



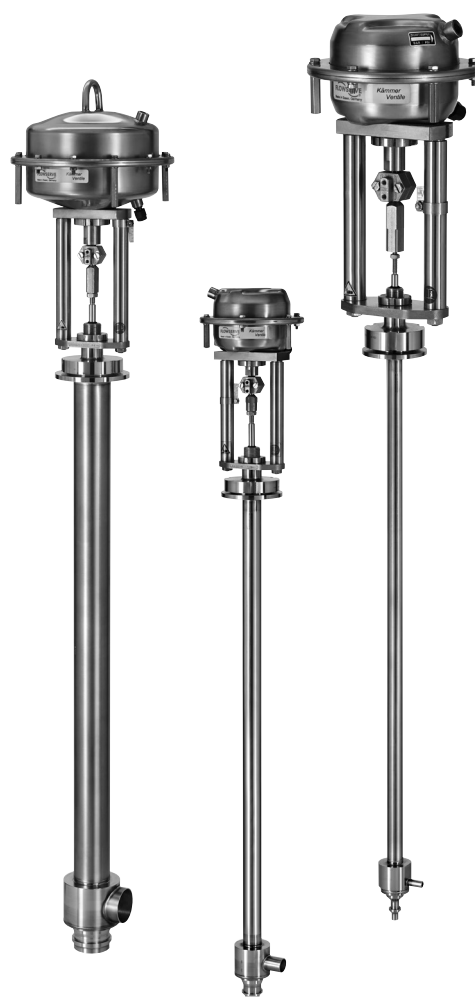
# *USER INSTRUCTIONS*

## *ColdFlow - 341000*

Cryogenic Control Valves 4K

FCD KMENIM4104-01 03/18

## *Maintenance*



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### 1 USING KÄMMER VALVES AND ACTUATORS CORRECTLY

#### 1.1 General

The following instructions are designed to assist in installing and performing maintenance as required on FLOWSERVE Kämmer products. Product users and maintenance personnel should Thoroughly review this maintenance instruction prior to installing and prior to performing any maintenance on the product.



**DANGER:** Please review also the general Installation and Operational Manual (IOM) for general safety instructions.

#### 1.2 Terms concerning safety

The safety terms **DANGER**, **WARNING**, **CAUTION** and **NOTE** are 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 precautions are not taken.*



**WARNING:** *indicates that death, severe personal injury and / or substantial property damage can occur if proper precautions are not taken.*



**CAUTION:** *indicates that minor personal injury and / or property damage can occur if proper precautions are not taken.*



**NOTE:** *indicates and provides additional technical information, which may not be very obvious even to qualified personnel. Compliance with other, not particularly emphasized notes, with regard to transport, assembly, operation and maintenance and with regard to technical documentation (e.g. in the operating instruction, product documentation or on the product itself) is essential, in order to avoid faults, which in themselves might directly or indirectly cause severe personal injury or property damage.*

## 2 INITIAL INSTALLATION

### 2.1 Unpacking

2.1.1 Valve and Actuator are delivered separately. This allows for more compact transport boxes and easier installation. After unpacking the valve and actuator, clearly mark the parts for proper assembly. The trim is installed inside the valve body to avoid damage during transport. To remove the trim assembly from the valve please refer to section 3.1

#### 2.1.2 Marking (figure 1)

Valve components have been marked with the serial number in order to allow a proper disassembly and assembly. The valve body is marked on top of the cover plate (1.1), trim kit at the upper part of the extension (1.2) and the bonnet on the side (1.3). All relevant technical data is shown on a stainless steel nameplate attached to the actuator. See also section 5 Identification.

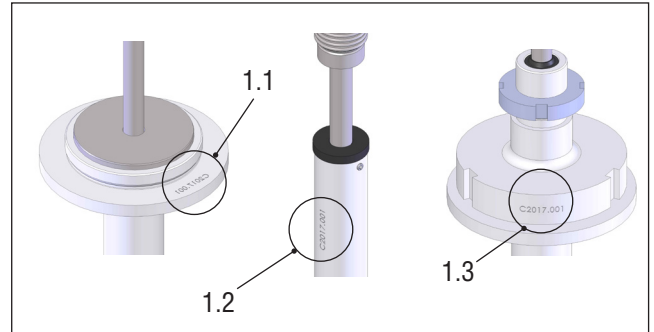


Figure 1: Marking

### 2.2 Preparation for vacuum box installation (figure 2)

2.2.1 After trim has been removed from the valve body (see chapter 3.1) mount the installation flange (2:1) on the bonnet flange thread of the valve.



**CAUTION:** Please ensure that the mounting flange has been tightened with the correct torque (see table 7.3).

2.2.2 Attach hoisting equipment of adequate lifting capacity to the hoisting lug (3:1) and lower the valve body into the vacuum box. See also table 7.2 for approximate maximum weights of this subassembly.

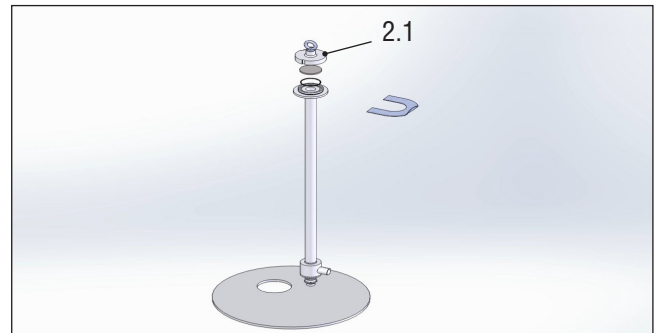


Figure 2: Mounting Preparation



**CAUTION:** take care when lowering the valve subassembly into the vacuum box.

#### Mounting (figure 3)

Insert the mounting Tool (3.1) between the valve cover plate (3.2) and the mounting flange (3.3) before reaching the final position inside the box.

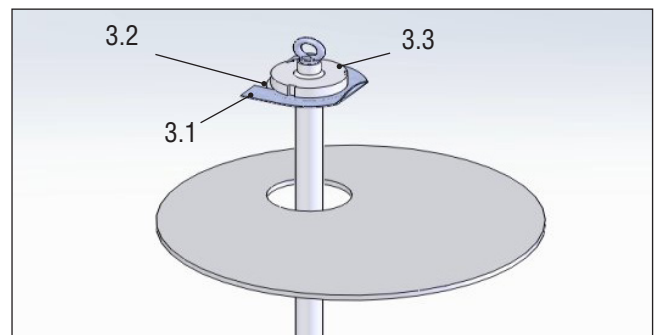


Figure 3: Mounting

## 2.3 Welding

### 2.3.1 Pipe connections

Position the valve inside the vacuum box and secure it with the mounting tool. The pipe connections for inlet and outlet can now be welded.

**!** **NOTE:** *Ensure that the trim internals are removed and that the mounting flange is the correct size.*

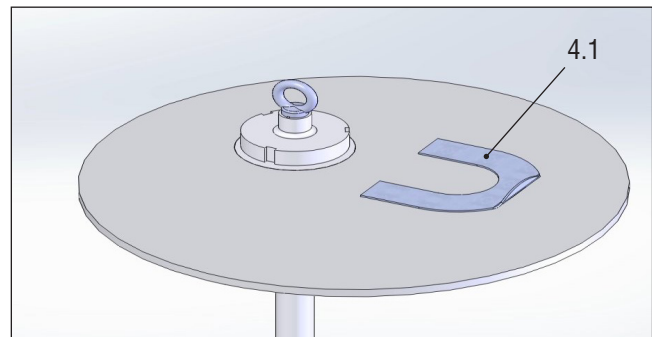
For the standard pipe sizes refer to table 7.2 BW (mm).

### 2.3.2 Welding cover plate (figure 4)

With the mounting tool (4.1) in position tack weld the cover plate to the vacuum box to secure its position. Rotating the mounting tool will provide space for the tack welding.

**!** **NOTE:** *ensure the valve can move freely and is not under tension while welding it to the vacuum box. Damage to trim and trim guiding may occur.*

Remove the mounting tool (4.1) and weld the entire circumference of the cover plate to the vacuum tank.



**Figure 4: Cover Plate Welding**

## 2.4 Pressure testing

After welding all the valves into the vacuum tank perform a pressure test with all valves. For this all valves must be fitted with mounting flanges. This mounting flange has a dual purpose: firstly it assists in mounting the valves into the vacuum tank and secondly to seal the valve at the bonnet connection in order to pressurize the piping system without the trim assemblies and actuators mounted.



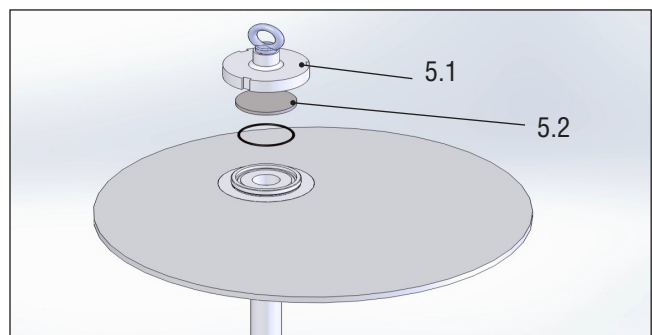
**CAUTION:** *Ensure all mounting flanges are in place and properly tightened. A loose mounting flange cannot sustain the pressure and will result in unwanted or unsecure leakage.*

## 2.5 Cleaning

With the mounting flanges in place, clean and purge the entire piping system with a cleaning media to remove dirt and welding residues from the system.

## 2.6 Remove mounting flanges (Figure 5)

After completing all tests, cleaning and mounting procedures, remove all mounting flanges (5.1) and spacer plates (5.2) from the valves. Flowserve Essen offers a refund system for returning the mounting flanges and mounting tools after use. For further details please contact Flowserve Essen Order administration.



**Figure 5: Remove Mounting Flange**

### 3. TRIM PARTS

#### 3.1 Remove Trim assembly

- 3.1.1 Remove actuator (See section 4)
- 3.1.2 Remove bonnet (figure 6)
- 3.1.3 Unscrew the bonnet (6.1) counter clockwise with a suitable tool and carefully remove the bonnet from the stem.



**CAUTION:** *do not rotate the stem in any direction. Severe damage to the bellows seal and/or the trim assembly may occur.*

- 3.1.4 Carefully remove the trim assembly (7.1) - consisting of bellows seal, extension and plug - from the valve housing (Figure 7)



**CAUTION:** *do not rotate the trim assembly within the valve body. Remove the trim assembly in an upright position avoiding any contact of the trim assembly with the valve housing. Severe damage of the bellows seal and/or the trim assembly may occur.*

#### 3.2 Install Trim assembly (Figure 8)

- 3.2.1 Insert body O-Ring seal (8.1)
- 3.2.2 Carefully insert trim assembly (8.2) into valve housing.



**CAUTION:** *do not rotate the trim assembly within the valve body in any direction. Insert the trim assembly in an upright position. Avoid any contact of the trim assembly with the valve housing. Severe damage of the bellows seal and/or the trim assembly may occur.*

#### 3.2.3 Bonnet assembly (Figure 9)

Carefully place the bonnet (9.1) over the stem (9.2) and tighten the bonnet clockwise with the suitable tool to the correct torque (see table 7.3). Ensure that the wiper ring (9.3) seats correctly on the stem

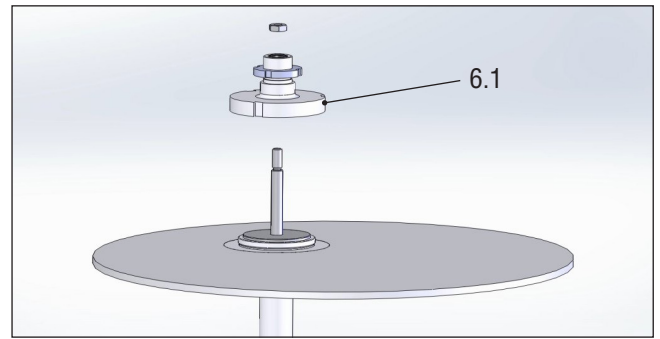


Figure 6: Bonnet

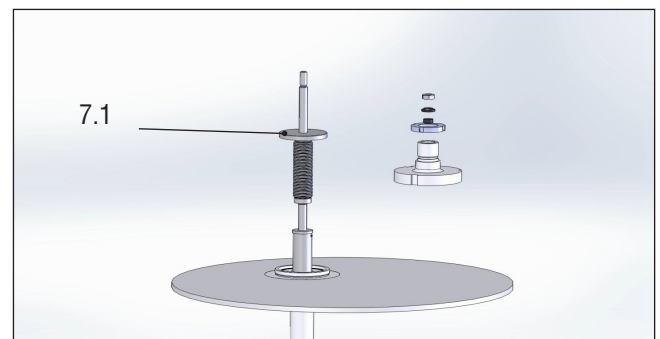


Figure 7: Trim Assembly

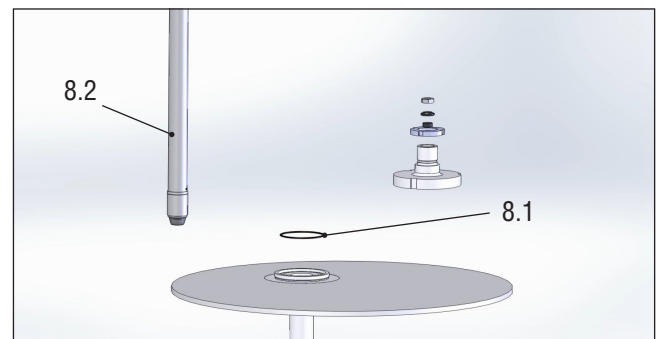


Figure 8: Body O-Ring

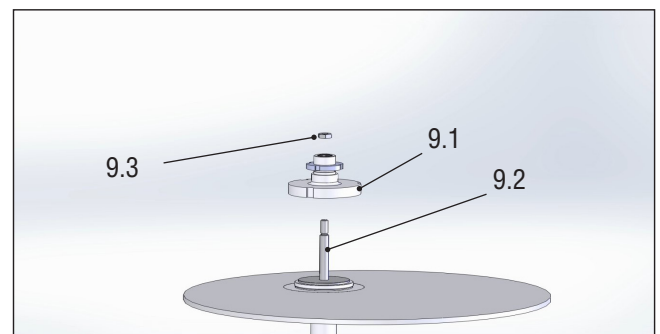
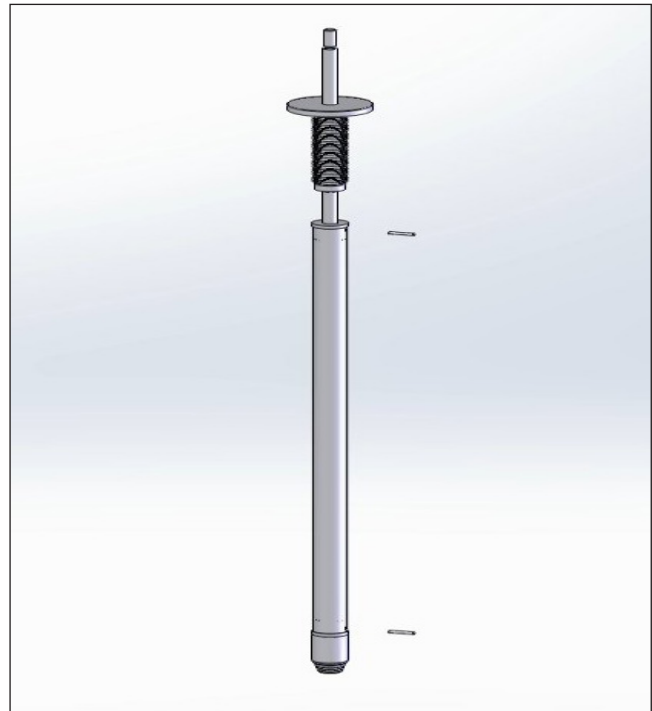


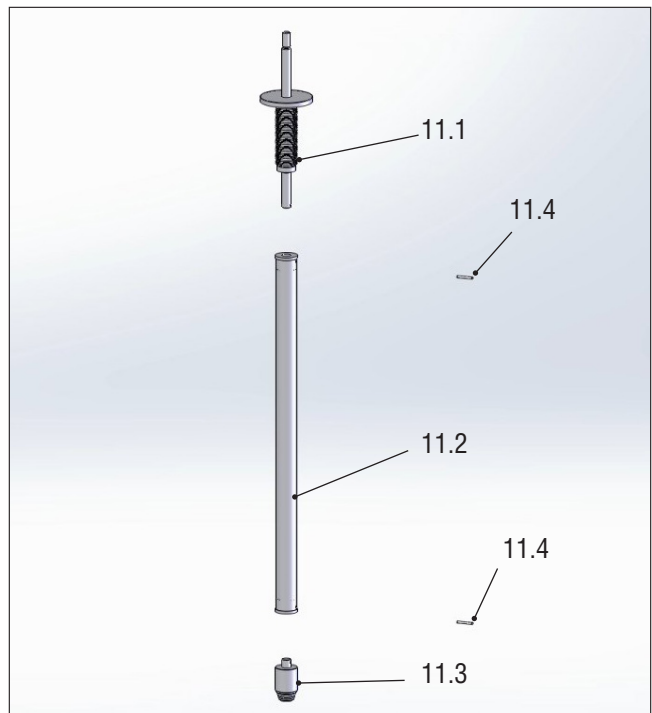
Figure: 9 Bonnet assembly

**3.3 Disassemble trim assembly (figure 11)**

3.3.1 The trim assembly consists out of 3 parts: the stem with bellows (11.1), the extension (11.2) and the plug (11.3). All three components can be disassembled and replaced individually. These parts are secured with pins (11.4). To remove the pins carefully drive them out by a suitable tool. When replacing one or more parts of the assembly always use new pins (see spare parts table) and make sure that they are in place and secure.



**Figure 10: Trim Assembly**



**Figure 11: Trim Parts**

## 4 ACTUATOR

### 4.1 KP Diaphragm Actuator

#### 4.1.1 First Installation after unpacking (figure 12)

ColdFlow Series 341000 will be delivered in two parts: valve subassembly and actuator. Especially for small sizes the mounted actuator might cause damage to the valve. Also for welding the valve into the vacuum cold box actuator and trim must be removed from the valve body.

Remove the locknut (12.1) from the valve bonnet. Place the actuator with the installed yoke plate (12.2) onto the valve bonnet. Before connecting the coupling (12.3) slip the locknut over the valve stem (12.4) and screw the locknut onto the bonnet thread. For tightening torques please refer to chapter 7.3



**CAUTION:** Be careful while placing the yoke plate over the stem. Damage of the stem and/or the entire trim assembly may occur.



**NOTE:** Make sure that the Serial Number of the valve (engraved at the bonnet) and of the actuator (Tag plate) correspond to each other.

#### 4.1.2 Removing for repair or maintenance (figure 13)

We recommend separating the actuator from the valve during all repair work. However, many maintenance and adjusting operations can be carried out in an installed condition.

##### 4.1.2.1 Shut off air supply

##### 4.1.2.2 Disconnect all air tubing from the actuator

##### 4.1.2.3 Remove and install actuator (figure 14)

Typically for a quick removal of the actuator the 2 yoke nut screws (14.1) are removed. After this remove the coupling screws (14.2) from the coupling and take off both coupling parts.



**NOTE:** If there are accessories such as positioners and/or limit switches connected to the coupling, please carefully disconnect the lever or if necessary the entire accessory.



**NOTE:** Ensure that the plug assembly is not rotated with the plug seated. This may cause irreparable damage to the seating faces.

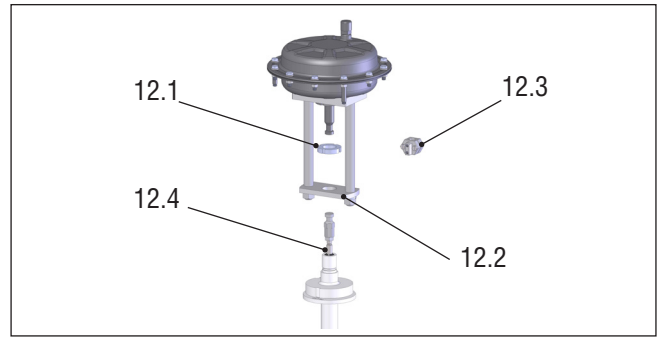


Figure 12: Actuator Mounting

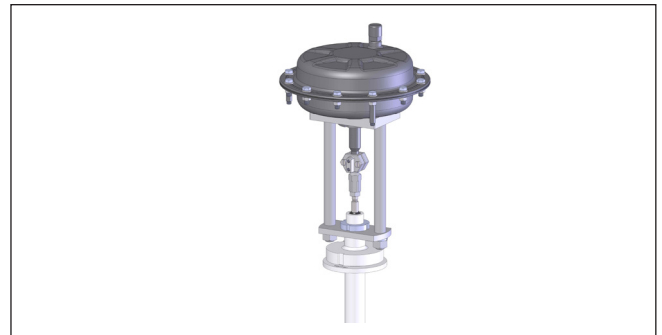


Figure 13: Actuator Assembly

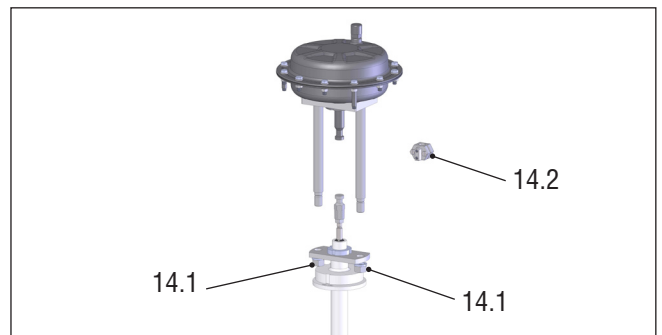


Figure 14: Remove and install actuator

**4.1.3 Install Actuator** (figure 15)

The actuator stem must be fully extended:

Actuators with air-to-open action must be fully vented. Actuators with air-to close action apply pressure. Manually depress the plug stem to ensure the plug is fully seated.

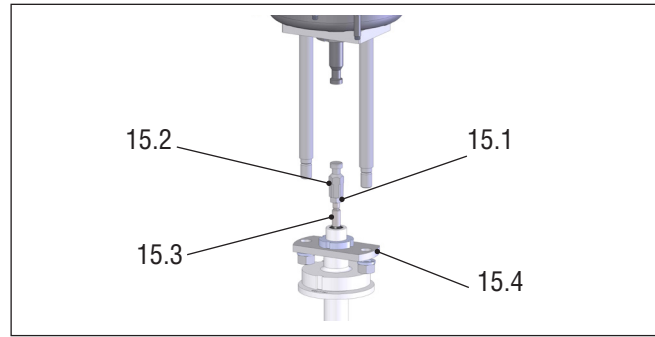
- 4.1.3.1 Screw coupling insert locknut (15.1) and coupling insert (15.2) as far as possible onto plug stem (15.3)
- 4.1.3.2 Place the actuator assembly on the valve engaging the yoke rod threads in the lower yoke plate (15.4) and ensuring the actuator faces in the right direction.
- 4.1.3.3 Unscrew the coupling insert until the lower yoke rods are raised from the lower yoke plate by around 2 mm.

**!** **NOTE:** *Ensure that the plug assembly is not rotated with the plug seated. This may cause irreparable damage to the seating faces.*

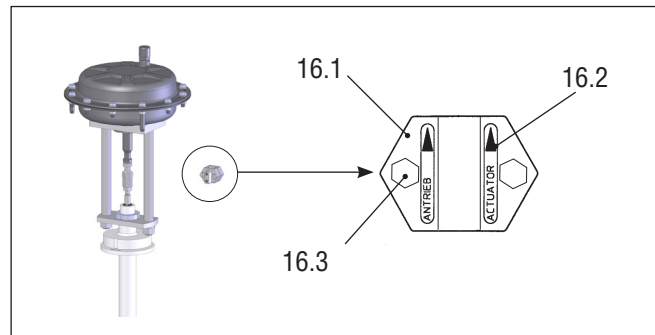
4.1.3.4 Refit the coupling (figure 16)

Refit the coupling (16.1), ensuring that the arrows (16.2), embossed on the coupling halves, point upward towards the actuator, and secure with 2 coupling screws (16.3).

- 4.1.3.5 Apply supply pressure respectively vent actuator to 50% stroke and refit and tighten yoke nuts.
- 4.1.3.6 Connect all tubing.



**Figure 15: Install Actuator**



**Figure 16: Refit the Coupling**



## 4.2 FlowAct Actuator

### 4.2.1 First Installation (figure 17)

The FlowAct actuator is equipped with a casted yoke, for all assembly and disassemble the entire actuator including the yoke must be installed or removed.

Remove the locknut (17.1) from the valve bonnet. Place the actuator and yoke assembly (17.2) onto the valve bonnet. Before connecting the coupling (17.3) slip the locknut over the valve stem (17.4) and screw the locknut onto the bonnet thread. For tightening torques please refer to chapter 7.3



**CAUTION:** Be careful while putting the yoke plate through the stem. Damage of the stem and/or the entire trim assembly may occur.



**NOTE:** Ensure that the serial number of the valve (engraved at the bonnet) and actuator (Tag plate) correspond to each other.

### 4.2.2 Removing for repair or maintenance

We recommend separating the actuator from the valve during all repair work. However, many maintenance and adjusting operations can be carried out in an installed condition.

#### 4.2.2.1 Shut off air supply

#### 4.2.2.2 Disconnect all air tubing from the actuator

#### 4.2.2.3 Remove actuator coupling (figure 18)



**NOTE:** If there are accessories such as positioners and/or limit switches connected to the coupling, please carefully disconnect the lever or if necessary the entire accessory. Remove four screws (18.1) from the upper coupling half.

#### 4.2.2.4 Remove locknut (18.2)

**NOTE:** The lower coupling half is still connected to the stem and can't be removed from the actuator at this stage.

#### 4.2.2.5 Carefully raise the actuator assembly vertically around 40 mm. Be aware that most of the FlowAct actuators are heavy, please use suitable lifting equipment.

#### 4.2.2.6 Remove the lower coupling half (18.3) counter clockwise from the stem.

**NOTE:** Ensure that the plug assembly is not rotated with the plug seated. This may cause irreparable damage to the seating faces and/or the bellows seal.

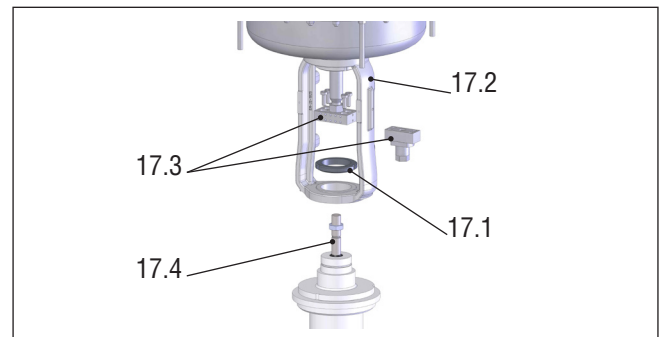


Figure 17: Actuator Mounting

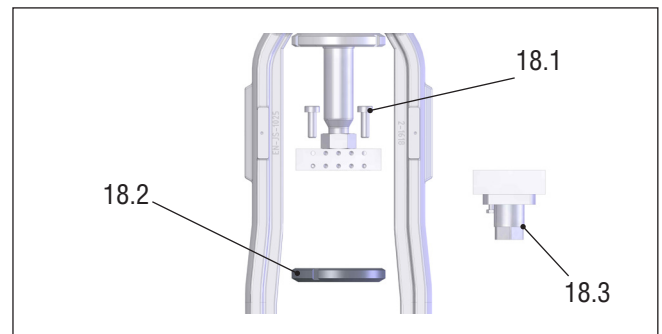


Figure 18: Remove and install actuator

#### 4.2.3 Installation

The actuator stem must be fully extended. Actuators with air-to-open action must be fully vented. Actuators with air-to close action apply pressure. Manually depress the plug stem to ensure the plug is fully seated.

4.2.3.1 Using suitable lifting equipment, carefully place the actuator onto the valve assembly. Before the actuator is fully lowered slip the locknut onto the bonnet and thread on the lower coupling half onto the stem.

4.2.3.2 Tighten the locknut. For tightening torques please refer to chapter 7.3

4.2.3.3 Reinstall the coupling

4.2.3.4 Connect all tubing



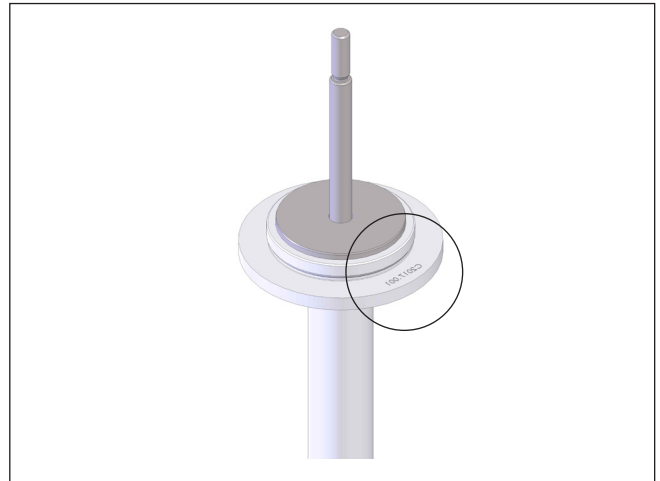
**Figure 19: Actuator Assembly**

**5 IDENTIFICATION**

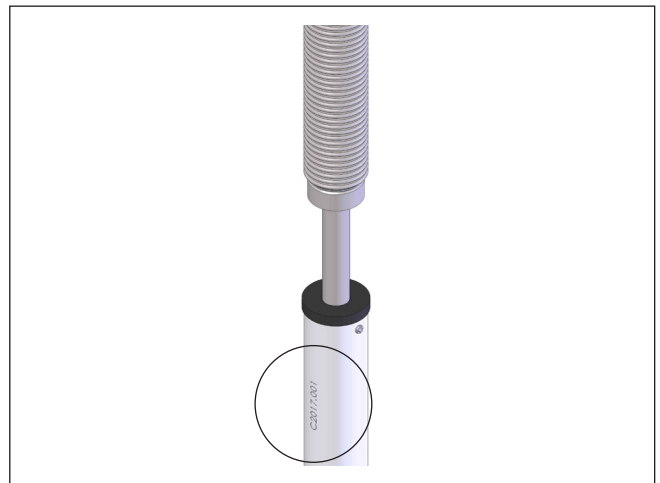
5.1 The complete valve assembly (valve plus actuator) are clearly marked with the serial number.



**CAUTION:** Ensure that only parts of the same serial number are assembled together. Serious damage of the parts may occur.



**Figure 20: Body Identification**



**Figure 21: Trim Identification**



**Figure 22: Bonnet Identification**

**6 SPARE PARTS**

**6.1 Miscellaneous parts**

DN	ANSI	Stem with bellows part #	Pin		O-Ring Bellows		O-Ring Bellows Adapter	
			qty	part #	part #	Dimension	part #	Dimension
4	0.16"	70-341B20471.00	2	70-0100375A2	70-S46031147	ID 33,4 x 2,4		
6	0.25"							
8	0.31"							
10	0.39"							
15	0.59"		2	70-0100376A2				
20	0.79"							
25	1"	70-341B50471.00	2	70-0100380A2	70-S46031165	ID 59,92 x 2,62		
32	1.25"							
40	1.5"							
50	2"							
65	2.5"	70-341K80271.00	1	70-0100377A2	70-S46031024	ID 104,37 x 3,53		
80	3"							
100	4"	70-341KA0274.00	1	70-0100378A2	70-S46031031	ID 158,43 x 3,53		
125	5"	70-341KA2274.00						
150	6"	70-341KA5284.00						
200	8"	70-341KB0284.00						
							70-S46031086	ID 225 x 4

**6.2 Spare Parts Table Plug**

DN	ANSI	Kvs	Cv	Trim #		Part #	
				mm	in	equal percentage	linear
4	0.16"	0,011	0,013	3H	0.12H	70-3419421ACT	70-3419451ACT
		0,017	0,02	3G	0.12G	70-3419422ACT	70-3419452ACT
		0,025	0,029	3F	0.12F	70-3419423ACT	70-3419453ACT
		0,04	0,047	3E	0.12E	70-3419424ACT	70-3419454ACT
		0,063	0,074	3D	0.12D	70-3419425ACT	70-3419455ACT
		0,1	0,12	3C	0.12C	70-3419426ACT	70-3419456ACT
		0,16	0,19	3B	0.12B	70-3419427ACT	70-3419457ACT
		0,25	0,29	3A	0.12A	70-3419428ACT	70-3419458ACT
6	0.25"	0,4	0,47	4,5B	0.18B	70-3419429ACT	70-3419459ACT
		0,63	0,74	4,5A	0.18A	70-3419430ACT	70-3419460ACT
8	0.31"	1	1,2	7B	0.28B	70-3419431ACT	70-3419461ACT
		1,6	1,9	7A	0.28A	70-3419432ACT	70-3419462ACT
10	0.39"	1,6	1,9	10B	0.40B	70-3419432XCT	70-3419462XCT
		2,5	2,9	10A	0.40A	70-3419433XCT	70-3419463XCT
15	0.59"	4	4,7	15B	0.63B	70-3419434XCT	70-3419464XCT
		6,3	7,4	15A	0.63A	70-3419435XCT	70-3419465XCT
20	0.79"	6,3	7,4	20B	0.80B	70-3419435VCT	70-3419465VCT
		10	12	20A	0.80A	70-3419436VCT	70-3419466VCT
25	1"	10	12	25B	1.00B	70-3419436ECT	70-3419466ECT
		16	19	25A	1.00A	70-3419437ECT	70-3419467ECT
32	1.25"	16	19	32B	1.25B	70-3419437GCT	70-3419467GCT
		25	29	32A	1.25A	70-3419438GCT	70-3419468GCT
40	1.5"	25	29	40B	1.60B	70-3419438HCT	70-3419468HCT
		40	47	40A	1.60A	70-3419439HCT	70-3419469HCT
50	2"	40	47	50B	2.00B	70-3419439LCT	70-3419469LCT
		63	74	50A	2.00A	70-3419440LCT	70-3419470LCT
65	2.5"	63	74	63B	2.50B	70-3419440MCT	70-3419470MCT
		100	120	63A	2.50A	70-3419441MCT	70-3419471MCT
80	3"	100	120	80B	3.20B	70-3419441PCT	70-3419471PCT
		160	190	80A	3.20A	70-341944APCT	70-341947APCT
100	4"	160	190	100B	3.90B	70-341944ARCT	70-341947ARCT
		250	290	100A	3.90A	70-341944BRCT	70-341947BRCT
125	5"	250	290	125B	4.90B	70-341944BZCT	70-341947BZCT
		400	470	125A	4.90A	70-341944CZCT	70-341947CZCT
150	6"	400	470	140B	5.50B	70-341944CTCT	70-341947CTCT
		560	650	140A	5.50A	70-341944ETCT	70-341947ETCT
200	8"	560	650	190B	7.48B	70-341944EICT	70-341947EICT
		900	1040	190A	7.48A	70-341944HICT	70-341947HICT

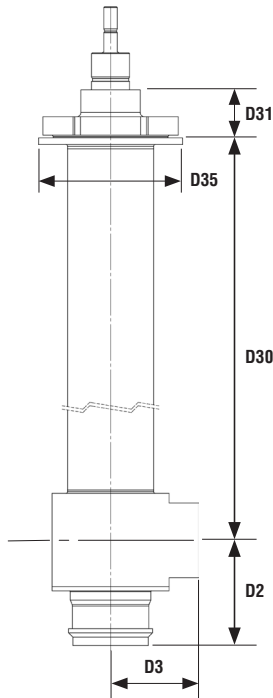
7 TECHNICAL TABLES

7.1 Cv Table

Kvs	Cv	Seat mm	Trim# in mm		4	6	8	10	15	20	25	32	40	50	65	80	100	125	150	200	
					0.16"	0.25"	0.31"	0.39"	0.59"	0.79"	1"	1.25"	1.5"	2"	2.5"	3"	4"	5"	6"	8"	
					10					20					40					60	
0,011	0,013	3	0.12H	3H																	
0,017	0,02		0.12G	3G																	
0,025	0,029		0.12F	3F																	
0,04	0,047		0.12E	3E																	
0,063	0,074		0.12D	3D																	
0,1	0,12		0.12C	3C																	
0,16	0,19		0.12B	3B																	
0,25	0,29		0.12A	3A																	
0,4	0,47		4,5	0.18B	4.5B																
0,63	0,74	0.18A		4.5A																	
1	1,2	7	0.28B	7B																	
1,6	1,9		0.28A	7A																	
2,5	2,9	10	0.40B	10B																	
4	4,7		0.40A	10A																	
6,3	7,4	15	0.63B	15B																	
			0.63A	15A																	
10	12	20	0.80B	20B																	
			0.80A	20A																	
16	19	25	1.00B	25B																	
			1.00A	25A																	
25	29	32	1.25B	32B																	
			1.25A	32A																	
40	47	40	1.60B	40B																	
			1.60A	40A																	
63	74	50	2.00B	50B																	
			2.00A	50A																	
100	120	63	2.50B	63B																	
			2.50A	63A																	
160	190	80	3.20B	80B																	
			3.20A	80A																	
250	290	100	3.90B	100B																	
			3.90A	100A																	
400	470	125	4.90B	125B																	
			4.90A	125A																	
560	650	140	5.50B	140B																	
			5.50A	140A																	
900	1040	190	7.48B	190B																	
			7.48A	190A																	

\* Alloy 6 plug only / equal percentage characteristic only

### 7.2 Dimensional Data



DN	ANSI	D2 [mm]	D3 [mm]	D30 [mm]	D31 [mm]	D35 [mm]	BW [mm]	weight [kg]
4	0,16"	45	35	600	39	70	8 x 1	1,5
6	0,25"	45	35	600	39	70	8 x 1	1,5
8	0,31"	45	35	600	39	70	12 x 1	1,5
10	0,39"	65	45	875	39	70	12 x 1	2,4
15	0,59"	65	45	875	39	70	21,3 x 1,6	2,4
20	0,79"	65	45	875	39	70	26,9 x 1,6	2,4
25	1"	80	65	875	48	110	28 x 1,5	5,0
32	1,25"	80	65	875	48	110	42,4 x 2	5,3
40	1,5"	85	65	875	48	120	48,3 x 2	7,1
50	2"	85	62	875	48	120	60,3 x 2	7,1
65	2,5"	125	105	875	57	190	76,1 x 2,6	30
80	3"	125	105	875	57	190	88,9 x 3,05	30
100	4"	175	125	1000	59	230	114 x 3	53
125	5"	175	140	1000	59	270	139,7 x 3	63
150	6"	225	175	1000	60	330	168,3 x 3	85
200	8"	300	225	1000	60	430	219,1 x 3	117

### 7.3 Bonnet Torque Table

DN	ANSI	Bonnet Flange [Nm]	Actuator Nut [Nm]
4	0.16"	70	210
6	0.25"	70	210
8	0.31"	70	210
10	0.39"	70	210
15	0.59"	70	210
20	0.79"	70	210
25	1"	120	210
32	1.25"	120	210
40	1.5"	120	210
50	2"	120	210
65	2.5"	200	430
80	3"	200	430
100	4"	280	-
125	5"	280	-
150	6"	315	-
200	8"	380	-

**7.4 Actuator Selection**

DN	Inch	Stroke [mm]	Stroke [in]	KP Diaphragm					KF Diaphragm			FlowAct	
				P1	P2	P3	P4	P5	F2	F3	F4	1502	3002
				220 daN	400 daN	900 daN	2000 daN	3500 daN	675 daN	1000 daN	1500 daN	3900 daN	6000 daN
4	0.16"	10	0.394	X	X				X				
6	0.25"	10	0.394	X	X				X				
8	0.31"	10	0.394	X	X	X			X				
10	0.38"	10	0.394	X	X	X			X				
15	0.5"	10	0.394	X	X	X			X				
20	0.75"	10	0.394	X	X	X			X				
25	1"	20	0.787		X	X	X		X	X			
32	1.25"	20	0.787		X	X	X		X	X			
40	1.5"	20	0.787		X	X	X		X	X			
50	2"	20	0.787		X	X	X		X	X			
65	2.5"	40	1.575				X	X		X	X		
80	3"	40	1.575				X	X		X	X		
100	4"	60	2.362									X	X
125	5"	60	2.362									X	X
150	6"	60	2.362									X	X
200	8"	80	3,150									X	X



8 TROUBLE SHOOTING

Problem		Possible cause		Remedy
<b>Actuator or stem moves stiffly</b>	1	Operating temperature too high for selected fittings	1	Note the operating data and contact Flowserve
	2	Inadequate air supply	2	Check system for leaks in air supply or signal lines, re tighten connections or replace lines if necessary
	3	Positioner defect	3	See operating instructions for positioner
<b>Excessive leakage</b>	1	Bonnet is loose	1	See step 3.2.3 for re-tightening the bonnet correctly
	2	Worn or damaged plug	2	Rework or replace plug
	3	Gaskets damaged	3	Renew gaskets
	4	Inadequate actuator thrust	4	Check air feed. If air feed is OK, contact Flowserve
	5	Plug incorrectly adjusted	5	Correctly adjust plug according to step 3.3.1
	6	Incorrect direction of flow	6	Check specification. Contact Flowserve
	7	Handwheel incorrectly adjusted (acts as an end-stop)	7	Adjust handwheel
<b>Inadequate flow</b>	1	Plug incorrectly adjusted (short stroke)	1	Correctly adjust plug according to step 3.3.1
	2	Positioner defect	2	See operating instructions for positioner
	3	Operating requirements too high	3	Check operating data. Contact Flowserve
<b>Plug slams</b>	1	Plug adjustment incorrect	1	Correctly adjust plug according to step 3.3.1
	2	Inadequate supply pressure	2	Check air supply, seal leaks, remove blockages
	3	Trim too large for flow rate	3	Replace trim







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Your contact:

A large, empty rounded rectangular box with a dashed border, intended for a contact name or signature.

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