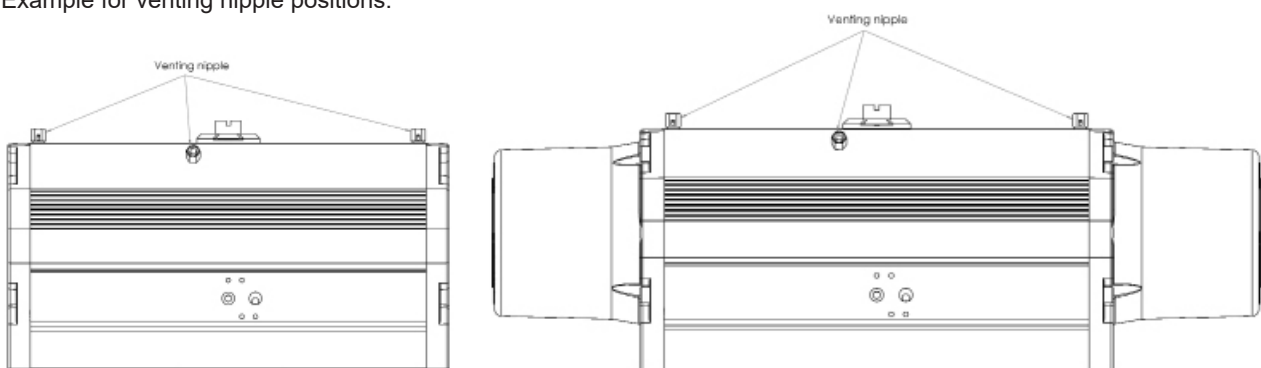
RC... Hydraulic actuator

Hydraulic actuators has venting nipples on the actuator. The venting nipples may be placed in different positions depending on actuator mounting orientation. For venting of the pressurized actuator, use PPE and protect the surroundings from spillage.



For opening and closing of the venting nipples, use the supplied key.

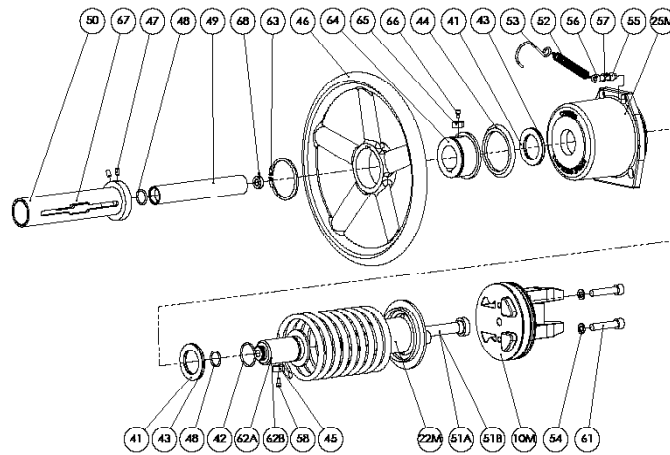
Example for venting nipple positions.



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Fig. 3

RC265



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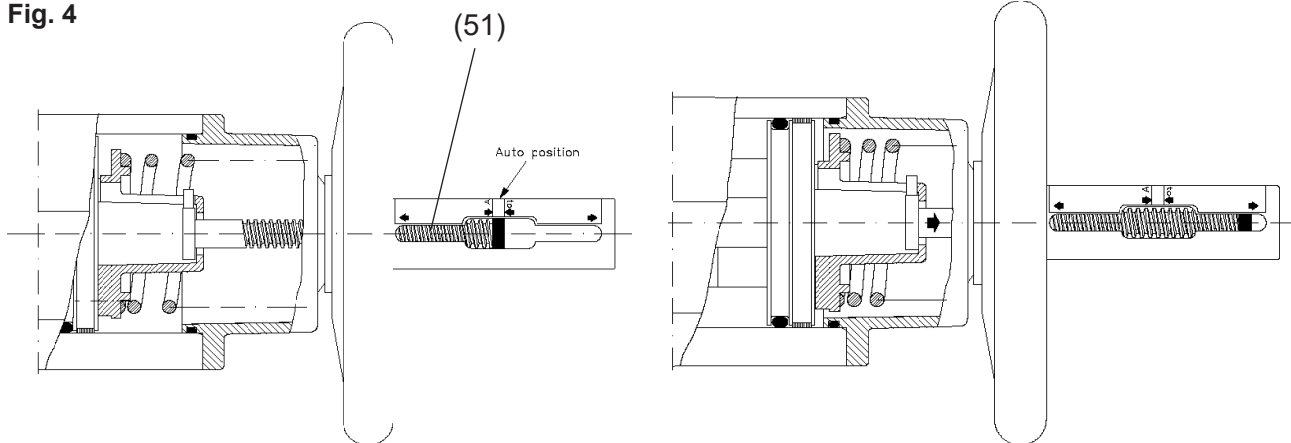
Material Table for RC265 M1³

Part No	Description	Number	Material	Surface treatment
10M	Piston M	1	Aluminium	-
22M	Spring guide M	1	Aluminium	-
25M	Spring housing M	1	Aluminium	Anodized Powder coated
41	Needle roller bearing	2	Needlebearing steel	-
42	O-ring ²	1	Nitrile	-
43	Needle bearing washer	4	Steel	-
44	Cuff sealing	1	Nitrile steel	Zinc plated
45	Key	1	Steel	-
46	Hand wheel	1	Aluminium	Anodized
47	Set screw	2	Stainless steel	-
48	O-ring ²	2	Nitrile	-
49	Tube, transparent	1	Acrylic Plastic	-
50	Protecting tube	1	Aluminium	-
51A	Stem, DA (right threaded)	1	Steel	-
51B	Stem, SR (left threaded)	1	Steel	-
52	Spring	1	Stainless spring steel	-
53	Locking hook	1	Stainless steel	-
54	Seal washer ²	2	Nitrile/Steel	Zinc plated
57	Spring Holder	1	Stainless steel	-
58	Screw	1	Steel	Zinc plated
61	Screw	2	Steel	Zinc plated
62A	Stem nut, DA (right threaded)	1		-
62B	Stem nut, SR (left threaded)	1		-
63	Circlip	1	Steel	Corrosion protected
64	Hand wheel bushing,	1	Aluminium	Anodized
65	Key	1	Steel	-
66	Screw	1	Steel	-
67	Label	1	Polymer material	-
68	Indication ring	1	Polymer material, yellow	-

2) Included in seal kit 3) For standard versions, for other versions consult Rotork

Function RC-M1

Fig. 4

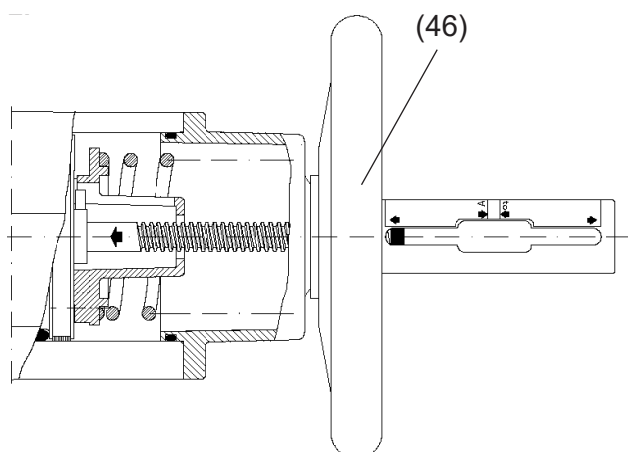


Neutral Position (Fig. 4)

With the stem (51) in Auto position, the piston (10M) can move freely and the actuator can be operated pneumatically. The picture shows a double acting actuator, DA, in "open" position or a single acting actuator, SR, in "closed" position.

Manual Operation (Fig 6)

DA and SRF: The handwheel is turned clockwise. The stem and piston are drawn outwards. The valve closes.
SR and DATP: The handwheel is turned anti-clockwise. The stem and piston are drawn outwards. The valve opens.



Manual Operation (Fig. 5)

DA and SRF: The handwheel (46) is turned anti-clockwise. The stem (51) and piston (10M) are pressed inwards. The valve opens.
SR and DATP: The handwheel is turned clockwise. The stem and piston are pressed inwards. The valve closes.

The actuator (15) shaft is thus turned in the same direction as the handwheel.

When the actuator has been operated manually, a return to the Auto position must take place before remote operation can be performed again.

On dismantling the manual operation housing (25M), the actuator **must** first be ventilated, for SR actuators the stem (51) **must** also be in Auto position.



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