

Installation and Instruction Manual

A300 Series Cylinder Actuator

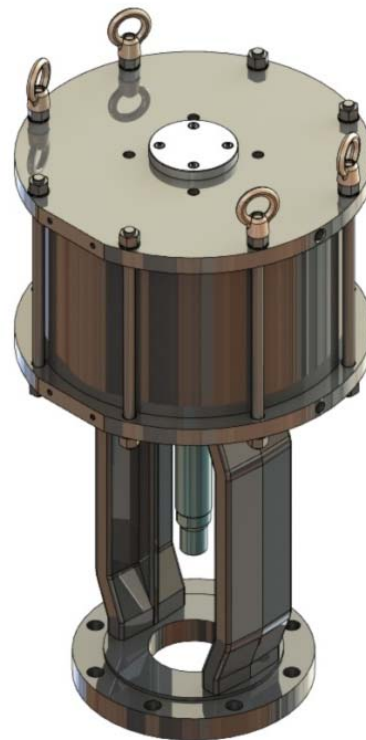


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Safety Information

Important – Please Read Before Installation

UNICON A300 Series Cylinder Actuator instructions contain **Danger**, **Warning** and **Caution** labels, where necessary, to alert you to safety related or other important information. **Danger** and **Warning** hazards are related to personal injury. **Caution** hazards involve equipment or property damage. Operation of damaged equipment can, under certain operational conditions, result in degraded process system performance that can read to injury or death. Total compliance with all **Danger**, **Warning** and **Caution** notices is required for safe operation.

The safety terms **Danger**, **Warning**, **Caution** and **Note** have used in these instructions to highlight particular dangers and/or to provide additional information on aspects that may not be readily apparent.

Danger : indicates that death , severe personal injury and/or substantial property damage will occur if proper precaution is not taken.

Warning : indicates that death, severe personal injury and/or substantial property damage can occur if proper precaution is not taken.

Caution : indicates that minor personal injury and/or property damage can occur if proper precaution is not taken.

Note : indicates and provides additional technical information which may not be obvious, even to qualified personnel.

1. General Information

1-1 Using

The following instructions are designed to assist in disassembling, reassembling and troubleshooting UNICON SYSTEM equipped with Cylinder Actuators. Separate installation, operation and maintenance instructions cover additional features (such as handle wheel, limit stops, fail-safe systems, limit switches or positioners).

Product users and maintenance personnel should thoroughly review this bulletin in conjunction with any handwheel or other accessory equipment before installing, operating or performing any maintenance on the actuator. In most cases, actuators and accessories are designed for specific applications.

For this reason they should not be used in other applications without first contacting the manufacturer.

1-2 Applicability

The following instructions are applicable to the maintenance and installation of cylinder actuators only. This document should be used in conjunction with the appropriate Installation, Operation and Maintenance Instructions specific to the model of the valve on which the actuator is installed.

1-3 Qualified Personnel

Qualified personnel are people who, on account of their training, experience, instruction and knowledge of relevant standards, specifications, accident prevention regulations and operating conditions, have been authorized by those responsible for the safety of the plant to perform the necessary work and who are able to recognize and avoid possible dangers.

Danger

Before installation, check the order number, serial number and/or the tag number to ensure that the valve/actuator is correct for the intended application.

1-4 Spare Parts

Use only UNICON original spare parts. UNICON cannot accept responsibility for any damages that occur from using spare parts or fastening materials from other manufactures. If UNICON spare part (especially sealing materials) have been on store for long periods of time check these products for corrosion or deterioration before using them. The end user must provide fire protection for UNICON products.

1-5 Service / Repair

To avoid possible injury to personnel or damage to products, the safety terms must be strictly adhered to (see Section 1.3). Modifying this product, substituting non-factory parts, or using maintenance procedures other than those outlined in this instruction manual can drastically affect performance, be hazardous to personnel and equipment, and may void existing warranties. Between the actuator and the valve there are moving parts.

To avoid injury, UNICON provides pinch-point-protection in the form of cover plates, especially where side-mounted positioners are fitted. If these plates are removed for inspection, service or repair special attention is required. After completing work the cover plates must be refitted. Apart from the operating instructions and the obligatory accident prevention directives valid in the country of use, all recognized regulations for safety and good engineering practices must be.

Warning

Before products are returned to UNICON for repair or service, UNICON must be provided with an MSDS (Material Safety Data Sheet) and a certificate, which confirms that the product has been decontaminated. UNICON will not accept deliveries if the MSDS and the certificate have not been provided (a form can be obtained from UNICON). Since the packing box can not be cleaned with out removing packing, valve packing should be removed and the packing area flushed as part of the cleaning.

1-6 Storage

In most cases, UNICON products are manufactured from carbon steel & fiber glass. Products not manufactured from carbon steel & fiber glass are provided with an organic coating. This means that UNICON products are well protected from corrosion. Nevertheless, UNICON products must be adequately stored in a clean, dry environment.

2. Unpacking

While unpacking the actuator, check the packing list against the materials received. Lists describing the actuator and accessories are included in each shipping container.

- » Position the lifting straps and hoist to avoid damage to the tubing and mounted accessories when lifting the actuator from the shipping container.

Warning

When lifting an actuator with lifting straps through the yoke legs, be aware that the center of gravity may be above the lifting point. Therefore, support must be given to prevent the actuator from rotating, causing serious injury to personnel or damage to nearby equipment.

- » Contact your shipper immediately in the event of shipping damage.
- » Contact your UNICON representative with any other problems.

3. Installation

Prior to installation, make sure adequate overhead clearance is provided for the actuator to allow for proper removal from the valve body and for proper maintenance. Please Refer to Table 3, 4.

- » Pipelines must be correctly aligned to ensure that the valve is not fitted under tension.
- » The user must provide fire protection.

Warning

Personal injury or equipment damage caused by sudden release of pressure may result if the actuator assembly is installed where service conditions could exceed the limits given in tables 1, 2 or the appropriate nameplates.

Caution

To avoid parts damage, do not use a normal operating pressure that exceeds the Maximum Cylinder Casing Pressure (see table 1) or produces a force on the actuator stem greater than the Maximum Allowable Output Thrust (see table 1 or 2) or Maximum Allowable Valve Stem Load.

Note!

When ordered, the valve configuration and construction materials were selected to meet particular pressure, temperature, pressure drop, and controlled fluid conditions.

- » Make sure the positioner mounting bolts, linkage and stem clamp are fastened securely.
- » Ensure all accessories, brackets and associated bolting are fastened securely.
- » Spray soap solution around the base and top of the cylinder, lower actuator stem bushing and the piston stem bushings to check for air leaks through the O-rings.
- » Clean any dirt or foreign material from the actuator and piston stems.
- » If an air filter is supplied, isolate the air filter, then check and replace the cartridge as necessary.

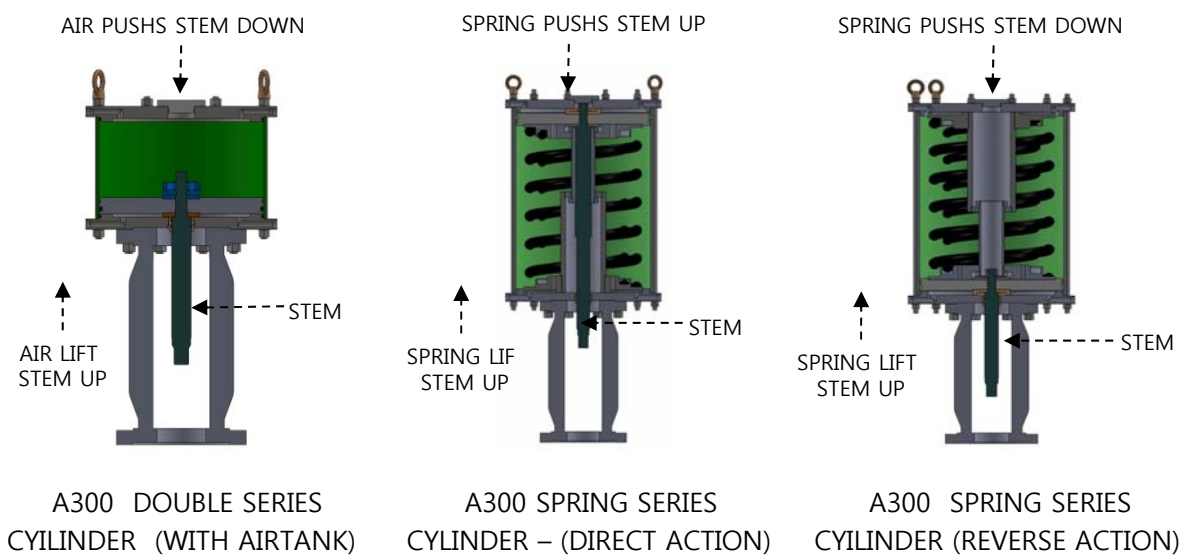
 **Warning**

When moving the actuator stem with piston loading pressure use caution to keep hands and tools out of the actuator stem travel path. Personal injury or property damage is possible if something is caught between the actuator stem and other parts of the valve assembly.

Caution:

The A300 actuator spring load will force the piston rod to extend out of the cylinder, and it can come into contact with the valve stem during actuator mounting. If the valve stem is allowed to remain in the up position (towards the actuator) during mounting, it can interfere with the actuator mounting, possibly damage valve stem threads or bend the valve stem. Be sure the valve stem is pushed down (into the valve body), away from the actuator while mounting. To avoid damaging the valve plug seating surfaces, do not rotate the valve plug while it is seated. Also avoid damage to the valve plug stem by careful use of tools during travel adjustment

A300 Cylinder Actuator				
Cylinder Series		DOUBLE		SPRING
Spring Quantity		N/A		1~2
Size		12"	16"	20"
Maximum Operating Pressure To Cylinder	BarG	4~7		
	PsiG	58~101		
Maximum Travel	mm	120	150	200
	inch	4.72	5.9	7.87
Valve Stem Connector Thread	mm	M30x2.5P		M36x2.5P
Pressure Connections	inch	PT 1/2" inch		



Figures 1. Section View - Operation Principle

Description:

A300 series are complete line of linear pneumatic actuators purposely designed for the operation of control Valves. The product range includes both double acting and spring return units available in several sizes which can de-liver a force up to 30,000 daN. These actuators can assure an extremely smooth valve operation and do not require any maintenance.

Table 1. Additional Specifications (Double Cylinder)

Size	Spring Quantity	Maximum Travel		Effective Cylinder Area (1)		Maximum Output Thrust (2)	
		Mm	Inch	mm	Inches ²	Application	Kg/cm ²
12"	N/A	100-120	3.9-4.7	728.5	28.6	Cylinder Area*4kg/cm ²	2914
16"	N/A	100-150	3.9-5.9	1295	50.9		5183
20"	N/A	100-200	3.9-7.9	2025	79.7		8100

Table 2. Additional Specifications (Spring Cylinder)

Size	Spring Quantity	Maximum Travel		Effective Cylinder Area (1)		Spring rate (2)
		mm	Inch	mm	Inches ²	Kg/mm
12" RA/DA	1~2	120	4.7	728.5	41.85	6.325
16" RA/DA	1~2	150	5.9	1295	60.45	6.47
20" RA/DA	1~2	100-200	3.9-7.9	2025	46.97	8.296

Note!

- » Effective cylinder area at 0% valve travel from piston.
- » Based upon 4 bar operating pressure to the cylinder and valve travel at 0% from seat

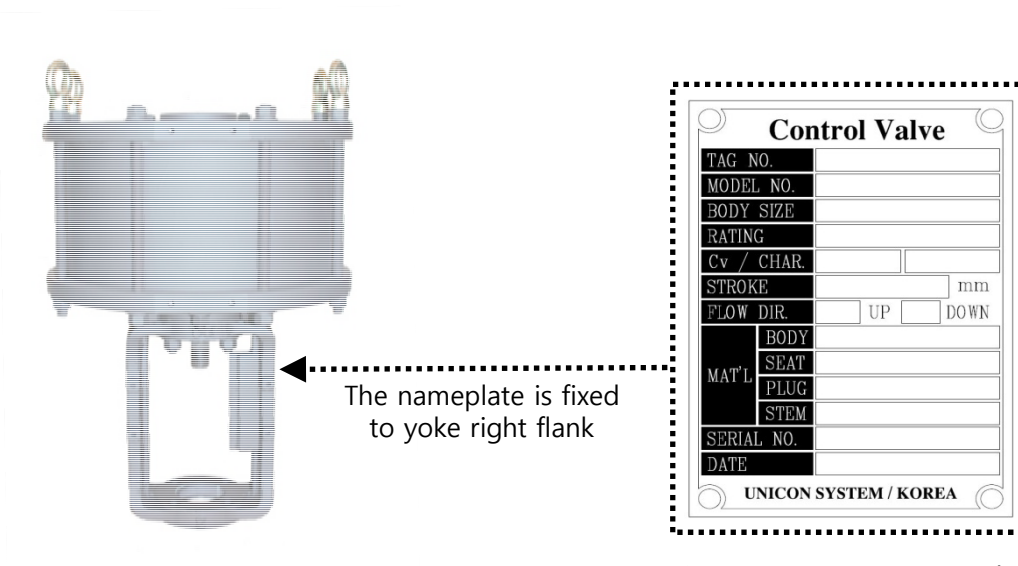


Figure 2. Actuator Nameplate

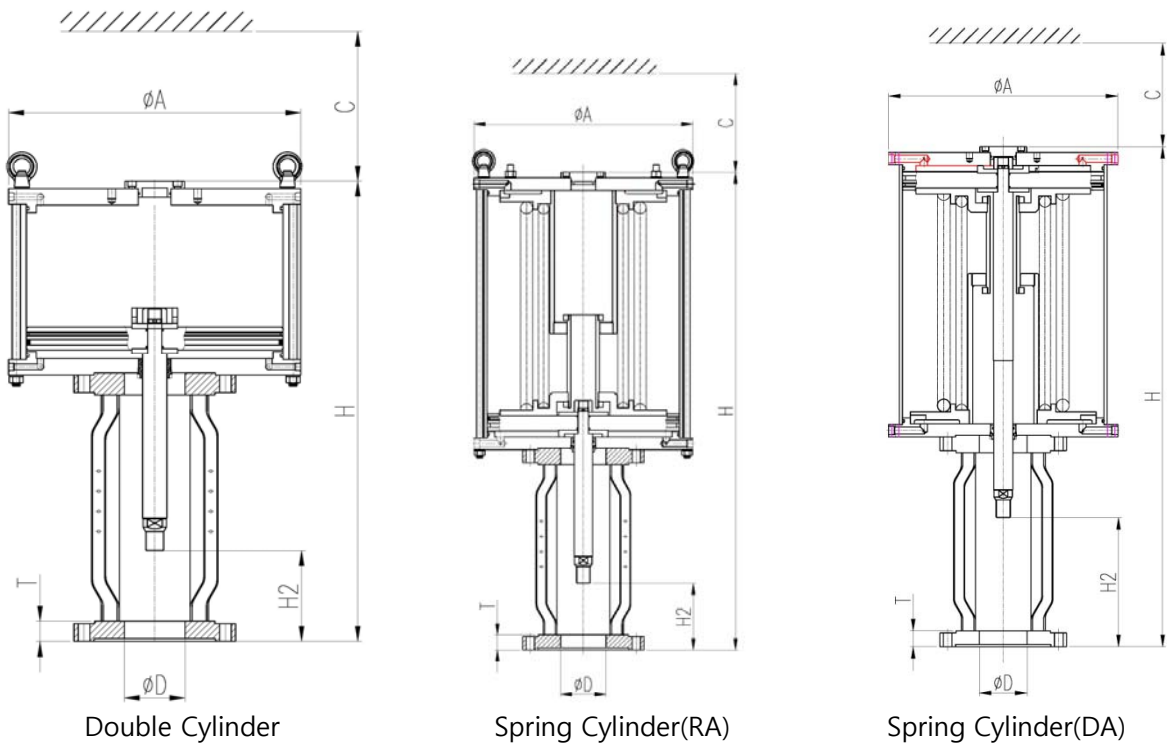


Figure3. Dimension

Table 3. Dimensions

Actuator Size	A	H2	H	D	T	C
	Millimeters (mm)					
12" Double	370	100-120	748~916	80-107	30	200
12" Spring RA		120				
12" Spring DA		120				
16" Double	472	100-150	658~848	80-107-120	30-35	
16" Spring RA		150				
16" Spring DA		150				
20" Double	578	100-200	860	120	35	
20" Spring RA						
20" Spring DA						

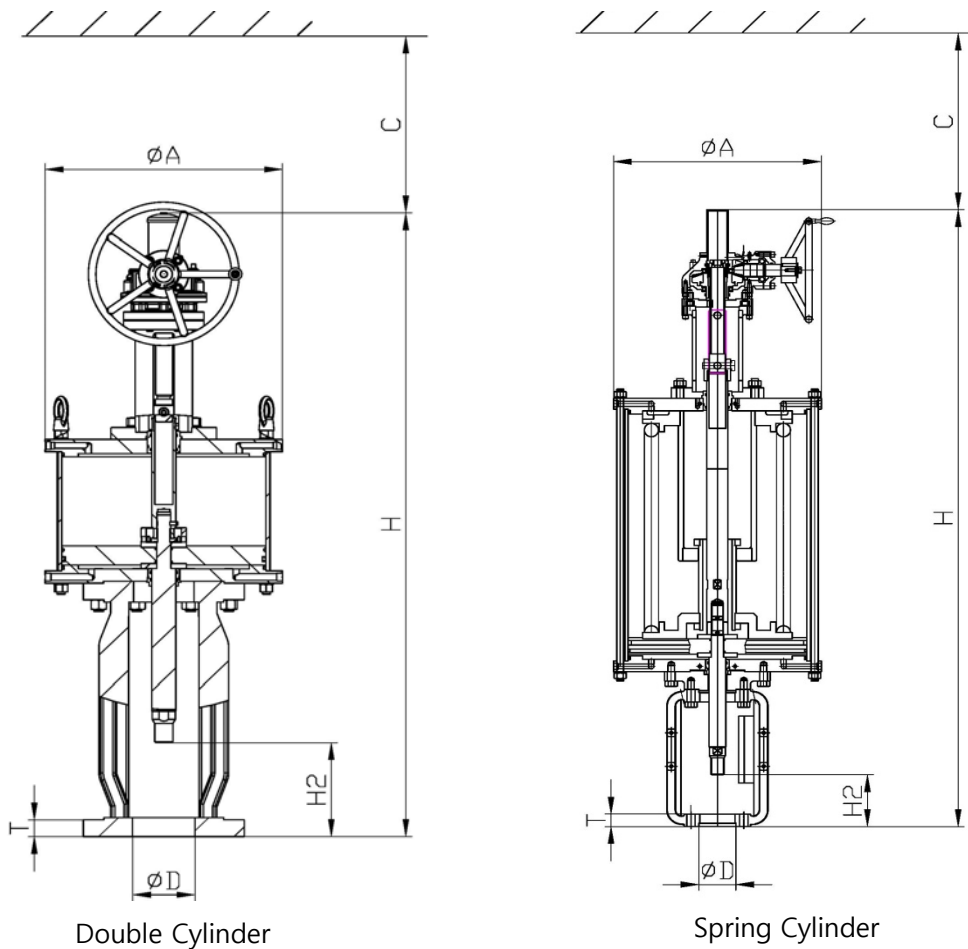
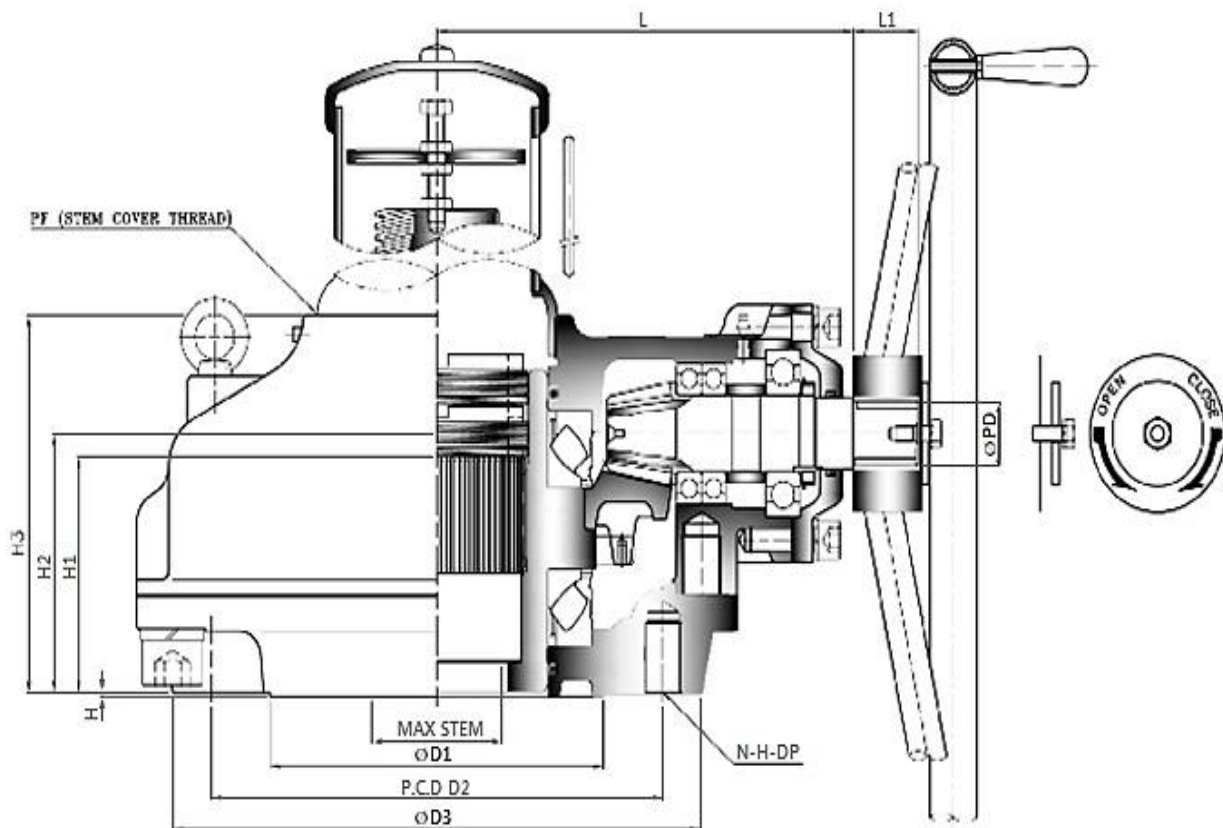


Figure 4. Actuator Dimensions With Steering Wheel

Table 4. Dimensions

Actuator Size	A	H2	H	D	T	C
	Millimeters (mm)					
12" Double	370	100-120	1074~1419	80-107	30	200
12" Spring RA		120				
12" Spring DA		120				
16" Double	472	100-150	1096~1475	80-107-120	30-35	
16" Spring RA		150				
16" Spring DA		150				
20" Double	578	100-200	1359~1795	120	35	
20" Spring RA						
20" Spring DA						

Actuator Steering Wheel Gearbox



:: Dimension

UNIT : mm

MODEL	DIM		BASE PART					EXTERNAL PART					INPUT SHAFT PART			HAND WHEEL	STEM COVER
	TYPE	FLANGE SIZE	ØD1	P.C.D		ØD3	H	H1	H2	H3	L	L1	ØPD	KEY			
				D2	N-H-DP												
SB-VS10	A	F-10	70	102	4-M10-17	125	3	56	71	95	121	34	26	8X7	250	PF 2"	

:: Selection Chart for Manual Operation

MODEL	SIZE	GEAR RATIO	MAX. STEM ACCEPTANCE		MAX. THRUST CAPACITY		MAX. TORQUE CAPACITY		WEIGHT
			TW	KEY	KN	lbf	N · m	Ft · lbf	
SB-VS10		2.5 : 1	30	22 (8X7)	75.5	16970	220	162	8

Actuator Steering Wheel Gearbox



- » Handle gearbox is part to be fitted by purchased from external suppliers.
- » Handle gearbox can be a small force, all the stems by moving up and down, it can open and close the fluid and gas.
- » This is a product that can be used for both of the diaphragm actuator and cylinder actuator.
- » Handle of diameter to be used for cylinder actuator can use the handle of 400mm size, the diameter of the handle that is used for the diaphragm actuator to use the handle of 500mm size.
- » A unique local position dial indicator is available. It is graduated from 0% (close) to 100% (open)

FEATURE

This series suitable for use with Gate & Globe type valve. Also sluice gates and any other type requiring linear motion for thrust and torque applications.

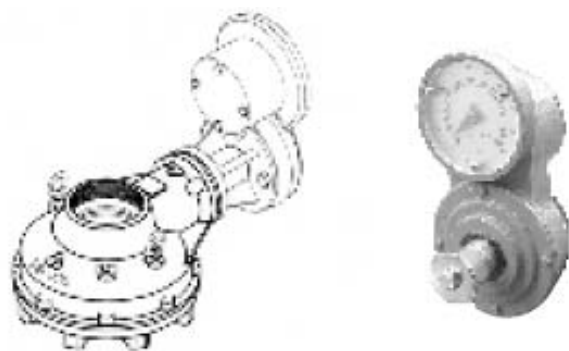
Unique Top Entry Replaceable Stem Nut, High Tensile Aluminum bronze material providing corrosion and abrasion resistance.

Castings are Ductile Iron, class 65-45-12 providing high strength and impact resistance.

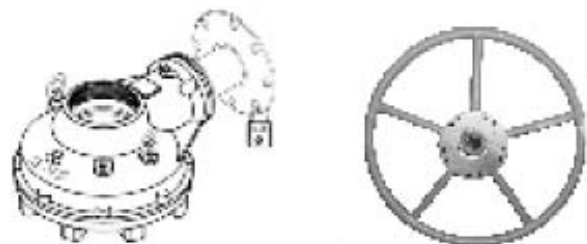
Heavy duty roller bearings supporting both radial & axial thrust loads.

Gears are Machine cut, heat treated and ground for optimum operation
Unit are completely O-Ring Sealed suitable for temporary submergence to meet Ip67 class.

Many options, such as hand wheels, chain wheels, stem covers, position dial indicators are available.



- » Input can be equipped with a hand wheel locking device for manually operated units.



4. Operation

At least once every six months, check for proper operation by following the preventative maintenance steps outlined below. These steps should not be performed while the actuator is in service. If an internal problem is suspected with the actuator, refer to the Disassembly and Assembly sections (Figure from 5 to 9 respectively).

**Warning**

To avoid serious injury, the following steps should only be performed with the air supply or positioner input disconnected.

- » When disconnecting air supply, observe actuator for correct fail-safe action.
- » Examine the actuator for damage caused by corrosive fumes and process drippings.
- » Clean the actuator and repaint any areas of severe oxidation.
- » If possible, stroke the actuator and check for smooth, full-stroke operation.

Caution

To avoid serious injury, keep hands, hair and clothing away from all moving parts while operating the actuator.

Note!

A300 Double Cylinder actuator uses a piston that moves inside the actuator cylinder. An O-ring provides a seal between the piston and the cylinder. From an equilibrium state, the actuator reacts to a force unbalance that is created by increasing Supply pressure on one side of the piston and decreasing it on the other. This moves the piston up or down, and results in a repositioning of the valve control element.

5. Disassembly Cylinder Actuator

To disassemble the Cylinder actuator, refer to Figure 5 and 6 and then proceed as follows. Shut off the air supply. If the actuator is installed on a UNICON valve, remove the valve using the appropriate Installation Operation and Maintenance instructions.

Warning

To avoid serious injury, depressurize the line to atmospheric pressure and drain all fluids before working on the actuator.

- ① Disconnect all tubing.
- ② Remove the actuator from the valve body using air in the cylinder to move the plug stem to approximately mid stroke position.
- ③ Remove the stem clamp and release the air from the cylinder slowly.
- ④ Remove the yoke bolts. Using lifting rings in the place of two of the top plate eye-nuts, lift the actuator up off the valve body subassembly. Set the actuator on a workbench or other sturdy work surface.

Warning

When lifting an actuator with lifting straps through the yoke legs, be aware that the center of gravity may be above the lifting point. Therefore, support must be given to prevent the actuator from rotating, causing serious injury to personnel or damage to nearby equipment.

- ⑤ Remove the cover plate bolts, cover plate.

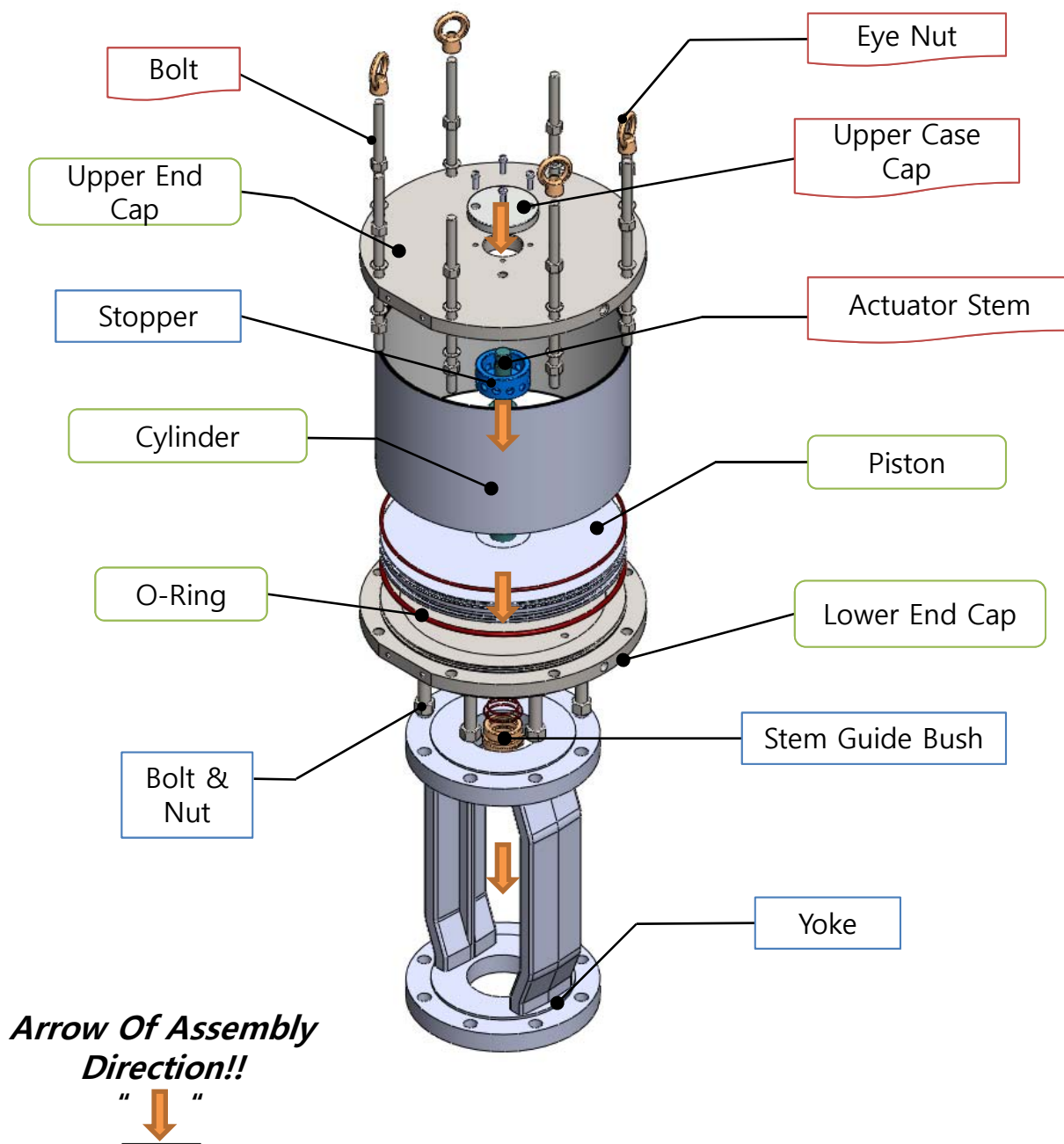


Figure 5. Double Cylinder Actuator Assembly Drawing

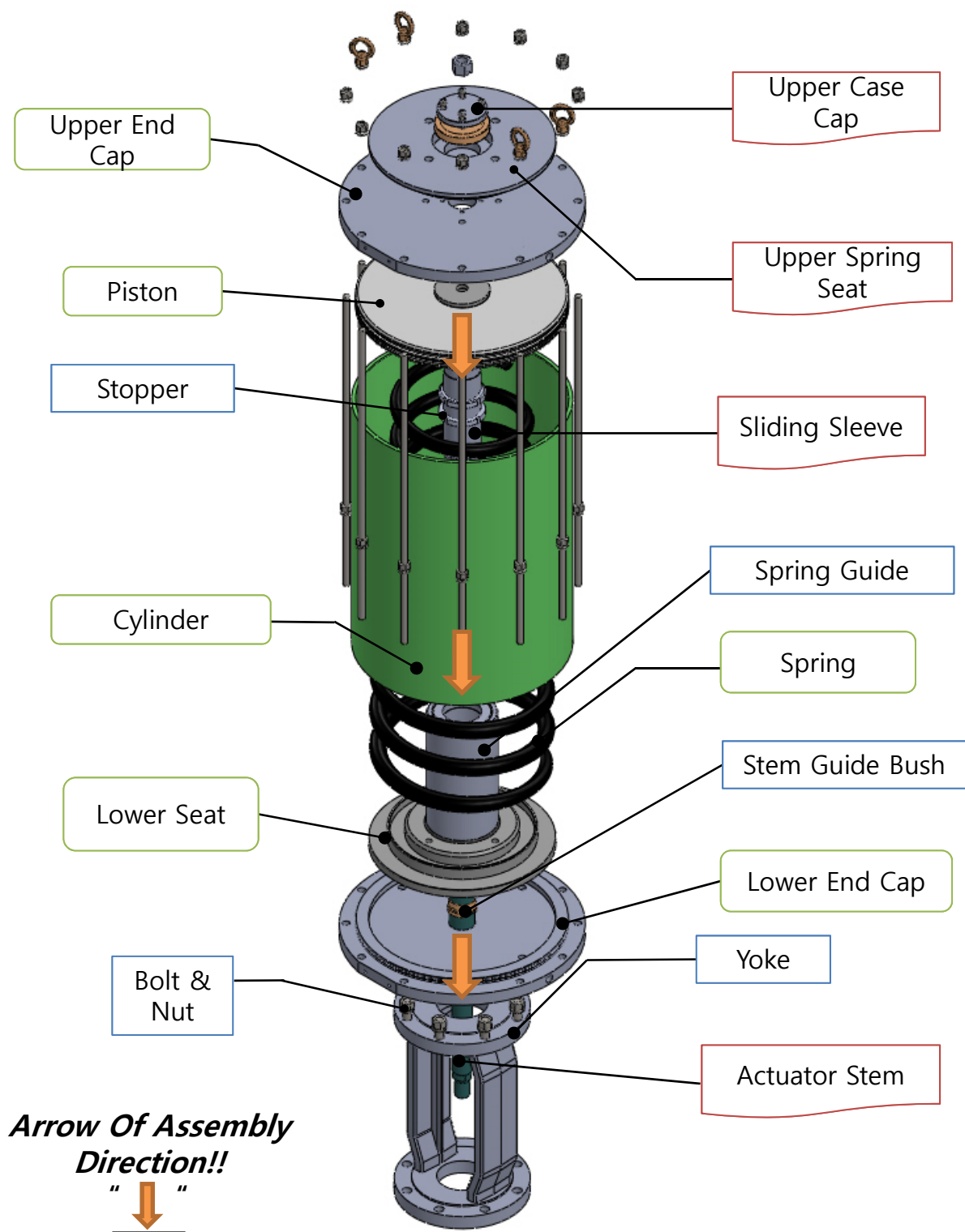


Figure 6. Spring Cylinder Actuator Assembly Drawing

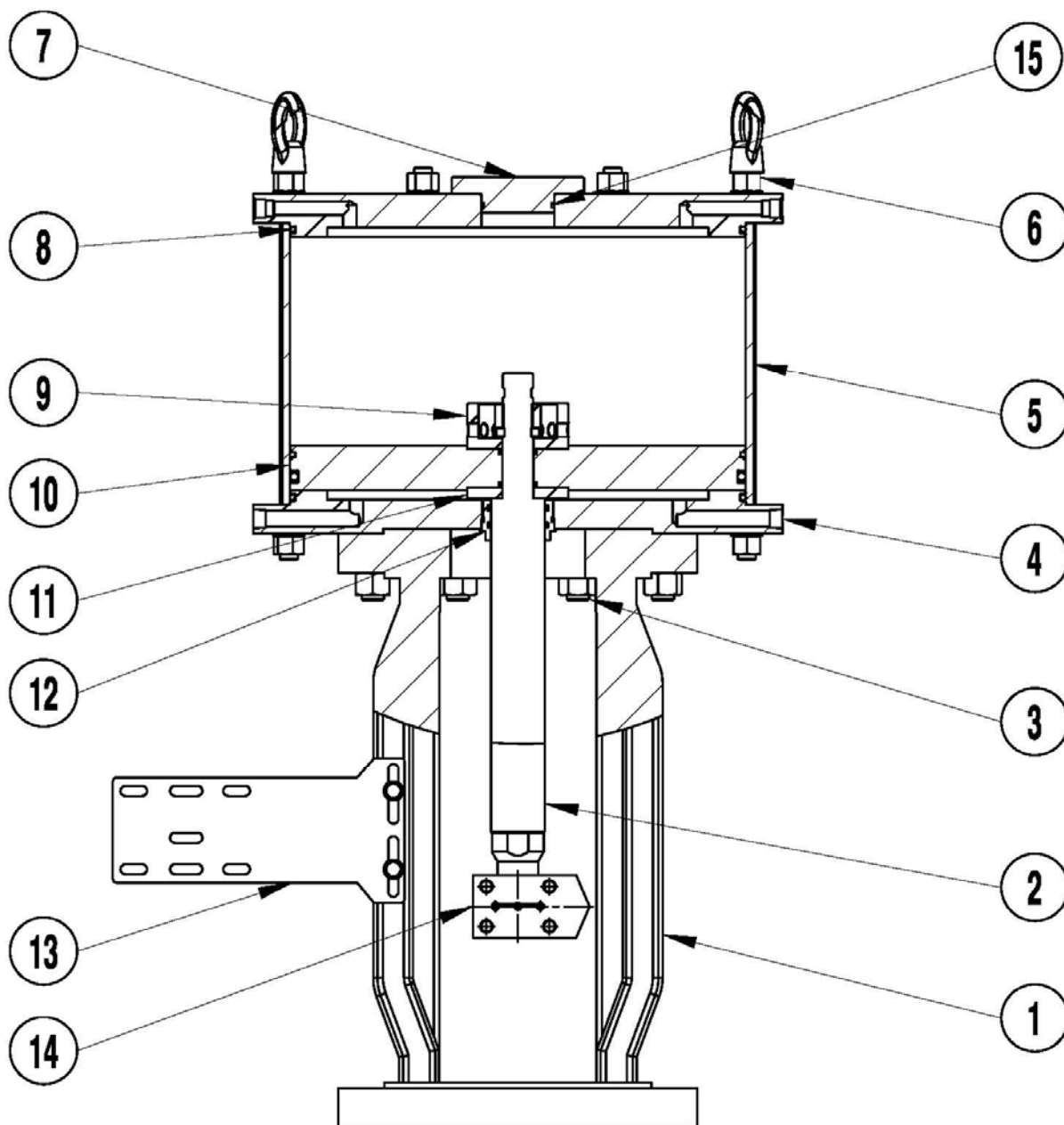


Figure 7. Double Cylinder Type

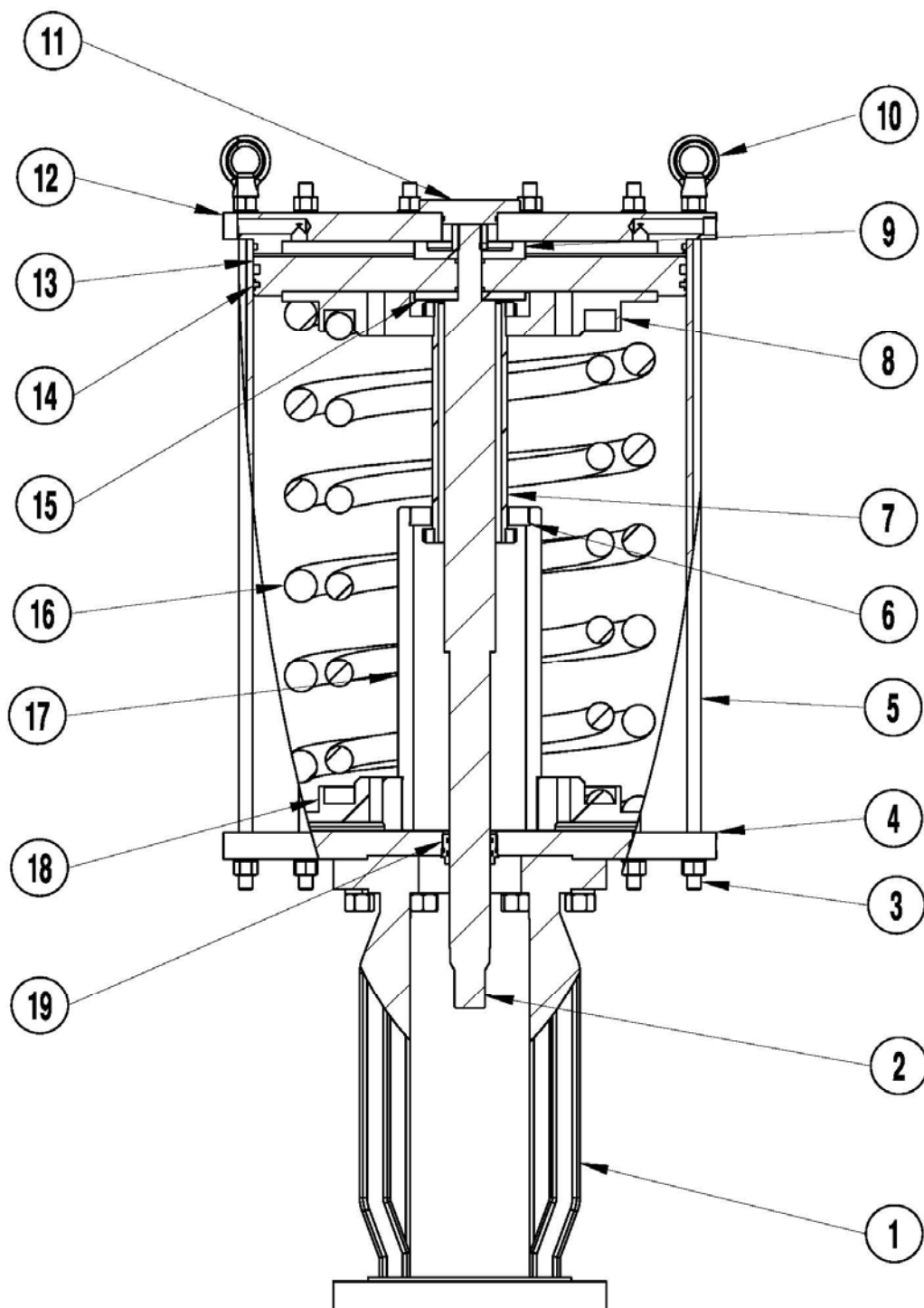


Figure 8. Spring Cylinder Direct Action Type

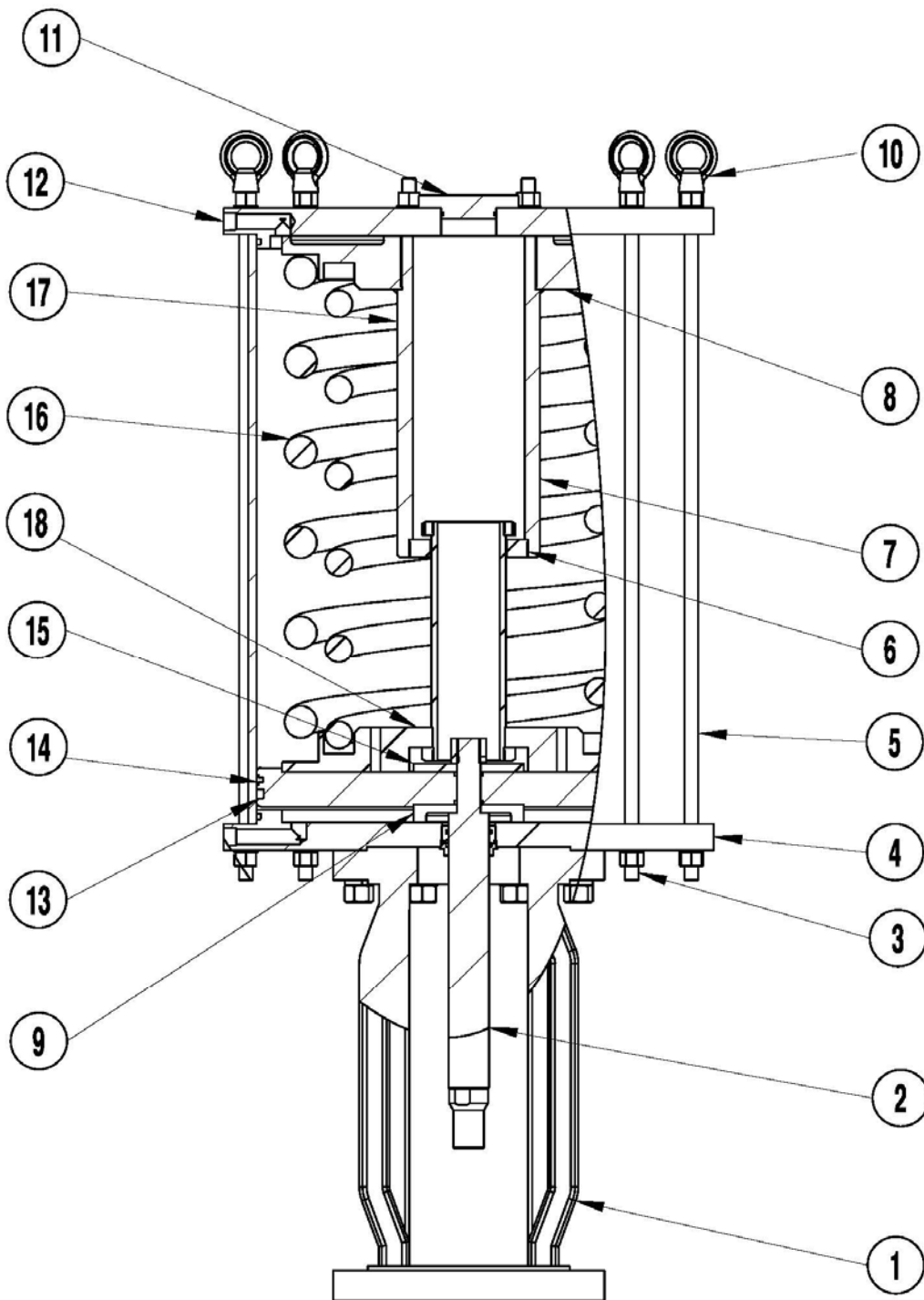


Figure 9. Spring Cylinder Reverse Action Type

Double Cylinder Type Part List

Key	Description	Explanation
1	YOKE	Different for each size ① 12 inch ② 16 inch ③ 20 inch
2	ACTUATOR STEM	①12 inch ②16 inch ③20 inch
3	BOLT & NUT	Used Bolts & Nuts: KS M6~M20
4	LOWER END CAP	Size of common parts is applied ① 12 inch ② 16 inch ③ 20 inch
5	CYLINDER	Distinguished according to the cylinder type are "Double" type Or "Spring" type
6	EYE NUT	Used Eye Nut
7	UPPER CASE CAP	Size of common parts is applied ① 12 inch ② 16 inch ③ 20 inch
8	UPPER END CAP	
9	STROKE LIMITER	
10	PISTON	
11	PISTON PROTECTOR	
12	STEM GUIDE BUSH	
13	POSITIONER BRACKET	
14	STEM CLAMP	
15	O-RING	Used O-ring Type: P TYPE SIZE [P28, P38, P48] G TYPE SIZE [G50, G60]

Spring Return Cylinder (Direct & Reverse) Part List

Key	Description	Explanation
1	YOKE	Different for each size ① 12 inch ② 16 inch ③ 20 inch
2	ACTUATOR STEM	①12 inch ②16 inch ③20 inch
3	BOLT & NUT	Used Bolts & Nuts: KS M6~M20
4	LOWER END CAP	Size of common parts is applied ① 12 inch ② 16 inch ③ 20 inch
5	CYLINDER	Distinguished according to the cylinder type are "Double" type Or "Spring" type
6	STOPPER GUIDE	Size of common parts is applied ① 12 inch ② 16 inch ③ 20 inch
7	STOPPER	
8	UPPER SEAT	Size of common parts is applied ① 12 inch ② 16 inch ③ 20 inch
9	STROKE LIMITER	Size of common parts is applied ① 12 inch ② 16 inch ③ 20 inch
10	EYE NUT	Used Eye Nut: KS M16
11	UPPER CASE CAP	Size of common parts is applied ① 12 inch ② 16 inch ③ 20 inch
12	UPPER END CAP	
13	PISTON	
14	O-RING	Used O-ring Type: P TYPE SIZE [P28, P38, P48] G TYPE SIZE [G50, G60]
15	PISTON PROTECTOR	Size of common parts is applied ① 12 inch ② 16 inch ③ 20 inch
16	SPRING	
17	SPRING GUIDE	
18	LOWER SEAT	
19	STEM GUIDE BUSH	

6. Connection disassembly from the Body

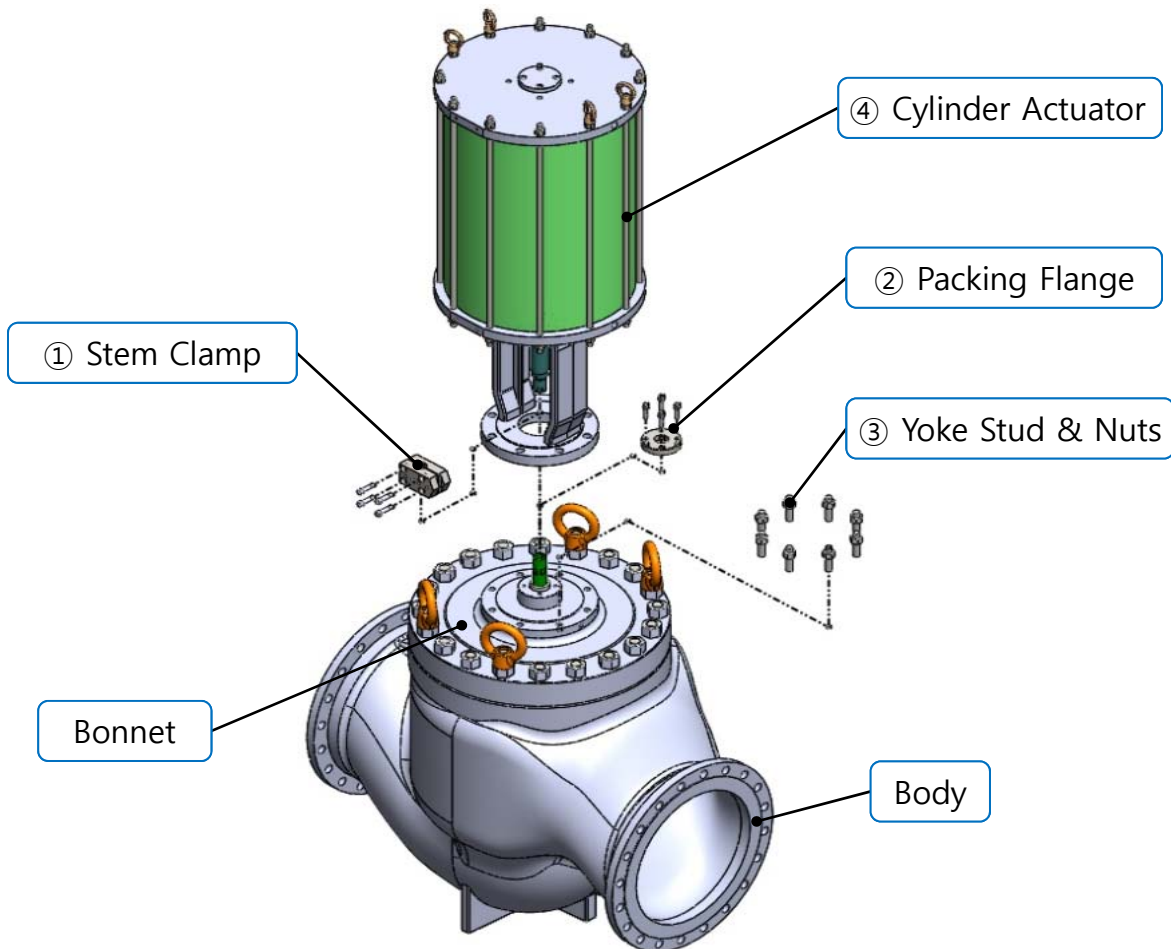


Figure 10 . Actuator separated from the Body (Cylinder)

Disassembly Order
① → ② → ③ → ④



1. disassemble the Stem Clamp

2. disassemble the Packing Flange

3. disassemble the Yoke Stud & Nuts