CAST IRON SBS VALVES

FAMILY 04 GROUP 19-22-25-76-77-78

Master Handbook Description: Guide to Choose, Use and Maintenance of Cast Iron SBS Valves (English)

Code: 7597
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DECLARATION OF CONFORMITY

Code.: **DPED00833** REV. 00 Date: March 1st, 2002

Family nr. 4 **GLOBE CONTROL VALVES – SERIES CAST IRON SBS EN – GJL250 EN1561;**

Groups: **19, 22, 25**

We ITALVALVOLE S.A.S. of Spadon Oscar & C., via Amendola 125, 13836 Cossato (BI), declare that:
the control globe valve, seires SBS with cast iron body EN – GJL250 in the following diameters, ND 15 PS 16 – ND 20 PS 16 – ND 25 PS 16 – ND 32 PS 16 - ND 40 PS 16 – ND 50 PS 16, complies with the directive 97/23/CE (directive PED) with classification under Art. 3.3

DECLARATION OF CONFORMITY

Code.:**DPED008C1** REV. 00 Date: March 1st, 2002

Family nr. 4 **CONTROL GLOBE VALVES - SERIES SBS**
CAST IRON EN – GJL250 EN1561
CAST IRON EN – GJS500-7 EN1563

Groups: **19, 22, 25, 76, 77, 78**

We ITALVALVOLE S.A.S. of Spadon Oscar & C., via Amendola 125, 13836 Cossato (BI), declare that:
the control globe valve, seires SBS with cast iron body EN – GJL250 in the following diameters and characteristics, ND 65 PS 16 – ND 80 PS 16 and cast iron body EN – GJS500-7 EN1563 in the following diameters and characteristics, ND 100 PS 16 – ND 125 PS 16 - ND 150 PS 16, complies with directive 97/23/CE (directive PED) with classification under category I.
The conformity evaluation procedure used as per Enclosure II consists of form A.

ITALVALVOLE S.A.S.

Legale rappresentante
Legal representative

Firmato digitalmente da
OSCAR SPADON
SerialNumber = IT:SPDSCR44M19L436J
C = IT

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Foreword

Diaphragm valves have been designed to control the flow of overheated water, liquids, gases and steam inside the pipes.
The valve is normally operated either by a pilot automatic regulator, which uses air as servocontrol fluid, or by an hand-operated pneumatic remote control panel.
The opening, closing and modulating action of the valve is possible thanks to the variation of the pneumatic signal arriving to the servomotor (pneumatic head of the valve).
Diaphragm, springs and obturators of valves shall be sized in order to get the required fluid dynamic characteristics and the perfect compliance with the operating conditions, as specified in the customer's order.
The diaphragm/springs combinations on the valve pneumatic head are normally provided for a control signal on the diaphragm of: 3/15 psi (0.2/1.0 bar), 6/18 psi (0.42/1.26 bar), 6/30 psi (0.42/2.1 bar), 9/32 psi (0.6/2.24 bar), 3/9 psi (0.2/0.6 bar), 9/15 psi (0.6/1.0 bar).

ITALVALVOLE® diaphragm valves are supplied normally closed N.C. (air opens), or normally open NO (air closes).
However, being the servo motor reversible, a NC valve can be turned into a NO, or vice-versa just replacing a few detail components.

Legend

- $\Delta p_{allowable}$ (allowable differential pressure): maximum allowable value, at a given temperature, of the static differential pressure of a valve when it is in the closed position (EN 7363: 1997).
- **Allowable temperature:** operating temperature limit, prescribed for safety reasons.
- **Allowable pressure:** operating pressure limits, normally at the top of each chamber of the pressure equipment, prescribed for safety reasons (UNI EN 764: 1997).
- **ND:** is an alphanumeric designation of size for components of a pipework system, which is used for reference purposes.
  It includes the ND letters followed by a nondimensional whole number which is indirectly related to the physical dimension, expressed in millimeters, of the hole or the outer diameter of the final end of fittings (ISO 6708: 1995)
- **Kv**: flow rate, expressed in cubic meters/h, of water (from 10 to 25 °C with a volume equal to 1000 Kg/cubic meters), which goes through two ways of a valve, with a pressure drop Δp of 100 KPa (1 bar)

$$Kv = \frac{Q}{\sqrt{\Delta p}}$$

  where : Q is the flow rate in cubic meters/h (Uni 9753 : 1990).

Requirements

In case of special requirements or doubts, the proper type of valve to be used shall be communicated to you, after contacting our technical department and filling up the following form.

DATA TO KNOW: ND_____ NP_____
Two-way ☐ Three way ☐ deflecting ☐ mixing
Control signal _____ Type of flanging _____
Obturator ☐ linear
☐ equally percentage
Body material ☐ cast iron
☐ carbon steel
☐ stainless steel
Valve operation ☐ normally closed
☐ normally open
Operating fluid _____ Specific weight _____Kg/cubic meter
Maximum capacity_____ Kg/h _____cubic meters/h
Valve upstream pressure _____bar
Valve downstream pressure _____bar
Fluid temperature in °C _____
Intermediate body ☐ standard
☐ with bellows
With handwheel ☐ With pneumatic setting device ☐

Technical Characteristics

SBS 86 2 VIE PN 16 GHISA

General notice: ⇒ all the pressure values indicated hereinafter are gauge pressure values.
⇒ **valve destined to fluids of group 2 (directive 97/23/CE).**

ND: ⇒ 15 to 150

Connections: ⇒ flanged in compliance with UNI PN 16

Pmax allowable: ⇒ 16 bar (1)

Pmin allowable: ⇒ 0 bar.

Seal: ⇒ PEEK (ND 15#50), PTFE-CARBO-GRAPHITE (ND 100#150), metallic and stellited (the stellited seat is suggested for $\Delta p>10$ bar)

Obturator characteristic: ⇒ equally percentage, linear

Tmax allowable.: ⇒ +200 °C PEEK (ND 15#80) PTFE-CARBO-GRAPHITE (ND 100#150)
+300 °C (with safety bellows for ND 100÷150 with metallic or stellited seal).

Tmin allowable.: ⇒ -10 °C (liquid phase)

Flow direction: ⇒ 2-way globe valve, with angle pattern body, unidirectional.
⇒ 3-way globe valve, with angle pattern body, unidirectional.

Air connection: ⇒ 1/8" GAS (head 200 dia),1/4" GAS (head 275 dia, 360 dia, 430 dia, 530 dia).

Supply fluid: ⇒ instrument air

Supply pipes: ⇒ Pipe inner diameter = 4 mm, min. outer diameter = 6 mm, able to bear the supply Pmax under the environment conditions of the plant, on which the valve has to be assembled

P min. (supply): ⇒ 3 to 15 PSI, 6 to 18 PSI, 6 to 30 PSI, 9 to 32 PSI, 3 to 9 PSI, 9 to 15 PSI

Versions: ⇒ normally closed, normally open, with or without bellows, with or without emergency handwheel

Working materials: ⇒ see working drawings and relevant tables

Overall dimensions: ⇒ See overall dimensions drawings and relevant tables.

(1) Pmax limit = 12 bar with steam

Table 1: Compatible Fluids

Type of fluid	Comp.	Type of fluid	Comp.
Linoleic acid	YES	Magnesium hydroxide	YES
Nitric acid HNO_3 anhydrous	YES	Animal iol	YES
Soft water H_2O	YES	Lubricating oil	YES
Ammonia NH_3 water	YES	Sodium hydroxide NaOH 5%	YES
Ammonia NH_3 solution	YES	Sodium hydroxide NaOH 20% (1	YES
Air	YES	Sodium hydroxide NaOH 50% E (1	YES
Nitrogen N liquid	YES	Sodium hydroxide NaOH 75% E (1	YES
Magnesium disulphate	YES	Soda Na_2CO_3 5%	YES
Ethylene glycol	YES	Water steam 200° (2)	YES
Propylene glycol	YES		

(1) "E" means boiling

(2) In versions where the temperature can reach such a value

All data indicated under table 1, if not otherwise specified, are relevant to a temperature of 21°C.
All data have a general meaning and are not valid for all possible working conditions. These data may considerably vary depending upon various conditions, such as: temperature, concentration, fluid speed.
For a deeper and thorough information, please get in touch with our technical department.
Any use of the valve on explosive, easily inflammable, comburant and poison gases is strictly forbidden.
Any use of the valve on liquids based on: chlorine, fluorine, bromine, iodine and derivative elements is strictly forbidden.
Any deviation from such prohibitions may be issued for special applications, by our technical department, in writing request.

Table 2: Δp of 2-way SBS ND 15 to 80 valves, without bellows

Note: if you consider the valves SBS ND 15 ÷ 80 3 ways, for the values of Kvs mentioned in the schedule you must foresee a reduction of abt 25 %.

					Valve Δp						
Control signal in PSI (1)					3/15	6/18	6/30	9/32	3/9	9/15	N. FOR VALVE DEFINITION
Control signal in BAR					0,2/1	0,42/1,26	0,4/2,1	0,6/2,24	0,2/0,6	0,6/1,0	
Control Max pressure BAR					1,0	1,26	2,21	2,4	0,8	1,2	
ND	**Φ seat [mm]**	**Kvs**	**CV**	**Φe servocontrol [mm]**	Letters for valve definition						
					A	B	C	D	R	A	
15	3	0,1	0,117	200							1
				275							2
	6	0,42	0,49	200							3
				275							4
	15	2,8	3,2	200	13	16	16	16	13	16	5
				275	16	16	16	16	16	16	6
20	8	1,1	1,28	200							7
				275							8
	15	2,5	2,9	200							9
				275							10
				360							11
				430							12
	20	7,8	9,1	200	7	14	14	16	7	16	13
				275	16	16	16	16	16	16	14
				360	16	16	16	16	16	16	15
				430							16
25	15	2,4	2,8	200							17
				275							18
				360							19
				430							20
	20	7	8,2	200							21
				275	16	16	16	16			22
				360	16	16	16	16			23
				430							24
	24	13,5	15,7	200	5	10	10	15	5	15	25
				275	12	16	16	16	12	16	26
				360	16	16	16	16	16	16	27
				430							28
32	20	6,6	7,7	200							29
				275							30
				360							31
				430							32
	24	12,2	14,2	200							33
				275							34
				360							35
				430							36
	31	15,2	17,7	200	4	8	8	12	4	12	37
				275	10	16	16	16	10	16	38
				360	16	16			16		39
				430							40

(1) In NO valves, to reach the same Δp of NC valves, the maximum control signal shall be increased by 20%. Then, for instance, in a NO valve with 3/15 PSI signal, the maximum control signal shall be increased up to 18 PSI to get the Δp of a similar NC valve.

Note: the Max. Δp Max is reached without air in the head.

					Valve Δp						N. FOR VALVE DEFINITION
Control signal in PSI (1)					3/15	6/18	6/30	9/32	3/9	9/15	
Control signal in BAR					0,2/1	0,42/1,26	0,4/2,1	0,6/2,24	0,2/0,6	0,6/1,0	
Control Max pressure BAR					1,0	1,26	2,21	2,4	0,8	1,2	
ND	**Φ seat [mm]**	**Kvs**	**CV**	**Φe** servocontrol **[mm]**	Letters for valve definition						
					A	B	C	D	R	A	
40	24	11,5	13,4	200							41
				275							42
				360							43
				430							44
	31	13,7	16	200							45
				275	10	16					46
				360							47
				430							48
	38	25,8	30,1	200	2,8	5,5	5,5	8	2,8	8	49
				275	7	14	14	16	7	16	50
				360	14	16	16	16	14	16	51
				430							52
50	31	12,9	15	200							53
				275							54
				360							55
				430							56
	38	23,2	27,1	200							57
				275							58
				360	14	16	16	16	14	16	59
				430							60
	48	33	38,6	200	1,6	3,2	3,2	4,5	1,6	4,5	61
				275	4	8	8	12	4	12	62
				360	8	16	16	16	8	16	63
				430	9,3	16	16	16	9.3	16	64
65	38	21,9	25,6	200							65
				275							66
				360							67
				430							68
	48	29,7	34,7	200	1,5	3	3	4,5	1,5	4,5	70
				275	4	8	8	11	4	11	71
				360	8	16	16	16	8	16	72
				430	9	16	16	16	9	16	73
	63	62	72,5	200	1	2	2	2,5	1	2,5	75
				275	2,5	5	5	6,5	2,5	6,5	76
				360	5	10	10	13	5	13	77
				430	5,5	10,5	10,5	16	5,5	16	78
80	48	28	32,7	200							80
				275							81
				360	8	8	8	16	8		82
				430							83
	63	55,8	65,2	200	1	2	2	2,5	1	2.,5	85
				275	2,5	5	5	6,5	2,5	6,5	86
				360	5	10	10	13	5	13	87
				430	5,5	10,5	10,5	16	5,5	16	88
	78	76	88,7	200	0,6	1,2	1,2	1,5	0.6	1,5	90
				275	1,5	3	3	4	1,5	4	91
				360	3	6	6	8,5	3	8,5	92
				430	3,5	7	7	10,5	3.5	10,5	93

(1) In NO valves, to reach the same Δp of NC valves, the maximum control signal shall be increased by 20%. Then, for instance, in a NO valve with 3/15 PSI signal, the maximum control signal shall be increased up to 18 PSI to get the Δp of a similar NC valve.

Note: the Max. Δp Max is reached without air in the head.

Table 2: Δp of 2-way SBS ND 15 to 80 valves, with bellows

Note: if you consider the valves SBS ND 15 ÷ 80 3 ways, for the values of Kvs mentioned in the schedule you must foresee a reduction of abt 25 %.

					Valve Δp						N. FOR VALVE DEFINITION
Control signal in PSI (1)					3/15	6/18	6/30	9/32	3/9	9/15	
Control signal in BAR					0,2/1	0,42/1,26	0,4/2,1	0,6/2,24	0,2/0,6	0,6/1,0	
Control Max pressure BAR					1,0	1,26	2,21	2,4	0,8	1,2	
ND	**Φ seat [mm]**	**Kvs**	**CV**	**Φe servocontrol [mm]**	Letters for valve definition						
					A	B	C	D	R	A	
15	3	0,1	0,117	200							1
				275							2
	6	0,42	0,49	200							3
				275							4
	15	2,8	3,2	200	4,5	8,5	8,5	11	4,5	11	5
				275	10,5	16	16	16	10,5	16	6
20	8	1,1	1,28	200							7
				275							8
	15	2,5	2,9	200							9
				275							10
				360							11
				430							12
	20	7,8	9,1	200	4	8,5	8,5	11	4	11	13
				275	10	16	16	16	10	16	14
				360	16	16	16	16	16	16	15
				430							16
25	15	2,4	2,8	200							17
				275							18
				360							19
				430							20
	20	7	8,2	200							21
				275							22
				360							23
				430							24
	24	13,5	15,7	200	4	8	8	11	4	11	25
				275	10	16	16	16	10	16	26
				360	16	16	16	16	16	16	27
				430							28
32	20	6,6	7,7	200							29
				275							30
				360							31
				430							32
	24	12,2	14,2	200							33
				275							34
				360							35
				430							36
	31	15,2	17,7	200	3,5	7,5	7,5	10,5	3,5	10,5	37
				275	9,5	16	16	16	9,5	16	38
				360	16				16		39
				430							40

(1) In NO valves, to reach the same Δp of NC valves, the maximum control signal shall be increased by 20%. Then, for instance, in a NO valve with 3/15 PSI signal, the maximum control signal shall be increased up to 18 PSI to get the Δp of a similar NC valve.

Note: the Max. Δp Max is reached without air in the head.

					Valve Δp						N. FOR VALVE DEFINITION
Control signal in PSI (1)					3/15	6/18	6/30	9/32	3/9	9/15	
Control signal in BAR					0,2/1	0,42/1,26	0,4/2,1	0,6/2,24	0,2/0,6	0,6/1,0	
Control Max pressure BAR					1,0	1,26	2,21	2,4	0,8	1,2	
ND	**Φ seat [mm]**	**Kvs**	**CV**	**Φe** servocontrol **[mm]**	Letters for valve definition						
					A	B	C	D	R	A	
40	24	11,5	13,4	200							41
				275							42
				360							43
				430							44
	31	13,7	16	200							45
				275	10	16					46
				360							47
				430							48
	38	25,8	30,1	200	2,8	5,5	5,5	8	2,8	8	49
				275	7	14	14	16	7	16	50
				360	14	16	16	16	14	16	51
				430							52
50	31	12,9	15	200							53
				275							54
				360							55
				430							56
	38	23,2	27,1	200							57
				275							58
				360	14	16	16	16	14	16	59
				430							60
	48	33	38,6	200	1,6	3,2	3,2	4,5	1,6	4,5	61
				275	4	8	8	11	4	11	62
				360	8	16	16	16	8	16	63
				430	9,3	16	16	16	9,3	16	64
65	38	21,9	25,6	200							65
				275							66
				360							67
				430							68
	48	29,7	34,7	200	1,5	3	3	4,5	1,5	4,5	70
				275	4	8	8	11	4	11	71
				360	8	16	16	16	8	16	72
				430	9	16	16	16	9	16	73
	63	62	72,5	200	1	2	2	2,5	1	2,5	75
				275	2,5	5	5	6,5	2,5	6,5	76
				360	5	10	10	13	5	13	77
				430	5,5	10,5	10,5	16	5,5	16	78
80	48	28	32,7	200							80
				275							81
				360	8	8	8	16	8		82
				430							83
	63	55,8	65,2	200	1	2	2	2,5	1	2,5	85
				275	2,5	5	5	6,5	2,5	6,5	86
				360	5	10	10	13	5	13	87
				430	5,5	10,5	10,5	16	5,5	16	88
	78	76	88,7	200	0,6	1,2	1,2	1,5	0,6	1,5	90
				275	1,5	3	3	4	1,5	4	91
				360	3	6	6	8,5	3	8,5	92
				430	3,5	7	7	10,5	3,5	10,5	93

(1) In NO valves, to reach the same Δp of NC valves, the maximum control signal shall be increased by 20%. Then, for instance, in a NO valve with 3/15 PSI signal, the maximum control signal shall be increased up to 18 PSI to get the Δp of a similar NC valve.

Note: the Max. Δp Max is reached without air in the head.

Table 2: Δp of 2-way SBS ND 100 to 150 valves, with and without bellows

					Valve Δp				N. FOR VALVE DEFINITION
Control signal in PSI (1)					3/15	6/18	6/30	9/32	
Control signal in BAR					0,2/1	0,42/1,26	0,4/2,1	0,6/224	
Control Max pressure BAR					1,2	1,512	2,52	2,688	
ND	**Φ seat [mm]**	**Kvs**	**CV**	**Φe** servocontrol **[mm]**	Letters for valve definition				
					A	B	C	D	
100	63	60	70	430 S (2)	9	16	16	16	1
				430 D (3)	16	16	16	16	2
	78	90	105	430 S	3,5	7	7	10,5	3
				430 D	7	14	14	16	4
	92	115	134	430 S	2,5	5	5	7,5	5
				430 D	5	10	10	15	6
125	78	80	93	430 S	3,5	7	7	10,5	7
				430 D	7	14	14	16	8
	92	120	140	430 S	2,5	5	5	7,5	9
				430 D	5	10	10	15	10
	115	190	222	430 S	1,5	3	3	4,5	11
				430 D	3	6	6	9,5	12
150	92	110	128	430 S	2,5	5	5	7,5	13
				430 D	5	10	10	15	14
	115	170	198	430 S	1,5	3	3	4,5	15
				430 D	3	6	6	9,5	16
	135	250	292	430 S	1	2	2	3,5	17
				430 D	2	4	4	7	18

(1) In NO valves, to reach the same Δp of NC valves, the maximum control signal shall be increased by 20%. Then, for instance, in a NO valve with 3/15 PSI signal, the maximum control signal shall be increased up to 18 PSI to get the Δp of a similar NC valve.

(2) "S" indicates the simple head.

(3) "D" indicates the double head.

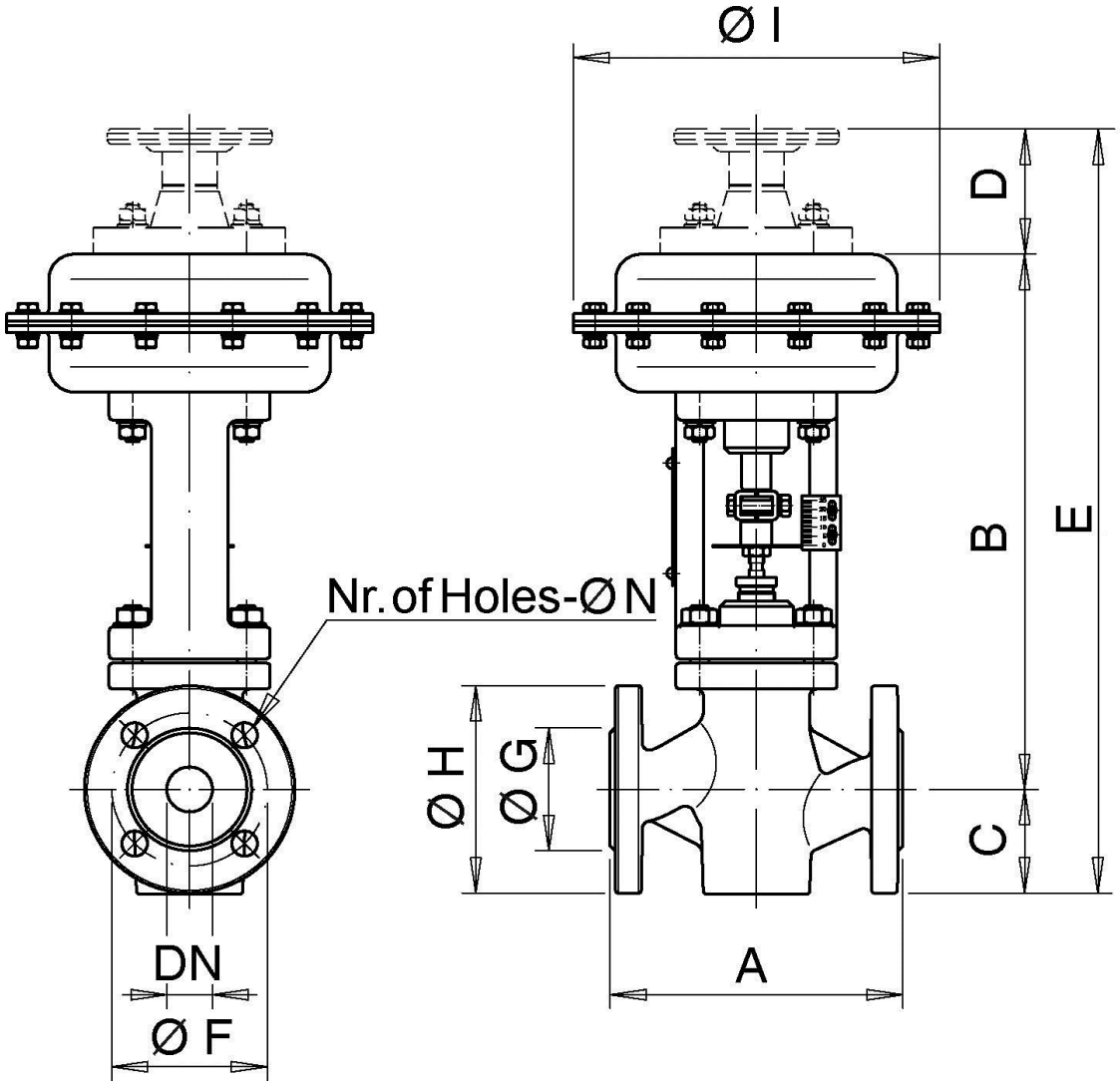
Note: the Max. Δp Max is reached without air in the head.

Safety Notes

- The valve body, under the maximum operating temperature depending upon the system, may reach a temperature T equal to +200 °C (ND 15#80) +300 °C (ND 100#150). It is up to the engineer to provide the system with the necessary safety guards and/or warning signals aiming at removing/indicating the risk of burns by the user.
- Whatever operation may be performed on the valve, the fluid must be present neither in pipes, nor inside the valve itself.

Overall Dimensions of SBS Valves

1.1.1 2-way SBS Cast Iron Valves ND 15 to 80 group: 19

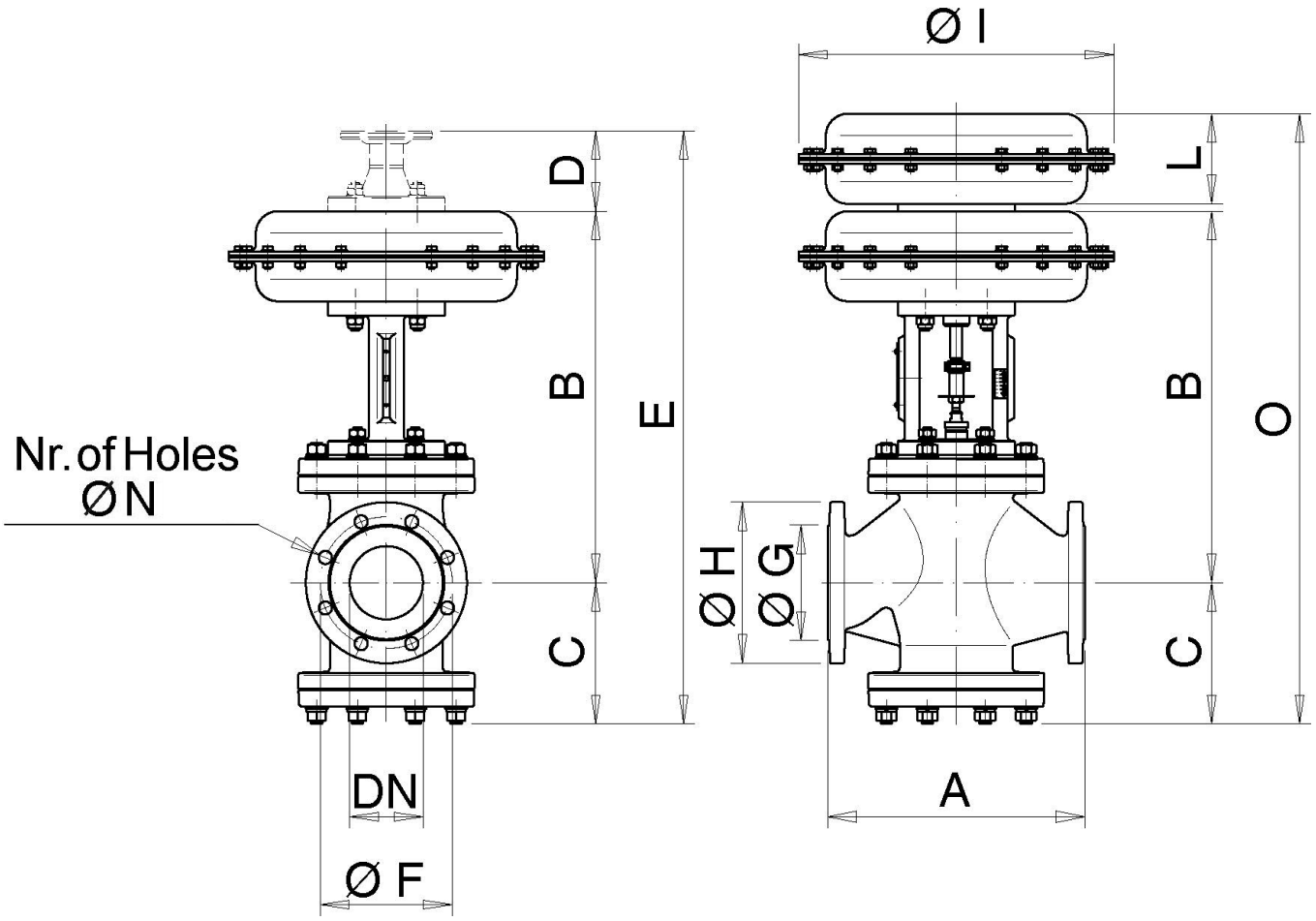


Dwg. nr. 020259 Rev:00

ND	A	B			C	D			E			Ø F	Ø G	Ø H	Ø I	Ø N	holes nr.
		Ø servocontrol				Ø servocontrol			Ø servocontrol								
		200	275 360	430		200	275 360	430	200	275 360	430						
15	130	297.5	309	343.5	48	70	74	79	415.5	431	470.5	65	45	95	Depending upon the required seal Δp (200-275-360-430)	14	4
20	150	297.5	309	343.5	53	70	74	79	420.5	436	475.5	75	58	105		14	4
25	160	297.5	309	343.5	58	70	74	79	425.5	441	480.5	85	68	115		14	4
32	180	316.5	328	362.5	70	70	74	79	456.5	472	511.5	100	78	140		18	4
40	200	316.5	328	362.5	75	70	74	79	461.5	477	516.5	110	88	150		18	4
50	230	316.5	328	362.5	82.5	70	74	79	469	484.5	524	125	102	165		18	4
65	290	375.5	387	421.5	125	70	74	79	570.5	586	625.5	145	122	185		18	4
80	310	375.5	387	421.5	136.5	70	74	79	582	597.5	637	160	138	200		18	8

Dimensions are in millimeters

1.1.2 2-way SBS Cast Iron Valves ND 100 to 150 group: 76

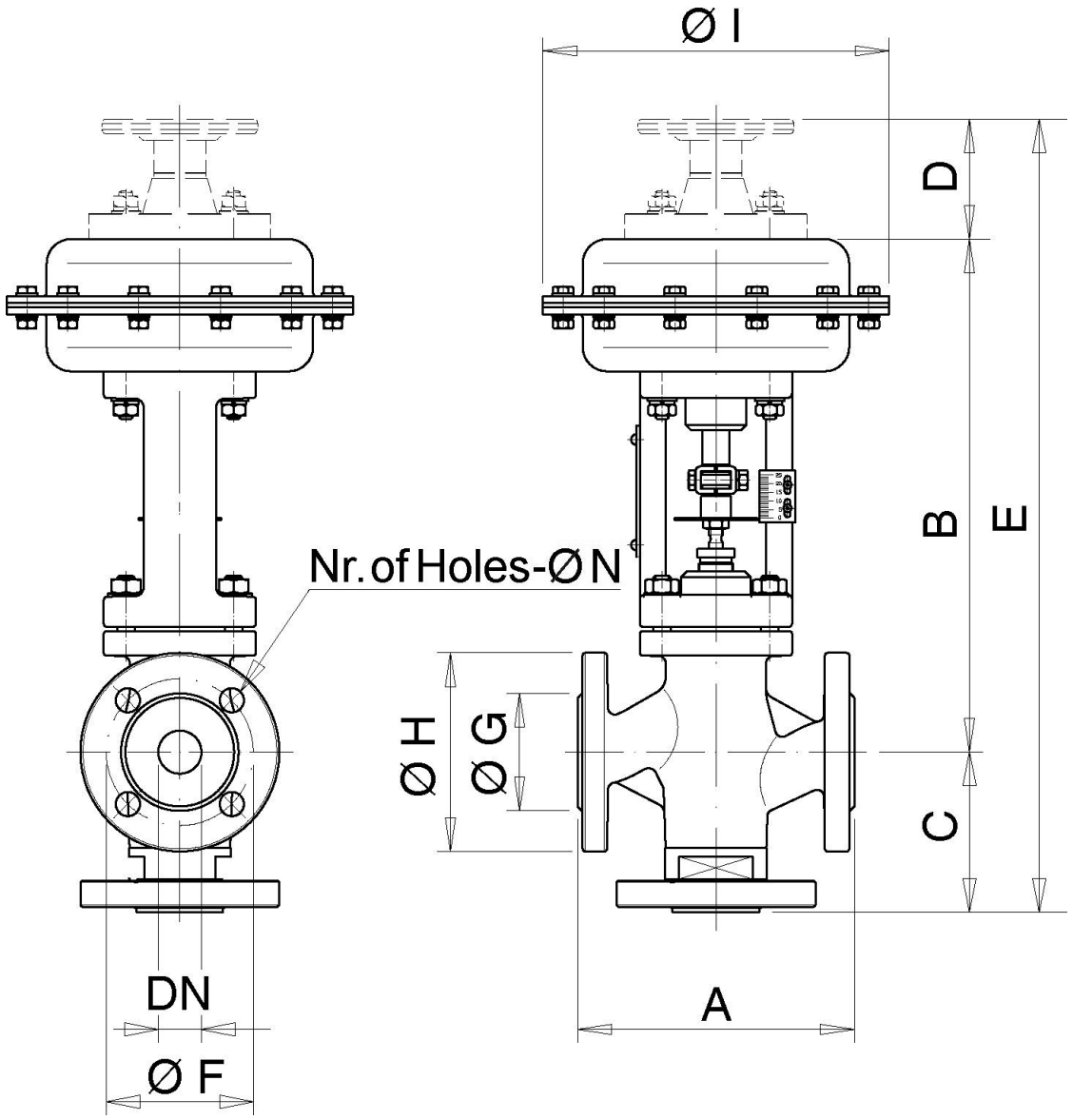


Dwg. nr. 020260 Rev.:00

ND	A	B	C	D	E	Ø F	Ø G	Ø H	Ø I	L	Ø N	O	holes nr.
100	350	507	192,5	110	809,5	440	158	220	430	123	18	832,5	8
125	400	530	215,5	110	855,5	445	188	250	430	123	18	878,5	8
150	480	555	245	110	910	450	212	285	430	123	22	933	8

Dimensions are in millimeters

1.1.3 3-way SBS Cast Iron Valves ND 15 to 80 group: 22 , 25

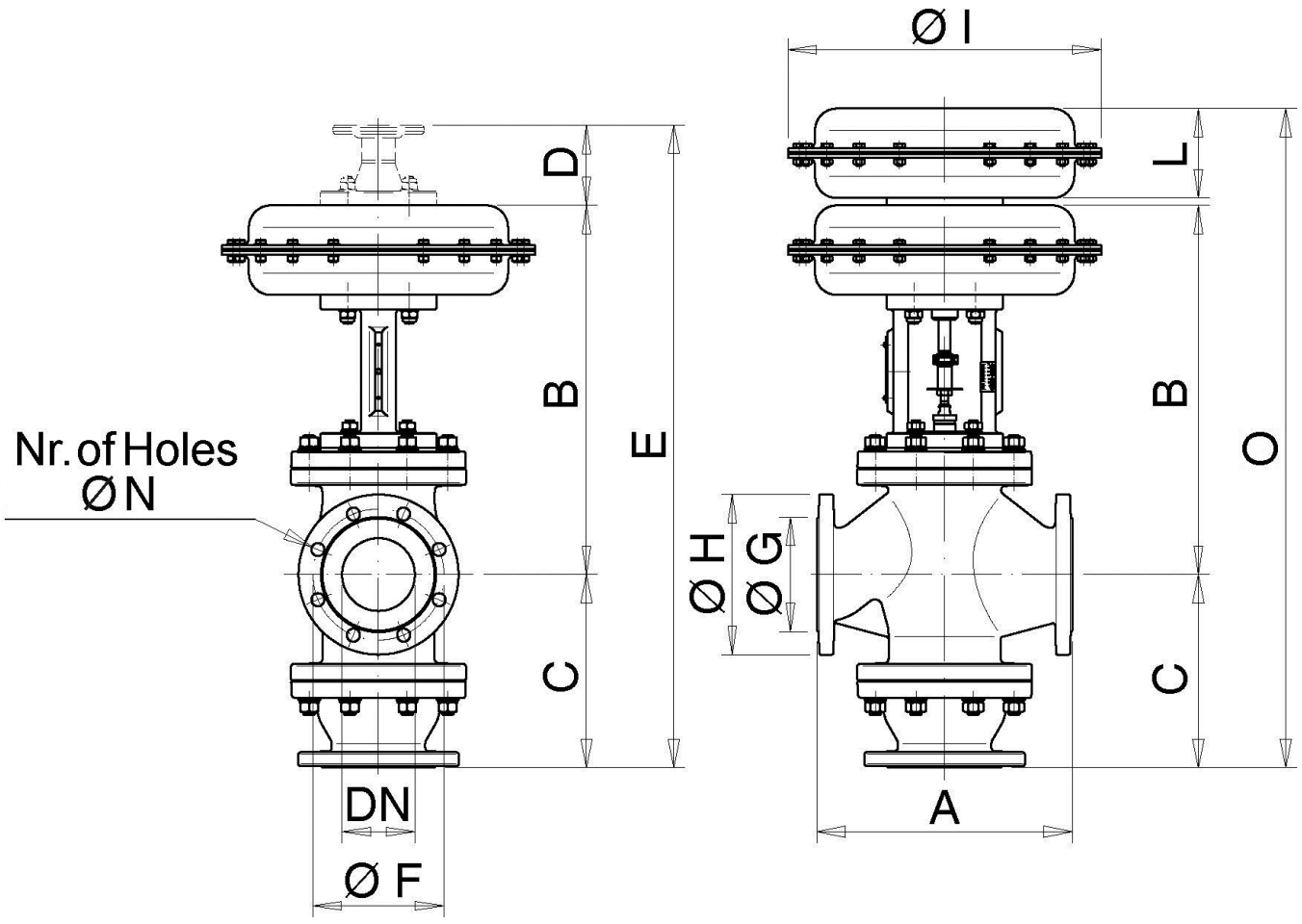


Dwg. nr.
020336 Rev.:00

ND	A	B			C	D			E			Ø F	Ø G	Ø H	Ø I	Ø N	holes nr.
		Ø servocontrol				Ø servocontrol			Ø servocontrol								
		200	275 360	430		200	275 360	430	200	275 360	430						
15	130	297,5	309	343,5	84	70	74	79	451,5	467	506,5	65	45	95	Depending upon the required seal Δp (200-275-360-430)	14	4
20	150	297,5	309	343,5	87,5	70	74	79	455	470,5	510	75	58	105		14	4
25	160	297,5	309	343,5	92,5	70	74	79	460	475,5	515	85	68	115		14	4
32	180	316,5	328	362,5	100,5	70	74	79	487	502,5	542	100	78	140		18	4
40	200	316,5	328	362,5	110,5	70	74	79	497	512,5	552	110	88	150		18	4
50	230	316,5	328	362,5	116,5	70	74	79	503	518,5	558	125	102	165		18	4
65	290	375,5	387	421,5	145	70	74	79	590,5	606	645,5	145	122	185		18	4
80	310	375,5	387	421,5	154.5	70	74	79	600	615,5	655	160	138	200		18	8

Dimensions are in millimeters

1.1.4 3-way SBS Cast Iron Valves ND 100 to 150 group: 77 , 78

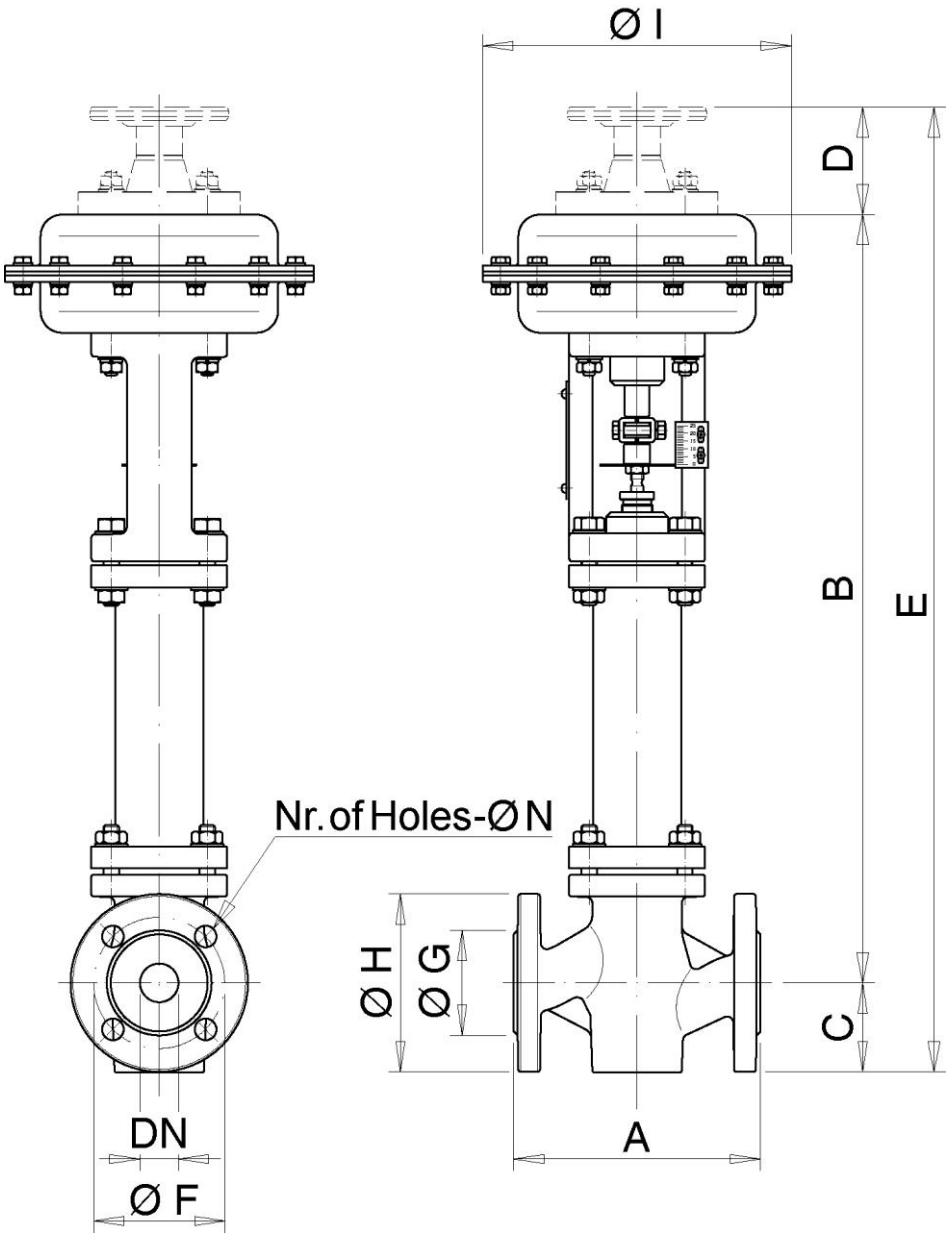


Dwg. nr. 020337 Rev.:00

ND	A	B	C	D	E	Ø F	Ø G	Ø H	Ø I	L	Ø N	O	holes nr.
100	350	507	265	110	882	440	158	220	430	123	18	905	8
125	400	530	318	110	958	445	188	250	430	123	18	981	8
150	480	555	382	110	1047	450	212	285	430	123	22	1070	8

Dimensions are in millimeters

1.1.5 2-way SBS Cast Iron Valves ND 15 to 80 with Safety Bellows group: 19

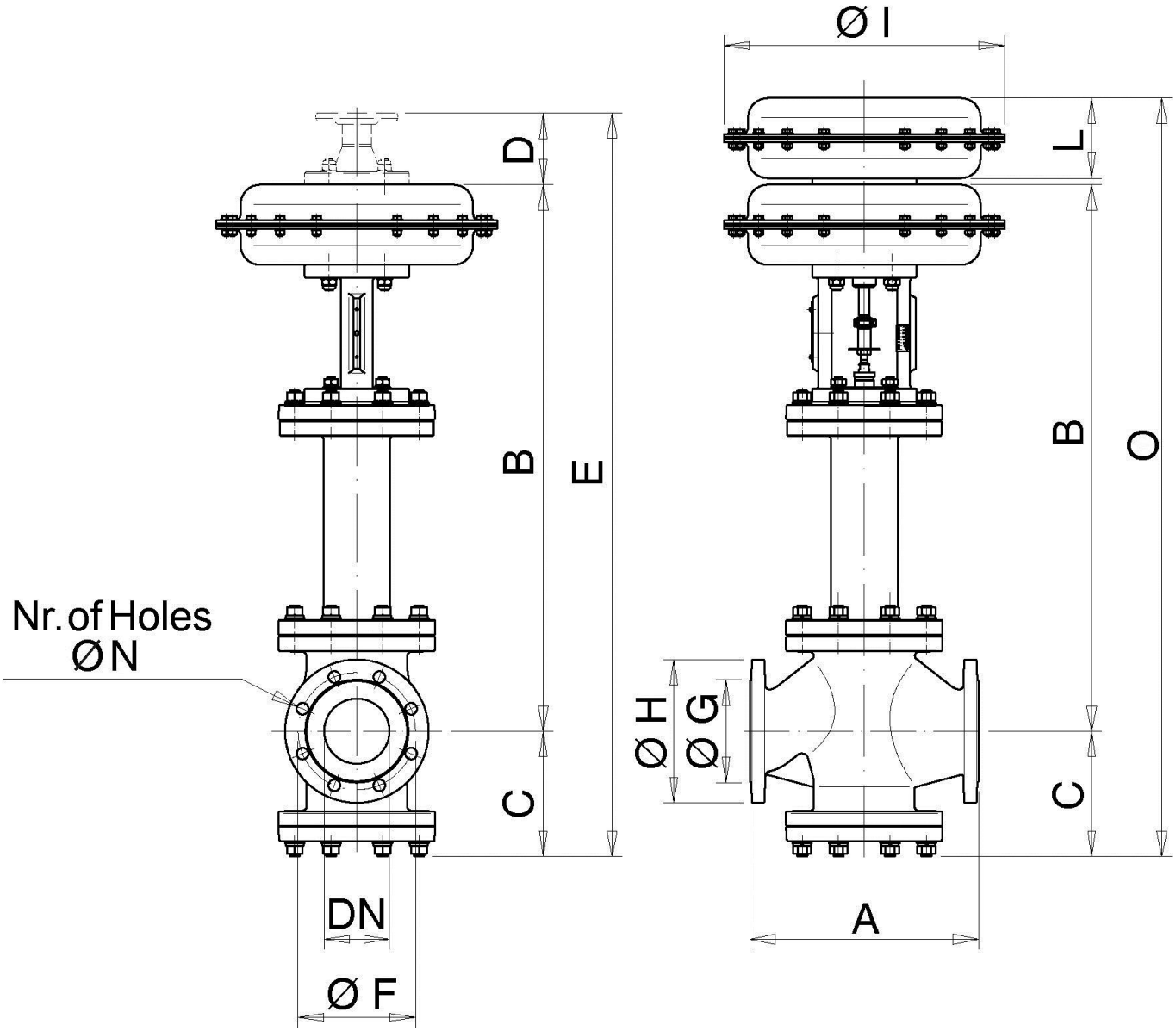


Dwg. nr. 020___ ReV:00

ND	A	B			C	D			E			Ø F	Ø G	Ø H	Ø I	Ø N	holes nr.
		Ø servocontrol				Ø servocontrol			Ø servocontrol								
		200	275 360	430		200	275 360	430	200	275 360	430						
15	130	497,5	509	543,5	48	70	74	79	615,5	631	670,5	65	45	95	Depending upon the required seal Δp (200-275-360-430)	14	4
20	150	497,5	509	543,5	53	70	74	79	620,5	636	675,5	75	58	105		14	4
25	160	497,5	509	543,5	58	70	74	79	625,5	641	680,5	85	68	115		14	4
32	180	530,5	542	576,5	70	70	74	79	670,5	686	725,5	100	78	140		18	4
40	200	530,5	542	576,5	75	70	74	79	675,5	691	730,5	110	88	150		18	4
50	230	529	540,5	575	82,5	70	74	79	681,5	697	736,5	125	102	165		18	4
65	290	557	568,5	603	125	70	74	79	752	767,5	807	145	122	185		18	4
80	310	557	568,5	603	136,5	70	74	79	763,5	779	818,5	160	138	200		18	8

Dimensions are in millimeters

1.1.6 2-way SBS Cast Iron Valves ND 100 to 150 with Safety Bellows group: 76

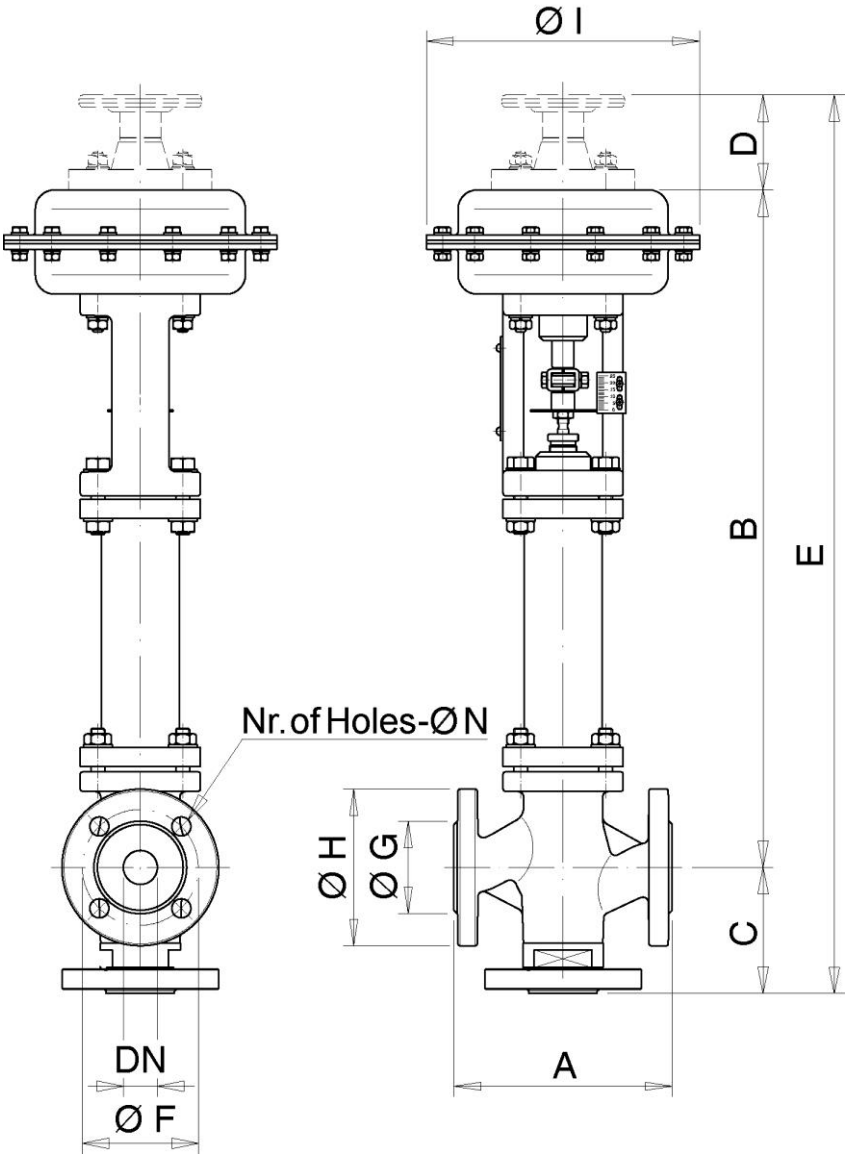


Dwg. nr. 020260 Rev.:00

ND	A	B	C	D	E	Ø F	Ø G	Ø H	Ø I	L	Ø N	O	holes nr.
100	350	738	192,5	110	1040,5	440	158	220	430	123	18	1063,5	8
125	400	761	215,5	110	1086,5	445	188	250	430	123	18	1109,5	8
150	480	786	245	110	1141	450	212	285	430	123	22	1164	8

Dimensions are in millimeters

1.1.7 3-way SBS Cast Iron Valves ND 15 to 80 with Safety Bellows group: 22 , 25

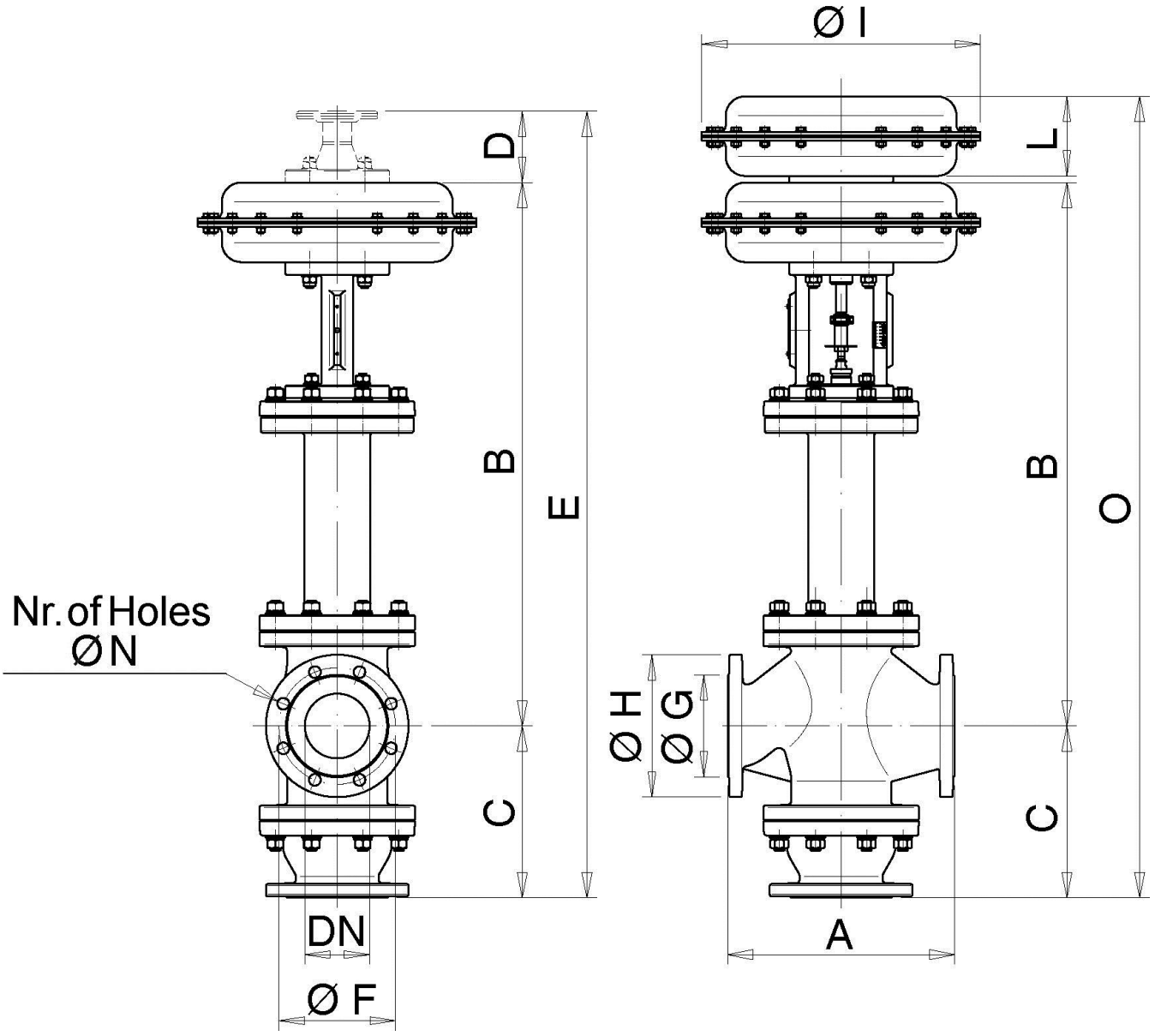


Dwg. nr. 020336 Rev.:00

ND	A	B			C	D			E			Ø F	Ø G	Ø H	Ø I	Ø N	holes nr.
		Ø servocontrol				Ø servocontrol			Ø servocontrol								
		200	275 360	430		200	275 360	430	200	275 360	430						
15	130	497,5	509	543,5	84	70	74	79	651,5	667	706,5	65	45	95	Depending upon the required seal Δp (200-275-360-430)	14	4
20	150	497,5	509	543,5	87,5	70	74	79	655	670,5	710	75	58	105		14	4
25	160	497,5	509	543,5	92,5	70	74	79	660	675,5	715	85	68	115		14	4
32	180	530,5	542	576,5	100,5	70	74	79	701	716,5	756	100	78	140		18	4
40	200	530,5	542	576,5	110,5	70	74	79	711	726,5	766	110	88	150		18	4
50	230	529	540,5	575	116,5	70	74	79	715,5	731	770,5	125	102	165		18	4
65	290	557	568,5	603	145	70	74	79	772	787,5	827	145	122	185		18	4
80	310	557	568,5	603	154,5	70	74	79	781,5	797	836,5	160	138	200		18	8

Dimensions are in millimeters

1.1.8 3-way SBS Cast Iron Valves ND 100 to 150 with Safety Bellows group: 77 , 78



Dwg. nr. 020337 Rev.:00

ND	A	B	C	D	E	Ø F	Ø G	Ø H	Ø I	L	Ø N	O	holes nr.
100	350	738	265	110	1113	440	158	220	430	123	18	1136	8
125	400	761	318	110	1189	445	188	250	430	123	18	1212	8
150	480	786	382	110	1278	450	212	285	430	123	22	1301	8

Dimensions are in millimeters

Storage, Assembly, Check And Maintenance

Transport, Storage And Handling

SBS valves shall be handled with the maximum care throughout the whole transport and assembly phase. Any crashes and anomalous stresses are to be avoided (do not grasp the valve by the servocontrol).

Avoid crashes and tampering of any possible fitting, which the valve might be equipped with (setting devices, transducers, FRLM groups, and so on)

Valves are delivered with dust-proof protections on all connections and these protections must not be removed until they are installed.

These valves shall be stored in areas which are not exposed to the sunshine, so as to prevent diaphragm and inner gaskets from getting dry and old before time.

Storage temperatures shall be included between 0°C and + 50°C.

Avoid any crush to the servocontrol, as they might cause misalignments and compromise the proper operation of the valve.

Observe label indications.

Assembly Instructions

1.1.9 General

The valve installation on the system shall be carried out by qualified personnel only, within the hydraulic and pneumatic fields, provided with all the equipment normally used in the industrial hydraulic and pneumatic plant engineering. The personnel shall always wear proper accident prevention garments, taking particular care to the protection of face, eyes and hands.

In no case the valve must be disassembled or modified, under pain of revocation of each type of guarantee.

N.B. Caution! Compression springs are located inside the valve servocontrol.

Before assembly, dust-proof protections shall be removed from the valve body.

In case of NC (normally closed) servocontrol, the supply shall be carried out in the servocontrol lower head. In case of NO (normally open) servocontrol, the supply shall be carried out in the servocontrol upper head. In both case, the threaded cap located on the air connection, which is not in use, shall not be removed, to prevent dust or foreign matters from entering the servocontrol..

The compressed air shall be instrument air, with a pressure included within the duty values of the servocontrol, in no way higher than 2.5 bar, with supply pipes made of nylon or copper $ø_{inner}$ = 4 mm. The air connections on the valve shall be made of 1/8” (head 200 dia) and 1/4" GAS (head 275 dia, 360 dia, 430 dia, 530 dia) threaded coupling.

1.1.10 Assembly of the valve

Observe the indications on the labels.

Before starting the assembly, make sure that dirty has not entered the valve body. When in doubt, strongly blow compressed air.

The assembly of a protection filter on the pipe upstream the valve is strongly recommended.

Generally, the valve shall be assembled vertically, with the head (servocontrol) upwards. Whenever required by the overall dimensions, the valve can be assembled in a slanting position or horizontally.

If a continuous duty has to be guaranteed during the valve maintenance operations as well, it is advisable to provide for a proper bypass, with relevant on-off valves and manual control.

NOTICES: during the installation of a valve, a minimum space shall be provided for the disassembly of the pneumatic head and the inner bodies, which are required for the maintenance operations.

N.B. Caution: Compression springs are located inside the valve servocontrol.

The maximum care shall be paid to the assembly of the valve on the piping. Make sure to assemble the valve making the arrows printed in the valve body follow the same direction of the pipe fluid. Then, torque tighten the flange bolts crossways and uniformly, in order to compress uniformly the gaskets and prevent dangerous stresses to the valve body.

After the assembly, with the pneumatic valve in the opening position, carefully clean the line with a proper blowing fluid in order to remove any foreign matters, lags and deposits, which might damage the seal surfaces of the valve.

Connect the pneumatic signal coming out of the pilot governor or the remote control to the proper threaded connection on the head.

Operation Test

Before starting up the system and after any repair or overhaul, the following operation test shall be carried out:

On valves with normally closed NC servo control:

Send the fluid inside the valve under obturator at the operating pressure, (check that it is always lower than the maximum allowable pressure indicated on the data plate).

Insert the minimum value of the control signal, as indicated on the data plate, into the servocontrol (the valve shall start to open, this data can be read on the speed plate)

Insert the maximum value of the control signal, as indicated on the data plate, into the servocontrol (the valve shall be completely open, this data can be read on the speed plate)

Blow air out of the servo control.

Repeat this operation 5 times.

Check, with air off, that there are no valve leakages.

Check, with air on, that there are no air leakages from the servo control.

On valves with normally open NO servo control:

1) Send the fluid inside the valve under obturator at the operating pressure, (check that it is always lower than the maximum allowable pressure indicated on the data plate).
2) Insert the minimum value of the control signal, as indicated on the data plate, into the servocontrol (the valve shall start to close, this data can be read on the speed plate).
3) Insert the maximum value of the control signal, as indicated on the data plate, into the servocontrol (the valve shall be completely close, this data can be read on the speed plate).
4) Repeat this operation 5 times.
5) Check, with air on (with a pressure value increased by 20% compared to the control maximum signal) that there are no air leakages from the valve.
6) Check, with air on, that there are no air leakages from the servo control.

Troubleshooting

Troubleshooting operations shall be always carried out by qualified personnel only, adequately equipped for the hydraulic and pneumatic operations and provided with the proper safety clothing, paying particular attention to the protection of face, eyes and hands.

Note: For a proper operation of the valve, the stem shall be able to move freely, without any friction, should the air pressure on the diaphragm change.

The valve serial number is printed on the metallic plate, which is fastened to the mounting. Reference shall be made to the serial number when requiring spare parts and in mail.

Whenever operations are to be carried out on valves, remove the fluid completely. The valve body shall be completely empty.

1.1.11 Passage of fluid with closed valve

If the valve is in the close position, check that no foreign matters are present between the obturator and the seat and that the contact surface is not damaged.

In case of real damages, owing to which the seat is damaged, the obturator seat has to be replaced (for the disassembly of the valve, see following items)

1.1.12 Diaphragm

In case the rubber diaphragm located inside the servocontrol breaks up, the valve cannot carry out a complete stroke.

When the diaphragm is broken or has lost its elasticity, it shall be removed (see following items for the proper procedure to be followed).

In all case of improper operation, check immediately that there are no air leakages from the pneumatic connections between the pilot governor and the valve and relevant fittings.

Verify, moreover, the proper calibration of the governor (operation direction, proportional band, automatic realignment, and so on) and its regular operation.

Scheduled Maintenance

Scheduled maintenance operations shall be carried out apart from the ones due to possible failures, which always need an immediate intervention.

The time interval between one maintenance operation and the following shall be included in the lower time interval between the one corresponding to 500,000 cycles and three years. It consists of a complete disassembly of the valve, replacement of all the gaskets and a complete cleaning of all other components. For disassembly and re-assembly operations, make reference to the relevant paragraphs of this manual.

After a first operation period, it is advisable to check the packing gland, which requires particular care. During the first operating hours, check that no leakages are present. If so, remove them carefully operating on the fastening nut, rotating it by one fourth turn at maximum for each teflon-graphite packing gland.

It is strongly recommended not to tighten the nut too much, as frictions might derive on the stem, which might cause the valve to stop, or, in any case, give rise to an unsatisfying operation. In case leakeages persist despite the tightening, the packing gland shall be completely replaced.

Instructions for Disassembly and Assembly of 15 mm Stroke SBS Servocontrol from the Valve Body

Refer to annexed Dwg. Nr. 020279 for the disassembly and assembly operations of the servocontrol for all the SBS valves, ND 15 to 80.
All the disassembly and assembly operations shall be carried out by qualified personnel, adequately equipped for the hydraulic and pneumatic and provided with the proper safety equipment. Before carrying out any operation on systems and valves, get acquainted with operating temperatures and pressures and any other particular conditions.
Whenever operations are to be carried out on valves, remove the fluid completely.
NOTE: Read the procedures thoroughly before starting any operation.

1.1.13 Removal of NC servocontrol from the valve

1) Mark the position of the adjusting nut (6) and the stroke indicator disk (7) in order to reassemble the valve in the original calibration conditions.
2) Unloosen screws (14), remove nuts (43), withdraw washers (44) and remove the connection blocks (19).
3) Screw down the nut (47) in order to remove it from the adjusting nut (6)
4) Screw down the adjusting nut (6) up to align it with the indicator disk (7).
5) Unloosen nuts (42), remove washers (41), washers (45) and withdraw the servocontrol from the mounting (17).

1.1.14 Removal of NA servocontrol from the valve

1) Mark the position of the adjusting nut (6) and the stroke indicator disk (7) in order to reassemble the valve in the original calibration conditions.
2) Unloosen screws (14), remove nuts (43), withdraw washers (44) and remove the connection blocks (19). When removing the connection blocks (19), the obturator (8) might move downwards and hit against the seat (13). It is then advisable to follow the obturator until it reaches the seat, to prevent any damage to the seal.
3) Screw down the nut (47) in order to remove it from the adjusting nut (6).
4) Screw down the adjusting nut (6) up to align it with the indicator disk (7).
5) Unloosen nuts (42), remove washers (41), washers (45) and withdraw the servocontrol from the mounting (17).

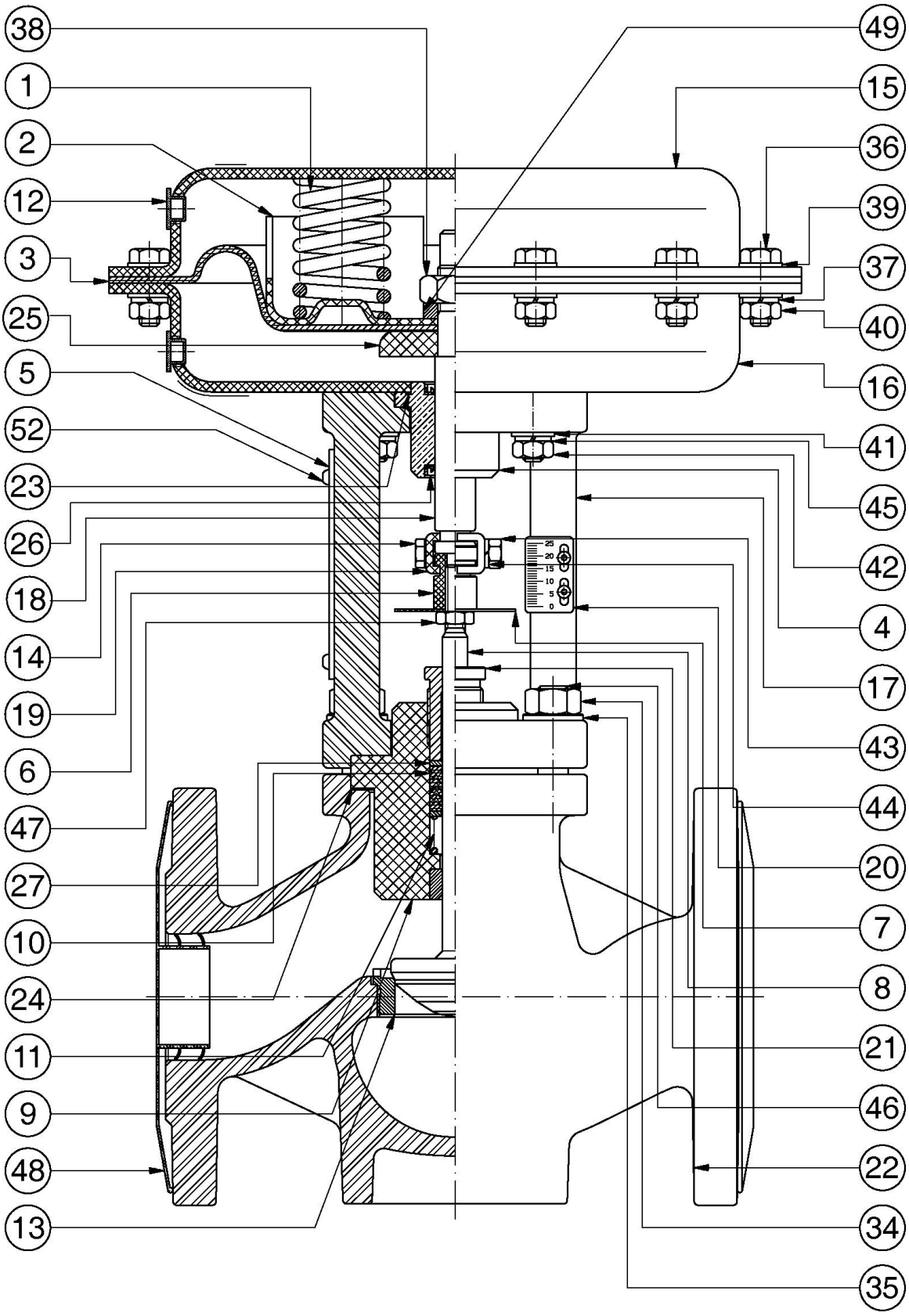
1.1.15 Positioning of NC servocontrol on the valve

1) Position the servocontrol on the valve mounting (17) so that the air connections are located on the valve output.
2) Insert washers (45) and washers (41) on the tie rods of the lower head (16).
3) Torque tighten nuts (42) following the indications of Table 6.
4) Blow air into the servocontrol. **Caution! The servocontrol shaft shall move from its stroke.**
5) Bring again the preloaded adjusting nut (6) into the position previously marked.
6) Torque tighten the nut (47) following the indications of Table 6, keeping the preloaded nut (6) and the indicator disk (7) into their position.
7) Remove air from the servocontrol. **Caution! The servocontrol shaft shall move from its stroke**.
8) Fasten the servocontrol shaft and the adjusting nut with the connection blocks (19).
9) Insert screws (14) into the connection blocks (19), and insert washers (44) on screws.
10) Torque tighten nuts (43), following the instructions of Table 6.

1.1.16 Positioning of NO servocontrol on the valve

1) Position the servocontrol on the valve mounting (17), so that the air connections are located on the valve output.
2) Insert washers (45) and washers (41) on the tie rods of the lower head (16).
3) Torque tighten nuts (42) following the indications of Table 6.
4) Bring again the preloaded adjusting nut (6) into the position previously marked.
5) Torque tighten the nut (47) following the indications of Table 6, keeping the preloaded nut (6) and the indicator disk (7) into their position.
6) Bring the adjusting nut (6) in touch with the servocontrol shaft (18).
7) Fasten the servocontrol shaft and the adjusting nut with the connection blocks (19).
8) Insert screws (14) into the connection blocks (19), and insert washers (44) on screws.
9) Torque tighten nuts (43), following the instructions of Table 6.

Section Plane - 2-way SBS NC Valve ND 15 to 50



Dwg. nr. 020279 Rev.:01

Instructions for Disassembly, Replacement of Gaskets and re-assembly of NC Servocontrols for SBS with 15 mm stroke

Refer to annexed Dwg. Nr. 020279 for the disassembly and assembly operations of the NC servocontrol for all the SBS valves, ND 15 to 80.

All the disassembly and assembly operations shall be carried out by qualified personnel, adequately equipped for the hydraulic and pneumatic and provided with the proper safety equipment. Before carrying out any operation on systems and valves, get acquainted with operating temperatures and pressures and any other particular conditions.

Whenever operations are to be carried out on valves, remove the fluid completely.

NOTE: Read the procedures thoroughly before starting any operation.

Instructions to disassemble and re-assemble the servocontrol from the valve body are described under item 5.6

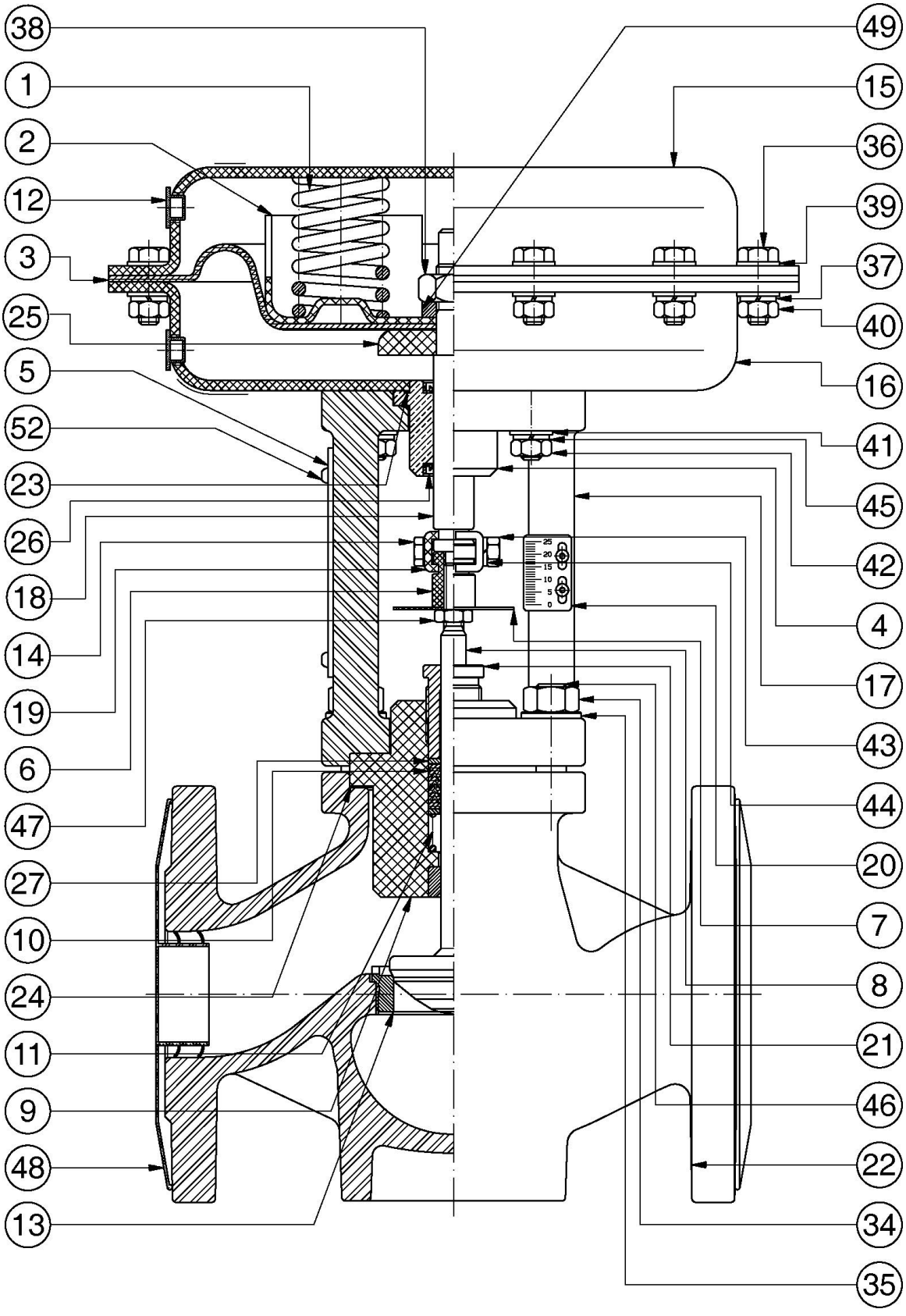
1.1.17 Disassembly of NC servocontrol, ND 15 to 80.

1) Withdraw the guide bush (4). Remove BA gaskets (26) and OR gasket (23).
2) Unloosen screws (36) and separate them from nuts (40), washers (39) and washers (37).
3) **Caution! Some compression springs are located inside the valve servocontrol**: it is necessary to use proper tools to prevent the two heads from suddenly move away from the servocontrol when all the screws (36) are unloosen.
4) Remove the upper head (15).
5) Withdraw the springs of the servocontrol (1).
6) Extract the servocontrol shaft (18) from the lower head (16).
7) Fasten the servocontrol shaft (18) between soft jaws, then unloosen the nut (38).
8) Withdraw the distance ring washer (49), the spring plate (2), the diaphragm (3) and the diaphragm counterdisk (25) from the servocontrol shaft (18).
9) At this point the servocontrol is completely disassembled. The required components can be then replaced.

1.1.18 Re-assembly of NC servocontrol, ND 15 to 80.

1) Fasten the servocontrol shaft (18) between soft jaws, insert on it the diaphragm counterdisk (25), the diaphragm (3), the spring plate (2) and the distance ring washer (49).
2) Screw down and punch the hexagon nut (38).
3) Insert the servocontrol shaft into the lower head (16).
4) Insert the springs (1) into the spring plate (2) positioning them on the bosses present in the spring plate.
5) Place the diaphragm so that the holes for its screws correspond to the holes for the screws of the lower head.
6) Place the upper head (15) so that the holes for the air inlet of the two heads are aligned and the holes for the screws correspond to the holes of the diaphragm and lower head screws.
7) Compress the springs with proper tools in order to make the two heads come closer. **Caution! Make sure that the two heads do not come suddenly off before they are fastened with the screws.**
8) Insert washers (39) into the screws (36), insert the screws (36) into the holes of the upper head (15), insert washers (39) and (37) on the screws (36), torque tighten the hexagonal nuts (40), as indicated in Table 6.
9) Insert BA gaskets (26) and OR gasket (23) into the guide bush (4).
10) Then, insert the guide bush (4) on the servocontrol shaft (18) and in the lower head (16).
11) The servocontrol is completely assembled and can be placed on the valve body.

1.1.19 Section Plane – 2-way SBS NC Valve ND 15 to 50



Dwg. nr. 020279 Rev.:01

Instructions for Disassembly, Replacement of Gaskets and Re-assembly of NO Servocontrols for SBS - ND 15 to 80

Refer to annexed Dwg. Nr. 020361 for the disassembly and assembly operations of the NO servocontrol for all the SBS valves, ND 15 to 80.

All the disassembly and assembly operations shall be carried out by qualified personnel, adequately equipped for the hydraulic and pneumatic and provided with the proper safety equipment. Before carrying out any operation on systems and valves, get acquainted with operating temperatures and pressures and any other particular conditions.

Whenever operations are to be carried out on valves, remove the fluid completely.

NOTE: Read the procedures thoroughly before starting any operation.

Instructions to disassemble and re-assemble the servocontrol from the valve body are described under item 5.6

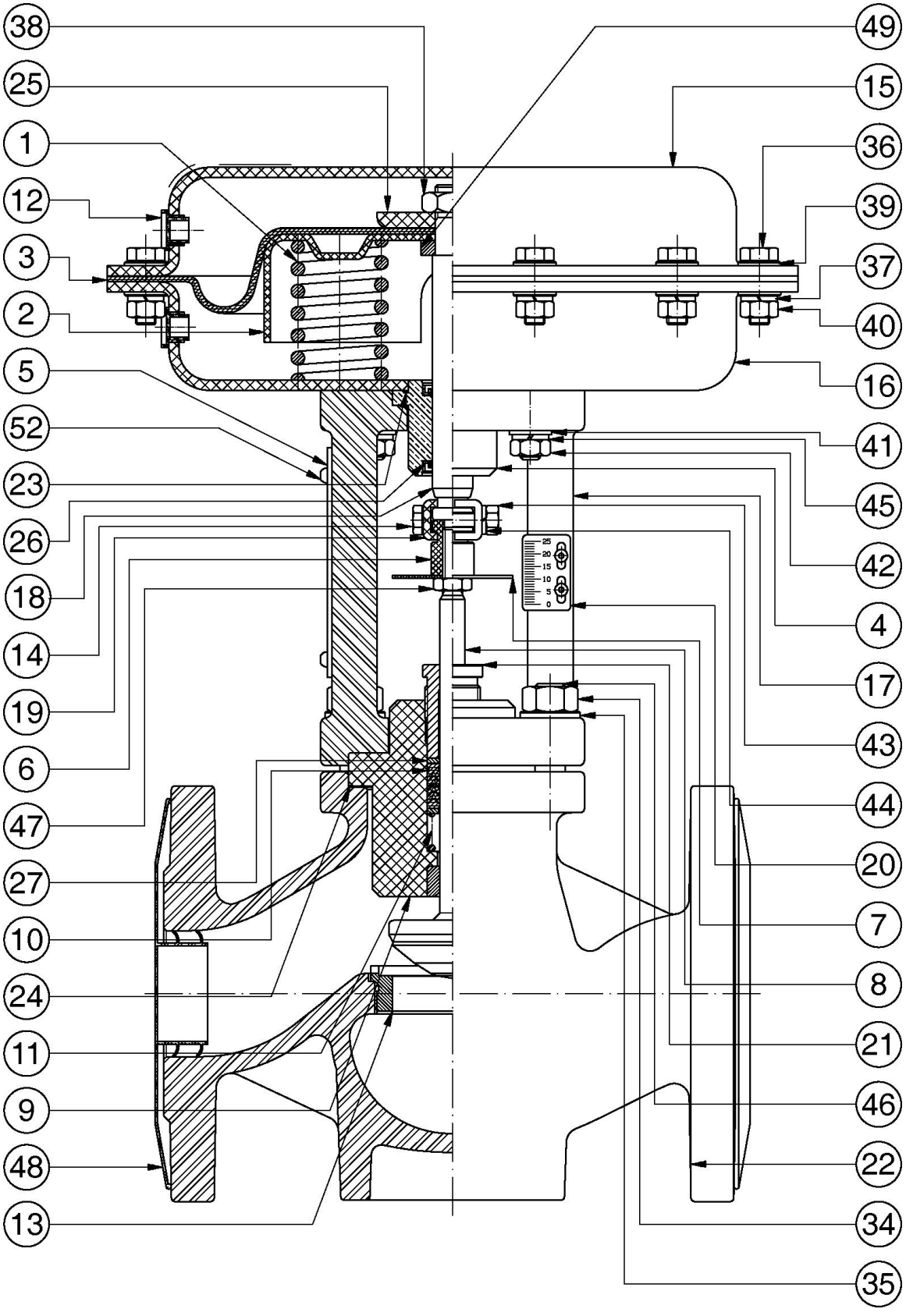
1.1.20 Disassembly of NO servocontrol, ND 15 to 80.

1) Withdraw the guide bush (4). Remove BA gaskets (26) and OR gasket (23).
2) Unloosen screws (36) and separate them from nuts (40), washers (39) and washers (37).
3) **Caution! Some compression springs are located inside the valve servocontrol**: it is necessary to use proper tools to prevent the two heads from suddenly move away from the servocontrol when all the screws (36) are unloosen.
4) Remove the upper head (15).
5) Extract the servocontrol shaft (18) from the lower head (16).
6) Withdraw the springs (1) from the upper head (16).
7) Fasten the servocontrol shaft (18) between soft jaws, then unloosen the nut (38), withdraw the diaphragm counterdisk (25). Note: the nut (38) is not available for the 200 dia servocontrol, as it is the same diaphragm counterdisk to act as fastening nut.
8) Withdraw the diaphragm (3), the spring plate (2) and the distance ring washer (49) from the servocontrol (18) shaft.
9) At this point the servocontrol is completely disassembled. The required components can be then replaced.

1.1.21 Re-assembly of NO servocontrol, ND 15 to 80.

1) Fasten the servocontrol shaft (18) between soft jaws, insert on it the distance ring washer (49), the spring plate (2), the diaphragm (3) and the diaphragm counterdisk (25).
2) Screw down and punch the hexagon nut (38). Note: the nut (38) is not available for the 200 dia servocontrol, as it is the same diaphragm counterdisk to act as fastening nut.
3) Insert the servocontrol shaft into the upper head (16).
4) Insert the springs (1) into the spring plate (2) positioning them on the bosses present in the spring plate.
5) Position the diaphragm so that the holes for its screws correspond to the holes for the screws of the lower head.
6) Position the upper head (15) so that the holes for the air inlet of the two heads are aligned and the holes for the screws correspond to the holes of the diaphragm and lower head screws.
7) Compress the springs with proper tools in order to make the two heads come closer. **Caution! Make sure that the two heads do not come suddenly off before they are fastened with the screws.**
8) Insert washers (39) into the screws (36), insert the screws (36) into the holes of the upper head (15), insert washers (39) and (37) on the screws (36), torque tighten the hexagonal nuts (40), as indicated in Table 6.
9) Insert BA gaskets (26) and OR gasket (23) into the guide bush (4).
10) Insert the guide bush (4) in the servocontrol shaft (18) and in the lower head (16).
11) The servocontrol is completely assembled and can be placed on the valve body.

1.1.22 Section Plane – 2-way SBS NO Valve ND 15 to 50



Dwg. nr. 020361 Rev.:00

Instructions for Disassembly, Replacement of Gaskets and Re-assembly of 2-way SBS Valve Bodies - ND 15 to 50

Refer to annexed Dwg. Nr. 020279 for the disassembly and assembly operations of the 2-way SBS valve, ND 15 to 50.

All the disassembly and assembly operations shall be carried out by qualified personnel, adequately equipped for the hydraulic and pneumatic and provided with the proper safety equipment. Before carrying out any operation on systems and valves, get acquainted with operating temperatures and pressures and any other particular conditions.

Whenever operations are to be carried out on valves, remove the fluid completely.

NOTE: Read the procedures thoroughly before starting any operation.

Instructions to disassemble and re-assemble the servocontrol from the valve body are described under item 5.6

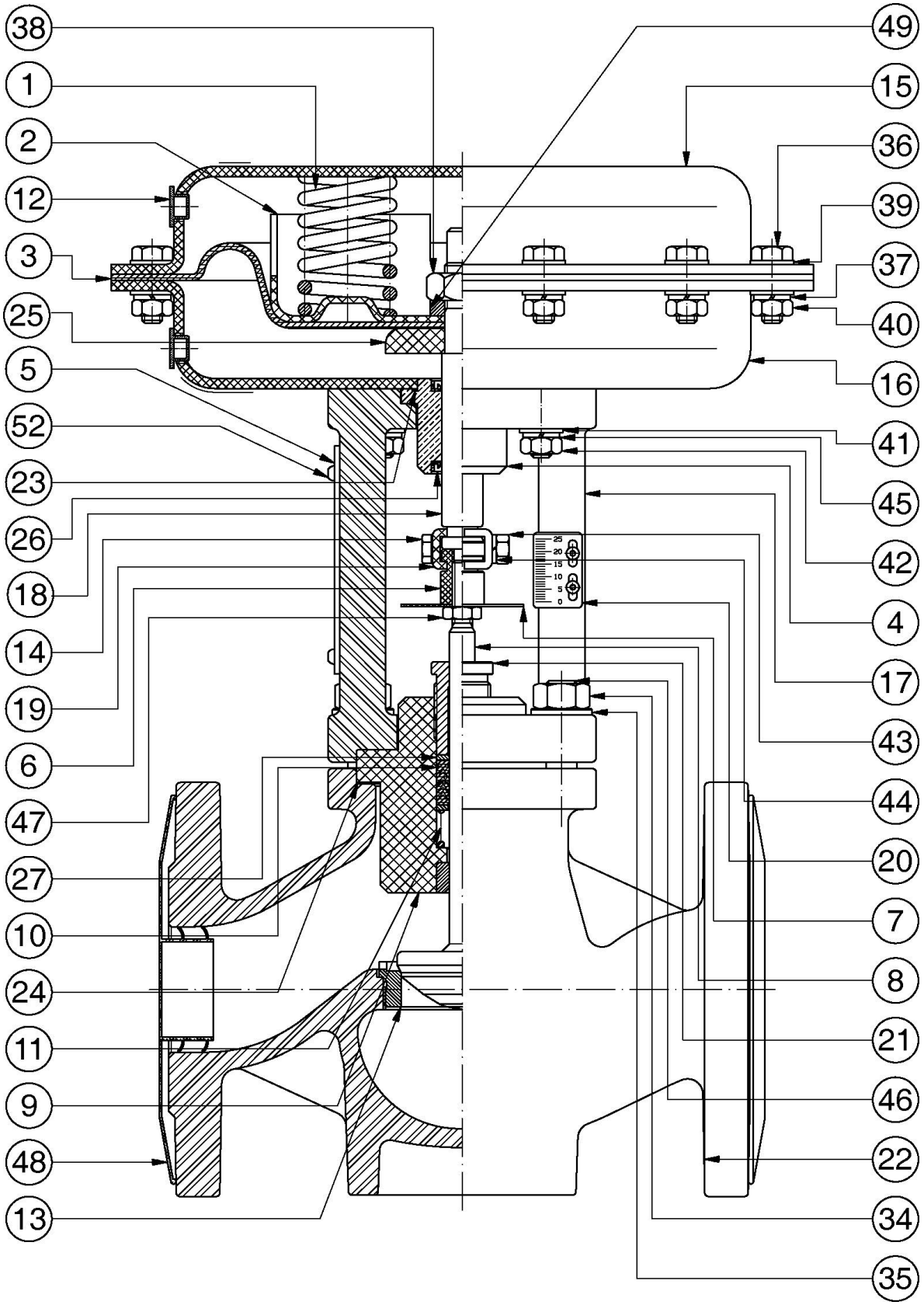
1.1.23 Disassembly of 2-way valve body, ND 15 to 50.

1) Withdraw the adjusting nut (6) from the fitted obturator stem (8).
2) Withdraw the stroke indicator disk (7) and unloosen the nut (47).
3) Withdraw nuts (34) and washers (35).
4) Remove the valve mounting (17).
5) Withdraw the intermediate body (9) with the obturator (8).
6) Extract the obturator (8) from the intermediate body (9).
7) Unloosen the packing gland screw (21). **Caution! The packing gland screw (21) keeps the packing gland spring (11) compressed. Pay attention that the inner components of the intermediate body do not come off once the packing gland screw (21) is no longer compressed.**
8) Withdraw the first packing gland washer (27), the packing gland (10), the second packing gland washer (27) and packing gland spring (11) from the intermediate body (9).
9) Withdraw the body gasket (24) from the valve body (22).
10) At this point the valve body is completely disassembled. The required components can be then replaced.

1.1.24 Re-assembly of 2-way valve body, ND 15 to 50.

1) Lubricate the inner part of the intermediate body (9) with silicone grease.
2) Insert the packing gland spring (11), the packing gland washer (27), the packing gland (10), the second packing gland washer (27) into the intermediate body (9).
3) Screw down the packing gland screw (21) until it protrudes 10 mm from the upper side of the intermediate body. **Caution! The packing gland screw (21) keeps the packing gland spring (11) compressed. Pay attention that the inner components of the intermediate body do not come off once the packing gland screw (21) is no longer compressed.**
4) Lubricate the obturator stem (9) with silicone grease and insert it into the intermediate body (9) previously prepared.
5) Place the body gasket (24) into the valve seat (22).
6) Then, place the intermediate body (9) with the obturator (8) inserted into the valve body.
7) Insert the valve mounting (17) near the valve body stud bolts, positioning the data plate in the direction of the valve body outlet.
8) Insert the washers (35) on the stud bolts, torque tighten the nuts (34), as indicated in Table 6.
9) Screw down the nut (47), insert the indicator disk (7) on the obturator stem, then screw down the adjusting nut (6).
10) At this point the valve body is completely assembled and can be reconnected to the servocontrol.

1.1.25 Section Plane - 2-way SBS NC Valve ND 15 to 50



Dwg. nr. 020279 Rev.:01

Instructions for Disassembly, Replacement of Gaskets and Re-assembly of 2-way SBS Valve Bodies - ND 65 to 80

Refer to annexed Dwg. Nr. 020362 for the disassembly and assembly operations of the 2-way SBS valve body - ND 65 to 80.

All the disassembly and assembly operations shall be carried out by qualified personnel, adequately equipped for the hydraulic and pneumatic and provided with the proper safety equipment. Before carrying out any operation on systems and valves, get acquainted with operating temperatures and pressures and any other particular conditions.

Whenever operations are to be carried out on valves, remove the fluid completely.

NOTE: Read the procedures thoroughly before starting any operation.

Instructions to disassemble and re-assemble the servocontrol from the valve body are described under item 5.6

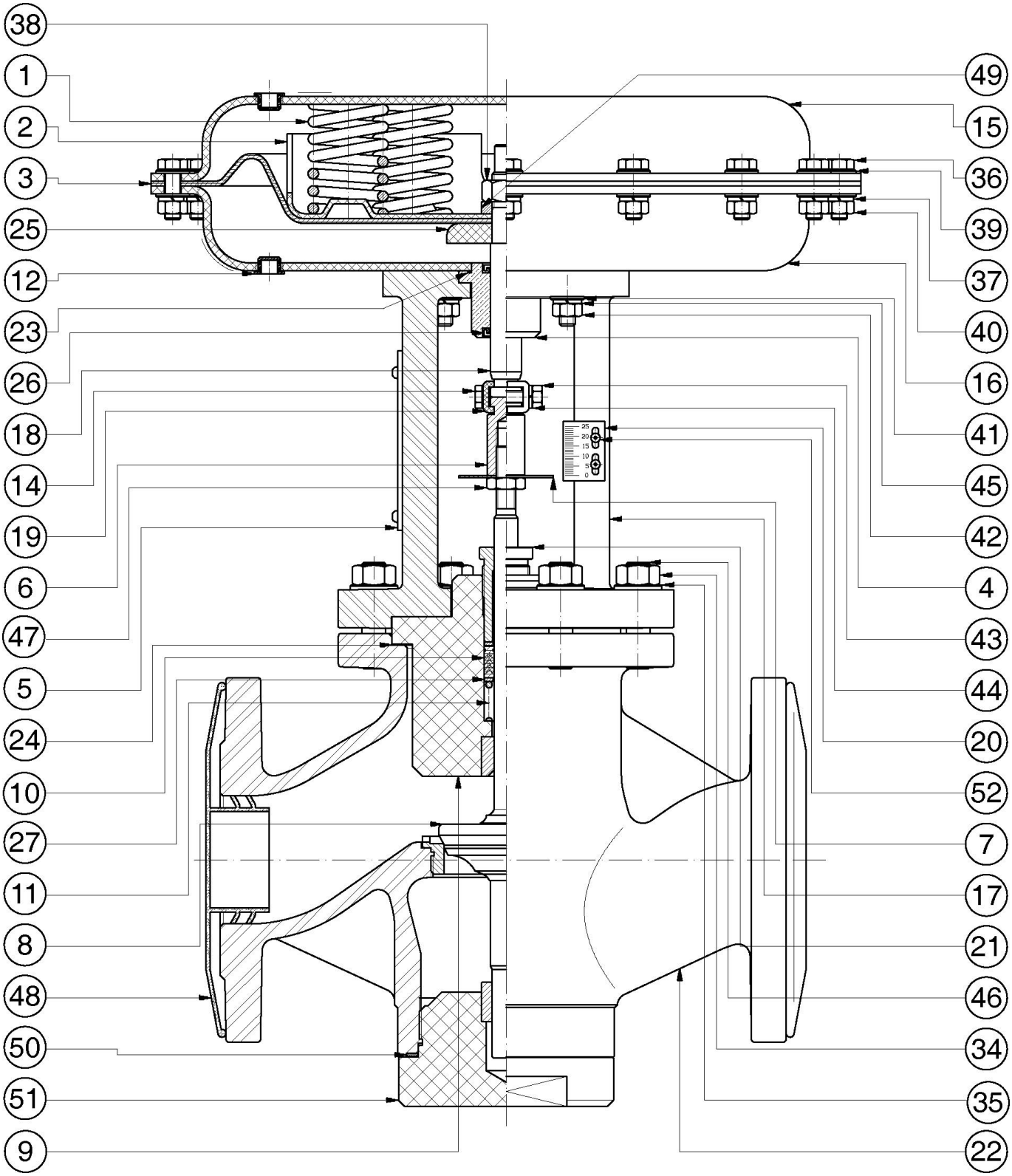
1.1.26 Disassembly of 2-way valve body, ND 65 to 80.

1) Withdraw the adjusting nut (6) from the obturator stem (8).
2) Withdraw the stroke indicator disk (7) and unloosen the nut (47).
3) Withdraw nuts (34) and washers (35).
4) Remove the valve mounting (17).
5) Withdraw the intermediate body (9) with the obturator (8).
6) Extract the obturator (8) from the intermediate body (9).
7) Unloosen the packing gland screw (21). **Caution! The packing gland screw (21) keeps the packing gland spring (11) compressed. Pay attention that the inner components of the intermediate body do not come off once the packing gland screw (21) is no longer compressed.**
8) Withdraw the first packing gland washer (27), the packing gland (10), the second packing gland washer (27) and packing gland spring (11) from the intermediate body (9).
9) Withdraw the body gasket (24) from the valve body (22).
10) Unloosen the bottom (51) from the valve body (22) and withdraw the bottom gasket (50).
11) At this point the valve body is completely disassembled. The required components can be then replaced.

1.1.27 Re-assembly of 2-way valve body, ND 65 to 80

1) Place the bottom gasket (50) on the gasket (51) and torque tighten it to the valve body (22), as indicated under Table 6.
2) Lubricate the inner part of the intermediate body (9) with silicone grease.
3) Insert the packing gland spring (11), the packing gland washer (27), the packing gland (10), the second packing gland washer (27) into the intermediate body (9).
4) Screw down the packing gland screw (21) until it protrudes 10 mm from the upper side of the intermediate body. **Caution! The packing gland screw (21) keeps the packing gland spring (11) compressed. Pay attention that the inner components of the intermediate body do not come off once the packing gland screw (21) is no longer compressed.**
5) Lubricate the obturator stem (9) with silicone grease and insert it into the intermediate body (9) previously prepared.
6) Place the body gasket (24) into the valve seat (22).
7) Then, place the intermediate body (9) with the obturator (8) inserted into the valve body.
8) Insert the valve mounting (17) near the valve body stud bolts, positioning the data plate in the direction of the valve body outlet.
9) Insert the washers (35) on the stud bolts, torque tighten the nuts (34), as indicated in Table 6.
10) Screw down the nut (47), insert the indicator disk (7) on the obturator stem, then screw down the adjusting nut (6).
11) At this point the valve body is completely assembled and can be reconnected to the servocontrol.

1.1.28 Section Plane - 2-way SBS NC Valve ND 65 to 80



Dwg. nr. 020362 Rev.:00

Instructions for Disassembly, Replacement of Gaskets and Re-assembly of 3-way SBS Valve Bodies - ND 15 to 80.

Refer to annexed Dwg. Nr. 020363 for the disassembly and assembly operations of the 3-way SBS valve body - ND 15 to 80.

All the disassembly and assembly operations shall be carried out by qualified personnel, adequately equipped for the hydraulic and pneumatic and provided with the proper safety equipment. Before carrying out any operation on systems and valves, get acquainted with operating temperatures and pressures and any other particular conditions.

Whenever operations are to be carried out on valves, remove the fluid completely.

NOTE: Read the procedures thoroughly before starting any operation.

Instructions to disassemble and re-assemble the servocontrol from the valve body are described under item 5.6

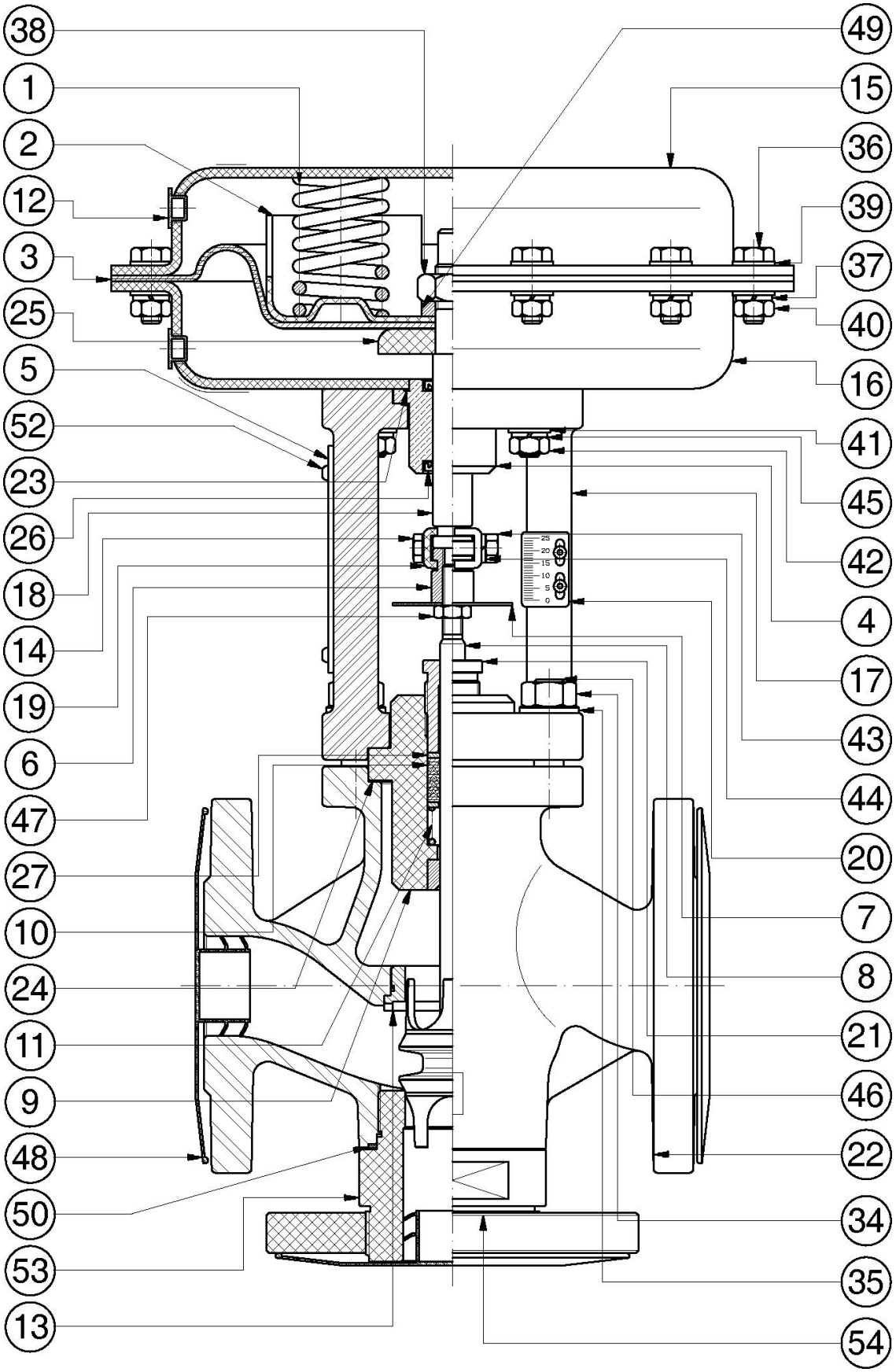
1.1.29 Disassembly of 3-way valve body.

1) Withdraw the adjusting nut (6) from the obturator stem (8).
2) Withdraw the stroke indicator disk (7) and unloosen the nut (47).
3) Withdraw nuts (34) and washers (35).
4) Remove the valve mounting (17).
5) Withdraw the 3-way flange (54), unloosen the 3-way bottom (53) and remove the bottom gasket (50) from it.
6) Withdraw the obturator (8) from the valve body bottom (22).
7) Withdraw the intermediate body (9).
8) Unloosen the packing gland screw (21). **Caution! The packing gland screw (21) keeps the packing gland spring (11) compressed. Pay attention that the inner components of the intermediate body do not come off once the packing gland screw (21) is no longer compressed.**
9) Withdraw the first packing gland washer (27), the packing gland (10), the second packing gland washer (27) and packing gland spring (11) from the intermediate body (9).
10) Withdraw the body gasket (24) from the valve body (22).
11) At this point the valve body is completely disassembled. The required components can be then replaced.

1.1.30 Re-assembly of 3-way valve body

1) Lubricate the inner part of the intermediate body (9) with silicone grease.
2) Insert the packing gland spring (11), the packing gland washer (27), the packing gland (10), the second packing gland washer (27) into the intermediate body (9).
3) Screw down the packing gland screw (21) until it protrudes 10 mm from the upper side of the intermediate body. **Caution! The packing gland screw (21) keeps the packing gland spring (11) compressed. Pay attention that the inner components of the intermediate body do not come off once the packing gland screw (21) is no longer compressed.**
4) Insert the body gasket (24) into the valve seat (22).
5) Then, place the intermediate body (9) into the valve body (22).
6) Insert the valve mounting (17) near the valve body stud bolts (46), positioning the data plate in the direction of the valve body outlet.
7) Insert the washers (35), on the stud bolts, torque tighten the nuts (34), as indicated in Table 6.
8) Lubricate the obturator stem (8) with silicone grease and insert it from the valve body (22) into the intermediate body (9) previously prepared.
9) Place the bottom gasket (50) on the three-way bottom (53) and torque tighten it to the valve body (22), as indicated under Table 6.
10) Screw down the nut (47), insert the indicator disk (7) on the obturator stem, then screw down the adjusting nut (6).
11) At this point the valve body is completely assembled and can be reconnected to the servocontrol.

1.1.31 Section Plane - 3-way SBS NC Valve ND 15 to 80



Dwg. nr. 020363 Rev.:00

Instructions for Disassembly, Replacement of Gaskets and Re-assembly of 2-way SBS Valve Bodies - ND 15 to 50 with bellows

Refer to annexed Dwg. Nr. 020372 for the disassembly and assembly operations of the 2-way SBS valve body - ND 15 to 50 with bellows.
All the disassembly and assembly operations shall be carried out by qualified personnel, adequately equipped for the hydraulic and pneumatic and provided with the proper safety equipment. Before carrying out any operation on systems and valves, get acquainted with operating temperatures and pressures and any other particular conditions.
Whenever operations are to be carried out on valves, remove the fluid completely..
NOTE: Read the procedures thoroughly before starting any operation.

Instructions to disassemble and re-assemble the servocontrol from the valve body are described under item 5.6

1.1.32 Disassembly of 2-way valve body, ND 15 to 50 with bellows.

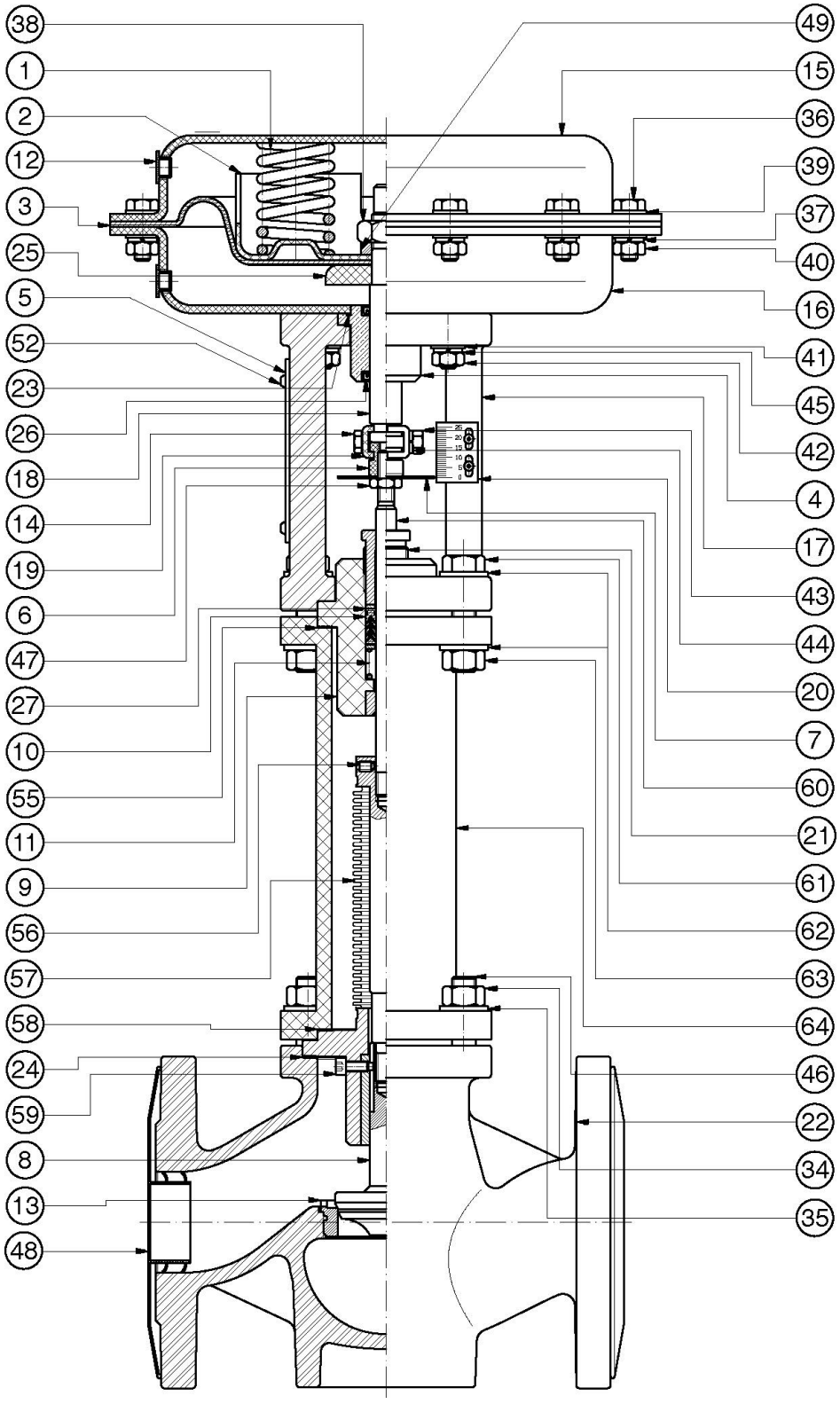
1) Withdraw the adjusting nut (6) from the obturator stem (60).
2) Withdraw the stroke indicator disk (7) and unloosen the nut (47).
3) Withdraw nuts (63), washers (62) and remove the screws (61) from the mounting (17).
4) Remove the valve mounting (17).
5) Withdraw the intermediate body (9) from the mounting extension (64), remove the gasket (55) from this last.
6) Unloosen the packing gland screw (21). **Caution! The packing gland screw (21) keeps the packing gland spring (11) compressed. Pay attention that the inner components of the intermediate body do not come off once the packing gland screw (21) is no longer compressed.**
7) Withdraw the first packing gland washer (27), the packing gland (10), the second packing gland washer (27) and packing gland spring (11) from the intermediate body (9).
8) Unloosen nuts (34) and washers (35).
9) Remove the mounting extension (64), then withdraw the gasket (58). It is then possible to withdraw the intermediate body with bellows (57). Pay attention, while handling the bellows, as it is a very delicate component, when disassembled.
10) Unloosen the grub screw (56) and the obturator stem (60).
11) Unscrew the HSH cap screw (59). Then withdraw the obturator (8) from the intermediate body with bellows (57). NB: This operation is very delicate and shall be carried out very carefully. It is not strictly required for the replacement of gaskets.
12) Withdraw the body gasket (24) from the valve body (22).
13) At this point the valve body is completely disassembled. The required components can be then replaced.

1.1.33 Re-assembly of 2-way valve body ND 15 to 50 with bellows.

1) Lubricate the inner part of the intermediate body (9) with silicone grease.
2) Insert the packing gland spring (11), the packing gland washer (27), the packing gland (10), the second packing gland washer (27) into the intermediate body (9).
3) Screw down the packing gland screw (21) until it protrudes 10 mm from the upper side of the intermediate body. **Caution! The packing gland screw (21) keeps the packing gland spring (11) compressed. Pay attention that the inner components of the intermediate body do not come off once the packing gland screw (21) is no longer compressed.**
4) Screw down the obturator (8) on the intermediate body stem with bellows (57). Then, screw down the HSH cap screw (59) into the intermediate body with bellows. This operation shall be carried out very carefully, as the point of the HSH cap screw (59) shall be perfectly centered into the obturator slot (8). Act on both components in the same time, to get a perfect centering.
5) Screw down the obturator stem (60) into the intermediate body with bellows (57), then torque tighten the grub screw (56), as indicated under Table 6.
6) Insert the body gasket (24) into the valve seat (22).
7) Then, insert the intermediate body with bellows previously assembled into the valve body.
8) Place the gasket (58) and insert the mounting extension (64) on the stud bolts (46) of the valve body.
9) Insert washers (35) on the stud bolts (46) and torque tighten nuts (34), as indicated under Table 6.
10) Place the gasket (55) into the mounting extension.
11) Insert the intermediate body (9) previously assembled into the mounting extension (64) and on the obturator stem (60).
12) Place the valve mounting (17) into the intermediate body (9), positioning the data plate in the direction of the valve body outlet.
13) Insert the first washers (62) on the screws (61), then place the screws into the holes of the valve mounting (17).

14) Insert the remaining washers (62) on the screws (61) and torque tighten the nuts (63), as indicated under Table 6.
15) Screw down the nut (47), insert the indicator disk (7) on the obturator stem, the screw down the adjusting nut (6).
11) At this point the valve body is completely assembled and can be reconnected to the servocontrol.

1.1.34 Section Plane – 2-way SBS valve ND 15 to 50 NC with bellows



Dwg. nr. 020372 Rev.:00

Instructions for Disassembly, Replacement of Gaskets and Re-assembly of 2-way SBS Valve Bodies - ND 65 to 80 with bellows

Refer to annexed Dwg. Nr. 020380 for the disassembly and assembly operations of the 2-way SBS valve body - ND 65 to 80 with bellows.
All the disassembly and assembly operations shall be carried out by qualified personnel, adequately equipped for the hydraulic and pneumatic and provided with the proper safety equipment. Before carrying out any operation on systems and valves, get acquainted with operating temperatures and pressures and any other particular conditions.
Whenever operations are to be carried out on valves, remove the fluid completely..
NOTE: Read the procedures thoroughly before starting any operation.

Instructions to disassemble and re-assemble the servocontrol from the valve body are described under item 5.6

1.1.35 Disassembly of 2-way valve body, ND 65 to 80 with bellows

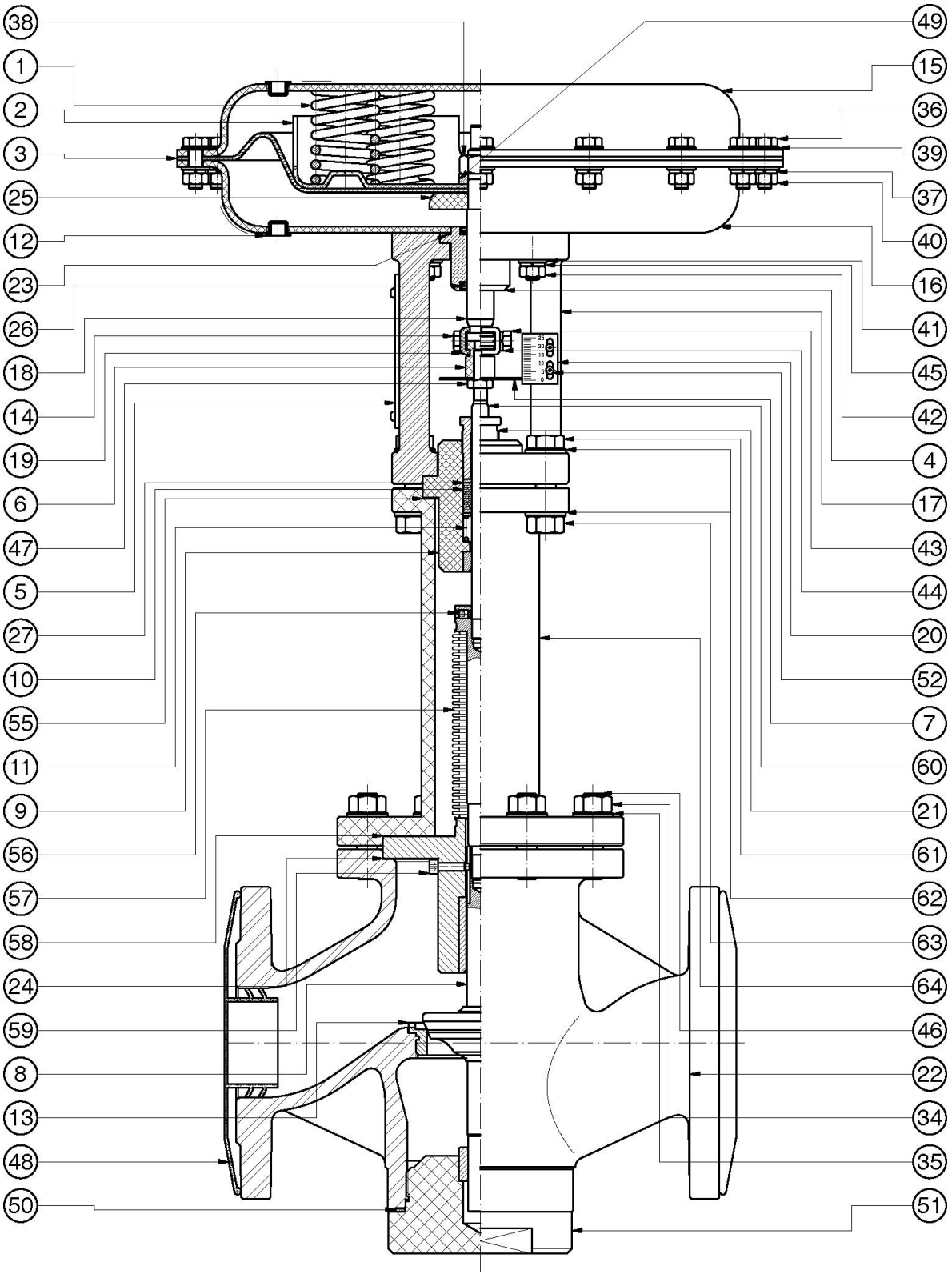
1) Withdraw the adjusting nut (6) from the obturator stem (60).
2) Withdraw the stroke indicator disk (7) and unloosen the nut (47).
3) Unloosen nuts (63), withdraw washers (62) and remove the screws (61) from the mounting (17).
4) Remove the valve mounting (17).
5) Withdraw the intermediate body (9) from the mounting extension (64), remove the gasket (55) from this last.
6) Unloosen the packing gland screw (21). **Caution! The packing gland screw (21) keeps the packing gland spring (11) compressed. Pay attention that the inner components of the intermediate body do not come off once the packing gland screw (21) is no longer compressed.**
7) Withdraw the first packing gland washer (27), the packing gland (10), the second packing gland washer (27) and packing gland spring (11) from the intermediate body (9).
8) Unloosen nuts (34) and withdraw washers (35).
9) Remove the mounting extension (64), then withdraw the gasket (58). It is then possible to withdraw the intermediate body with bellows (57). Pay attention, while handling the bellows, as it is a very delicate component, when disassembled.
10) Unloosen the grub screw (56) and the obturator stem (60).
11) Screw down the HSH cap screw (59). Then withdraw the obturator (8) from the intermediate with bellows (57). NB: This operation is very delicate and shall be carried out very carefully. It is not strictly required for the replacement of gaskets.
12) Withdraw the body gasket (24) from the valve body (22).
13) Unloosen the bottom (52) from the valve body (22), then withdraw the bottom gasket (51).
14) At this point the valve body is completely disassembled. The required components can be then replaced.

1.1.36 Re-assembly of 2-way valve body ND 65 to 80 with bellows

1) Place the bottom gasket (51) into the bottom (52), torque tighten it to the valve body (22), as indicated under Table 6 (22).
2) Lubricate the inner part of the intermediate body (9) with silicone grease.
3) Insert the packing gland spring (11), the packing gland washer (27), the packing gland (10), the second packing gland washer (27) into the intermediate body (9).
4) Screw down the packing gland screw (21) until it protrudes 10 mm from the upper side of the intermediate body. **Caution! The packing gland screw (21) keeps the packing gland spring (11) compressed. Pay attention that the inner components of the intermediate body do not come off once the packing gland screw (21) is no longer compressed.**
5) Screw down the obturator (8) on the intermediate body stem with bellows (57). Then, screw down the HSH cap screw (59) into the intermediate body with bellows. This operation shall be carried out very carefully, as the point of the HSH cap screw (59) shall be perfectly centered into the obturator slot (8). Act on both components in the same time, to get a perfect centering.
6) Screw down the obturator stem (60) into the intermediate body with bellows (57), then torque tighten the grub screw (56), as indicated under Table 6.
7) Insert the body gasket (24) into the valve seat (22).
8) Then, insert the intermediate body with bellows previously assembled into the valve body.
9) Place the gasket (58) and insert the mounting extension (64) on the stud bolts (46) of the valve body.
10) Insert washers (35) on the stud bolts (46) and torque tighten nuts (34), as indicated under Table 6.
11) Place the gasket (55) into the mounting extension .
12) Insert the intermediate body (9) previously assembled into the mounting extension (64) and on the obturator stem (60).
13) Place the valve mounting (17) into the intermediate body (9), positioning the data plate in the direction of the valve body outlet.
14) Insert the first washers (62) on the screws (61), then place the screws into the holes of the valve mounting (17).

15) Insert the remaining washers (62) on the screws (61) and torque tighten the nuts (63), as indicated under Table 6.
16) Screw down the nut (47), insert the indicator disk (7) on the obturator stem, screw down the adjusting nut (6).
17) At this point the valve body is completely assembled and can be reconnected to the servocontrol.

1.1.37 Section Plane – 2-way SBS valve ND 65 to 80 NC with bellows



Dwg. nr. 020380 Rev.:00

Instructions for Disassembly, Replacement of Gaskets and Re-assembly of 3-way SBS Valve Bodies - ND 15 to 80 with bellows

Refer to annexed Dwg. Nr. 020386 for the disassembly and assembly operations of the 3-way SBS valve body - ND 15 to 80 with bellows.

All the disassembly and assembly operations shall be carried out by qualified personnel, adequately equipped for the hydraulic and pneumatic and provided with the proper safety equipment. Before carrying out any operation on systems and valves, get acquainted with operating temperatures and pressures and any other particular conditions.

Whenever operations are to be carried out on valves, remove the fluid completely..

NOTE: Read the procedures thoroughly before starting any operation.

Instructions to disassemble and re-assemble the servocontrol from the valve body are described under item 5.6

1.1.38 Disassembly of 3-way valve body, ND 15 to 80 with bellows

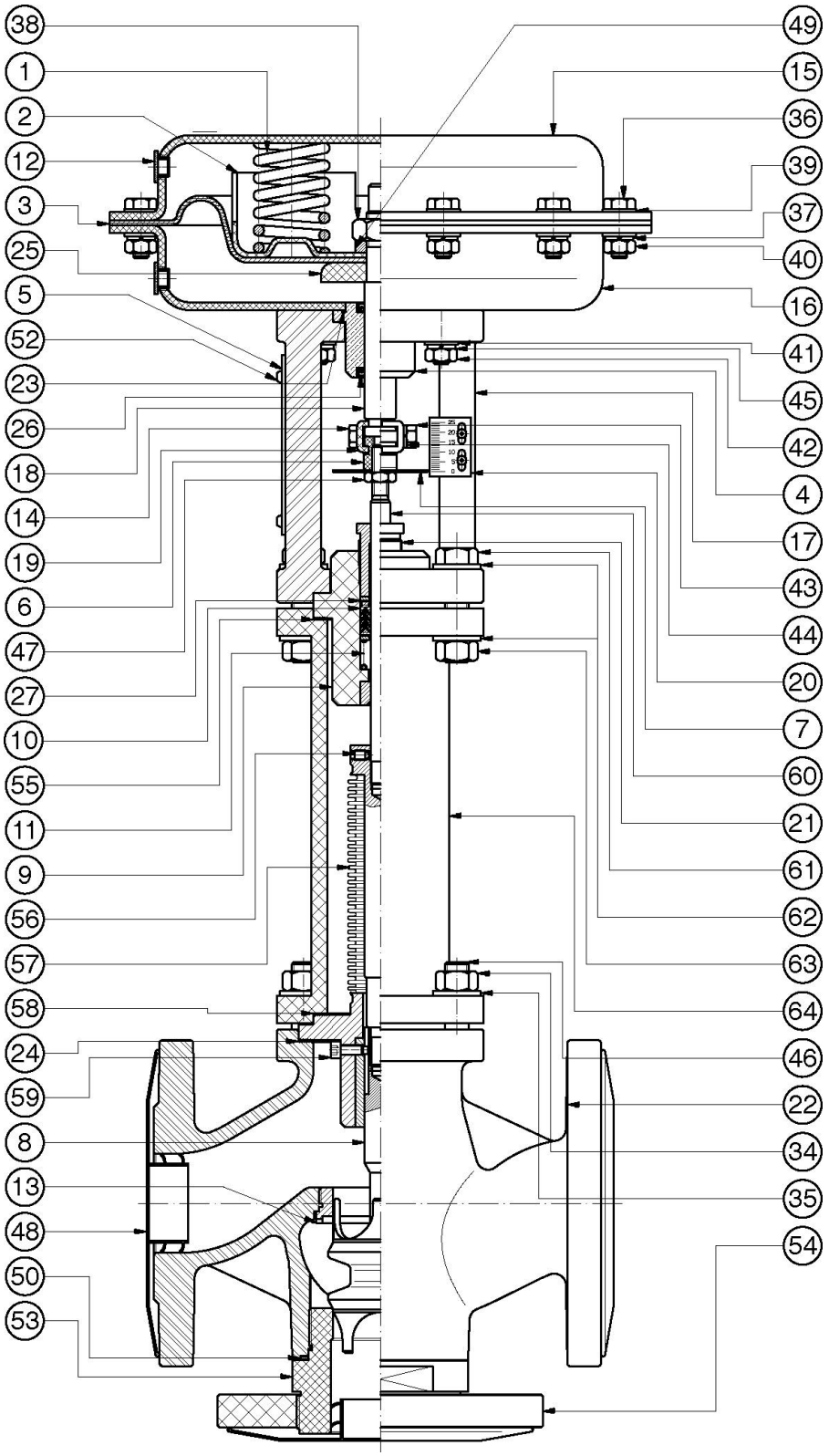
1) Withdraw the adjusting nut (6) from the obturator stem (60).
2) Withdraw the stroke indicator disk (7) and unloosen the nut (47).
3) Unloosen nuts (63), withdraw washers (62) and remove the screws (61) from the mounting (17).
4) Remove the valve mounting (17).
5) Withdraw the intermediate body (9) from the mounting extension (64), remove the gasket (55) from this last.
6) Unloosen the packing gland screw (21). **Caution! The packing gland screw (21) keeps the packing gland spring (11) compressed. Pay attention that the inner components of the intermediate body do not come off once the packing gland screw (21) is no longer compressed.**
7) Withdraw the first packing gland washer (27), the packing gland (10), the second packing gland washer (27) and packing gland spring (11) from the intermediate body (9).
8) Unloosen nuts (34) and withdraw washers (35).
9) Remove the mounting extension (64), then withdraw the gasket (58). Pay attention, while handling the bellows, as it is a very delicate component, when disassembled.
10) Unloosen the grub screw (56) and the obturator stem (60).
11) Blocking the valve body (22), take the intermediate body with bellows and pull until the HSH screw (59) comes out of the valve body; then, unloosen it. Caution! This operation is very delicate and requires a particular care. The bellows is particularly delicate, once it has been disassembled.
12) Withdraw the 3-way bottom (54) and withdraw from it the bottom gasket (51).
13) The obturator (8) can be then disassembled from the intermediate body with bellows (57) and withdraw the obturator from the valve bottom.
14) Withdraw the intermediate body with the bellows (57) from the valve body (22), the remove the gasket (24).
15) At this point the valve body is completely disassembled. The required components can be then replaced.

1.1.39 Re-assembly of 3-way valve body, ND 15 to 80 with bellows

1) Place the gasket (24) into the valve body (22), then place the intermediate body with bellows (57). Pay attention, while handling the bellows, as it is a very delicate component, when disassembled.
2) Inserting the obturator (8) from the valve body bottom, fastened it to the intermediate body with bellow..
3) Blocking the valve body, pull and withdraw the intermediate body with bellows until the crew hole becomes visible, then screw down the HSH cap screw (59) into the intermediate body with bellows. This operation shall be carried out very carefully, as the point of the HSH cap screw (59) shall be perfectly centered into the obturator slot (8). Act on both components in the same time, to get a perfect centering.
4) Place the bottom gasket (50) in the three-way bottom (53), torque tighten it to the valve body (22), as indicated under Table 6.
5) Screw down the obturator stem (60) to the intermediate body with bellows (57). Then, torque tighten the grub screw (56), as indicated under Table 6.
6) Place the gasket (58) and insert the mounting extension (64) on the stud bolts (46).
7) Insert the washers (35) on the stud bolts (46) and torque tighten the nuts (34), as indicated under Table 6.
8) Lubricate the intermediate body (9) with silicone grease.
9) Insert the packing gland spring (11), the packing gland washer (27), the packing gland (10), the second packing gland washer (27) into the intermediate body (9).
10) Screw down the packing gland screw (21) until it protrudes 10 mm from the upper side of the intermediate body. **Caution! The packing gland screw (21) keeps the packing gland spring (11) compressed. Pay attention that the inner components of the intermediate body do not come off once the packing gland screw (21) is no longer compressed.**
11) Place the gasket (55) into the mounting extension.
12) Insert the intermediate body (9) previously assembled on the mounting extension (64) and on the obturator stem (60).

13) Place the valve mounting (17) into the intermediate body (9), positioning the data plate in the direction of the valve body outlet.
14) Insert the first washers (62) on the screws (61), then place the screws into the holes of the valve mounting (17).
15) Insert the remaining washers (62) on the screws (61) and torque tighten the nuts (63), as indicated under Table 6.
16) Screw down the nut (47), insert the indicator disk (7) on the obturator stem, screw down the adjusting nut (6).
17) At this point the valve body is completely assembled and can be reconnected to the servocontrol.

1.1.40 Section Plane – 3-way SBS valve ND 15 to 80 NC with bellows



Dwg. nr. 020386 Rev.:00

Instructions for Disassembly and Assembly of 15 mm Stroke SBS Servocontrol from the Valve Body

Refer to annexed Dwg. Nr. 020387 for the disassembly and assembly operations of the servocontrol for all the SBS valves, ND 100 to 150.
All the disassembly and assembly operations shall be carried out by qualified personnel, adequately equipped for the hydraulic and pneumatic and provided with the proper safety equipment. Before carrying out any operation on systems and valves, get acquainted with operating temperatures and pressures and any other particular conditions.
Whenever operations are to be carried out on valves, remove the fluid completely..
NOTE: Read the procedures thoroughly before starting any operation.

1.1.41 Removal of NC servocontrol from the valve

1) Mark the position of the adjusting nut (6) and the stroke indicator disk (7) in order to reassemble the valve in the original calibration conditions.
2) Unloosen screws (14), remove nuts (43), withdraw washers (44) and remove the connection blocks (19).
3) Screw down the nut (47) in order to remove it from the adjusting nut (6).
4) Screw down the adjusting nut (6) up to align it with the indicator disk (7).
5) Unloosen nuts (70), remove washers (71) and (72) and withdraw the servocontrol with the mounting (17) from the stud bolts (69) of the intermediate body (9).

1.1.42 Removal of NA servocontrol from the valve

1) Mark the position of the adjusting nut (6) and the stroke indicator disk (7) in order to reassemble the valve in the original calibration conditions.
2) Unloosen screws (14), remove nuts (43), withdraw washers (44) and remove the connection blocks (19). When removing the connection blocks (19), the obturator (8) might move downwards and hit against the seat (13). It is then advisable to follow the obturator until it reaches the seat, to prevent any damage to the seal.
3) Screw down the nut (47) in order to remove it from the adjusting nut (6)
4) Screw down the adjusting nut (6) up to align it with the indicator disk (7).
5) Unloosen nuts (70), remove washers (71) and (72) and withdraw the servocontrol with the mounting (17) from the intermediate body (9).

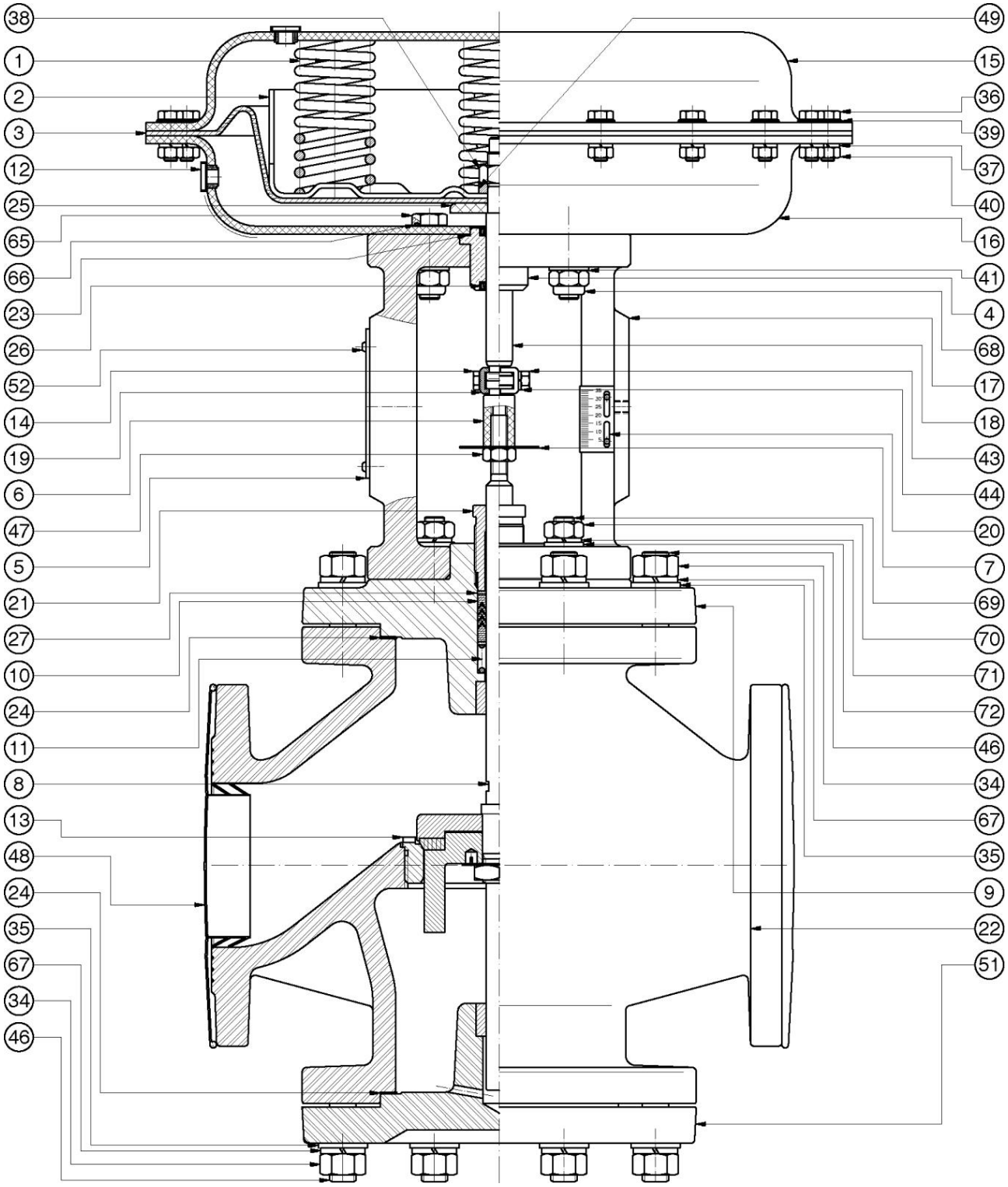
1.1.43 Positioning of NO servocontrol on the valve

1) Position the servocontrol with the valve mounting (17) on the stud bolts (69) of the intermediate body (9), so that the air connections are located on the valve output.
2) Insert washers (72) and (71) on the stud bolts (69).
3) Torque tighten the nuts (70), as indicated under Table 6.
4) Blow air into the servocontrol. **Caution! The servocontrol shaft shall move from its stroke**.
5) Bring again the preloaded adjusting nut (6) into the position previously marked.
6) Torque tighten the nut (47) following the indications of Table 6, keeping the preloaded nut (6) and the indicator disk (7) into their position (7).
7) Remove air from the servocontrol. **Caution! The servocontrol shaft shall move from its stroke.**
8) Fasten the servocontrol shaft and the adjusting nut with the connection blocks (19).
9) Insert screws (14) into the connection blocks (19), and insert washers (44) on screws.
10) Torque tighten nuts (43), following the instructions of Table 6.

1.1.44 Positioning of NO servocontrol on the valve

1) Position the servocontrol with the valve mounting (17) on the stud bolts (69) of the intermediate body (9), so that the air connections are located on the valve output.
2) Insert washers (72) and (71) on the stud bolts (69) of the intermediate body.
3) Torque tighten the nuts (70), as indicated under Table 6.
4) Bring again the preloaded adjusting nut (6) into the position previously marked.
5) Torque tighten the nut (47) following the indications of Table 6, keeping the preloaded nut (6) and the indicator disk (7) into their position (7).
6) Bring the adjusting nut (6) in touch with the servocontrol shaft (18).
7) Fasten the servocontrol shaft and the adjusting nut with the connection blocks (19).
8) Insert screws (14) into the connection blocks (19), and insert washers (44) on screws.
9) Torque tighten nuts (43), following the instructions of Table 6.

Section Plane - 2-way SBS NC Valve ND 100 to 150



Dwg. nr. 020387 Rev.:00

Instructions for Disassembly, Replacement of Gaskets and re-assembly of NC Servocontrols for SBS with 30 mm stroke

Refer to annexed Dwg. Nr. 020279 for the disassembly and assembly operations of the NC servocontrol for all the SBS valves, ND 100 to 150.

All the disassembly and assembly operations shall be carried out by qualified personnel, adequately equipped for the hydraulic and pneumatic and provided with the proper safety equipment. Before carrying out any operation on systems and valves, get acquainted with operating temperatures and pressures and any other particular conditions.

Whenever operations are to be carried out on valves, remove the fluid completely..

NOTE: Read the procedures thoroughly before starting any operation.

Instructions to disassemble and re-assemble the servocontrol from the valve body are described under item 5.15

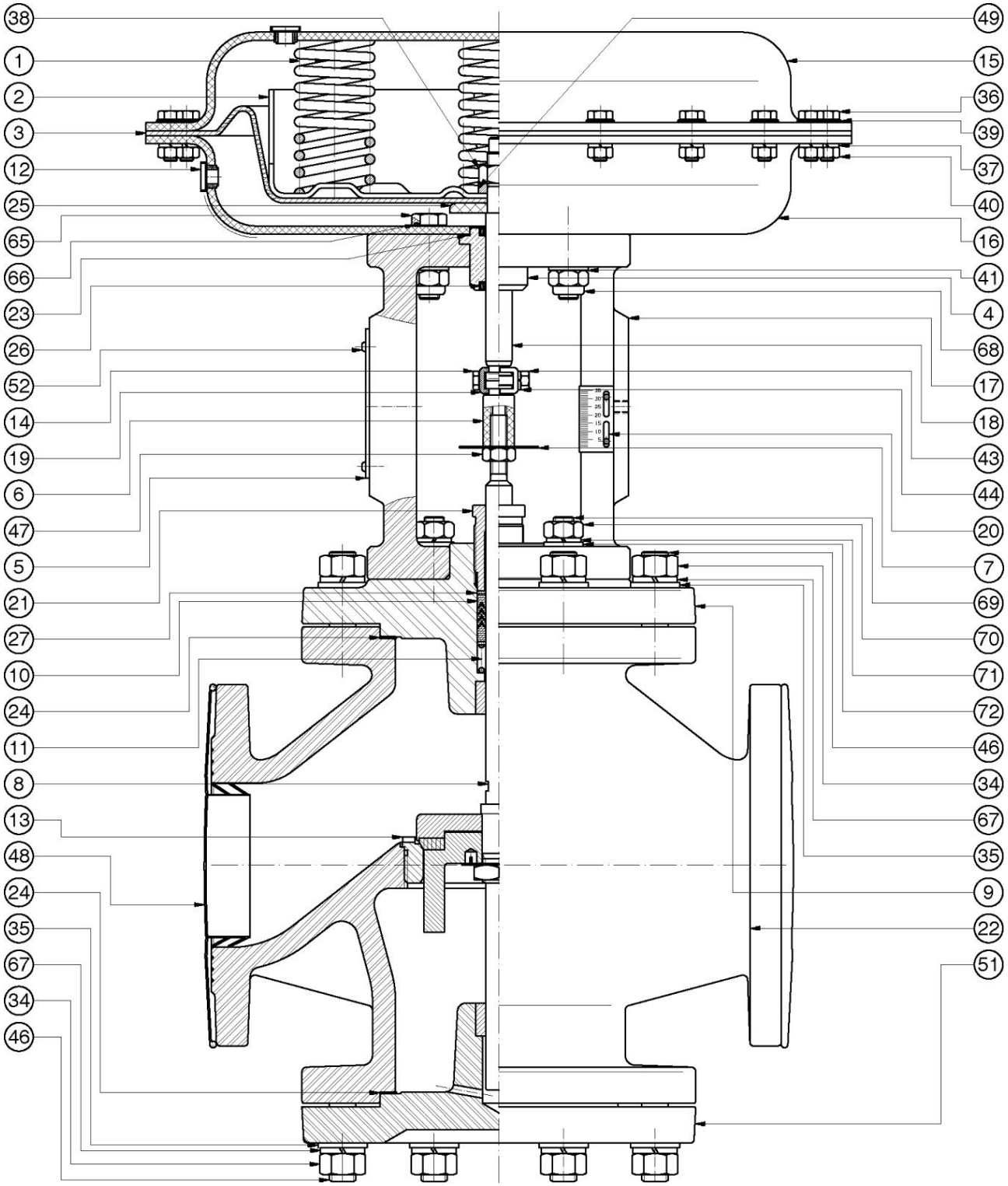
1.1.45 Disassembly of NC servocontrol, ND 100 to 150

1) Withdraw the screws (36) and separate them from nuts (40) from washers (39) and washers (37).
2) **Caution! Some compression springs are located inside the valve servocontrol**: it is necessary to use proper tools to prevent the two heads from suddenly move away from the servocontrol when all the screws (36) are unloosen.
3) Remove the upper head (15).
4) Withdraw the springs of the servocontrol (1).
5) Extract the servocontrol shaft (18) from the lower head (16).
6) Fasten the servocontrol shaft (18) between soft jaws, then unloosen the nut (38).
7) Withdraw the distance ring washer (49), the spring plate (2), the diaphragm (3) and the diaphragm counterdisk (25) from the servocontrol shaft (18).
8) Unloosen self-braking nuts (68), then withdraw the washers (41).
9) Withdraw screws (65) from the lower head, remove OR gaskets from the screws (66).
10) Remove the lower head (16), withdraw the guide bush (4) from the valve mounting (17).
11) Remove the OR gasket (23) and gaskets BA (26) from the guide bush (4).
12) At this point the servocontrol is completely disassembled. The required components can be then replaced.

1.1.46 Re-assembly of NC servocontrol, ND 100 to 150

1) Insert the BA gaskets (26) and OR gasket (23) into the guide bush (4).
2) Then, place the guide bush in the relevant seat of the valve mounting (17).
3) Insert OR gaskets (66) into the screws (65), then place the lower head on the valve mounting, with the air outlets positioned in the direction of the data plate, and insert the screws (65) into the relevant holes.
4) Insert washers (41) on the screws, then screw down the self-braking nuts (68).
5) Fasten the servocontrol shaft (18) between soft jaws, insert on it the diaphragm counterdisk (25), the diaphragm (3), the spring plate (2) and the distance ring washer (49).
6) Screw down and punch the hexagon nut (38).
7) Insert the servocontrol shaft into the lower head (16).
8) Insert the springs (1) into the spring plate (2) positioning them on the bosses present in the spring plate.
9) Place the diaphragm so that the holes for its screws correspond to the holes for the screws of the lower head.
10) Place the upper head (15) so that the holes for the air inlet of the two heads are aligned and the holes for the screws correspond to the holes of the diaphragm and lower head screws.
11) Compress the springs with proper tools in order to make the two heads come closer. **Caution! Make sure that the two heads do not come suddenly off before they are fastened with the screws.**
12) Insert washers (39) into the screws (36), insert the screws (36) into the holes of the upper head (15), insert washers (39) and (37) on the screws (36), torque tighten the hexagonal nuts (40), as indicated in Table 6.
13) The servocontrol is completely assembled and can be placed on the valve body.

1.1.47 Section Plane – 2-way SBS NC Valve ND 100 to 150



Dwg. nr. 020387 Rev.:00

Instructions for Disassembly, Replacement of Gaskets and re-assembly of NO Servocontrols for SBS with 30 mm stroke

Refer to annexed Dwg. Nr. 020388 for the disassembly and assembly operations of the NO servocontrol for all the SBS valves, ND 100 to 150

All the disassembly and assembly operations shall be carried out by qualified personnel, adequately equipped for the hydraulic and pneumatic and provided with the proper safety equipment. Before carrying out any operation on systems and valves, get acquainted with operating temperatures and pressures and any other particular conditions.

Whenever operations are to be carried out on valves, remove the fluid completely..

NOTE: Read the procedures thoroughly before starting any operation.

Instructions to disassemble and re-assemble the servocontrol from the valve body are described under item 5.15

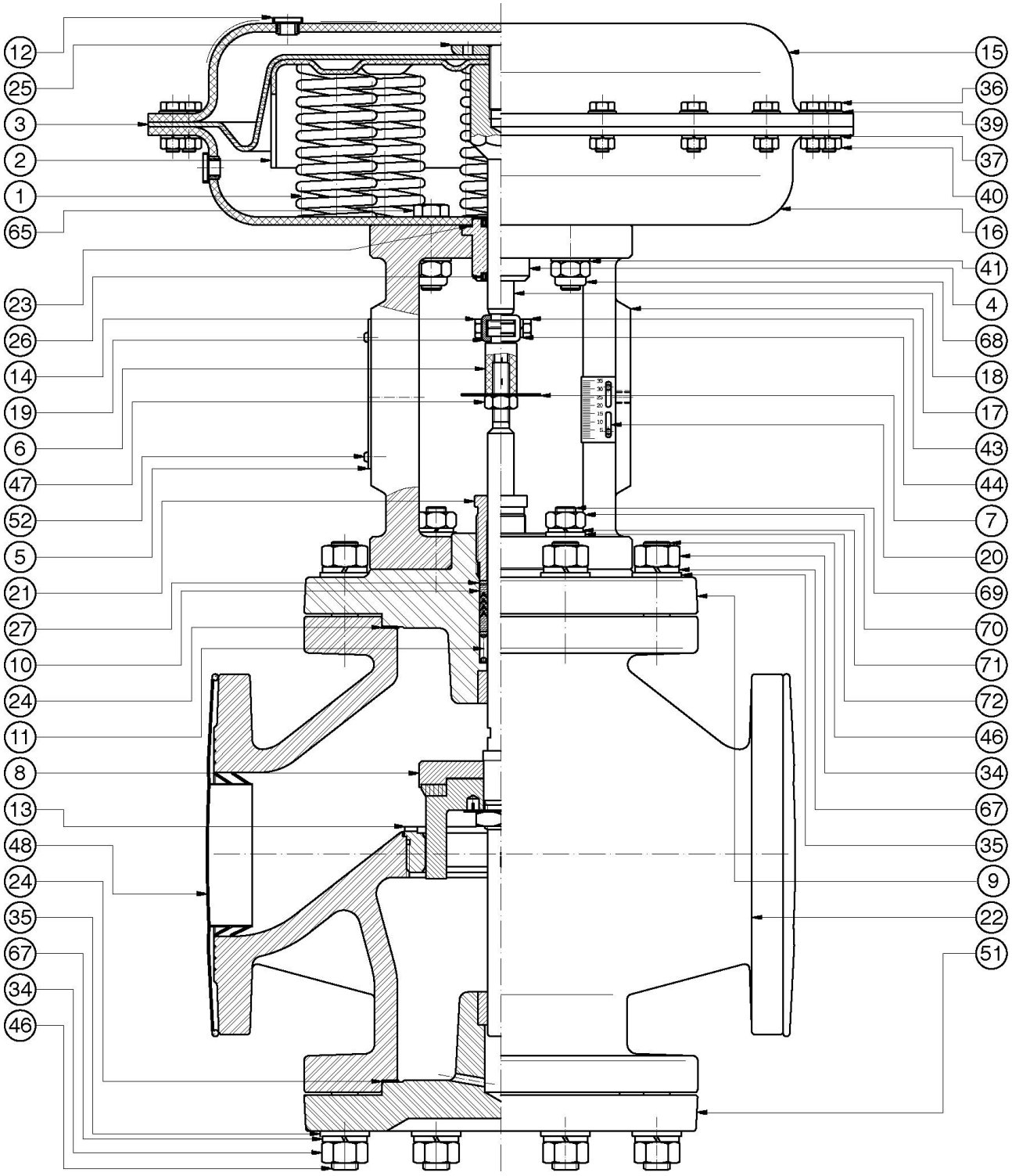
1.1.48 Disassembly of NO servocontrol, ND 100 to 150

1) Withdraw the screws (36) and separate them from nuts (40) from washers (39) and washers (37).
2) **Caution! Some compression springs are located inside the valve servocontrol**: it is necessary to use proper tools to prevent the two heads from suddenly move away from the servocontrol when all the screws (36) are unloosen.
3) Remove the upper head (15).
4) Extract the servocontrol shaft (18) from the lower head (16).
5) Fasten the servocontrol shaft (18) between soft jaws, then unloosen the diaphragm counterdisk (25).
6) Withdraw the diaphragm (3) and the spring plate (2) from the servocontrol shaft (18)..
7) Withdraw the springs of the servocontrol (1).
8) Unloosen self-braking nuts (68), then withdraw the washers (41).
9) Withdraw the screws (65) from the lower head.
10) Remove the lower head (16), withdraw the guide bush (4) from the valve mounting (17).
11) Remove the OR gasket (23) and gaskets BA (26) from the guide bush (4).
12) At this point the servocontrol is completely disassembled. The required components can be then replaced.

1.1.49 Re-assembly of NO servocontrol, ND 100 to 150

1) Insert the BA gaskets (26) and OR gasket (23) into the guide bush (4).
2) Then, place the guide bush in the relevant seat of the valve mounting (17).
3) Then place the lower head on the valve mounting, with the air outlets positioned in the direction of the data plate, and insert the screws (65) into the relevant holes.
4) Insert washers (41) on the screws, then screw down the self-braking nuts (68).
5) Fasten the servocontrol shaft (18) between soft jaws, insert on it the spring plate (2), the diaphragm.
6) Torque tighten the diaphragm counterdisk (25), as indicated under Table 6.
7) Insert the servocontrol shaft into the upper head (15).
8) Insert the springs (1) into the spring plate (2), positioning them into the existing bosses.
9) Place the diaphragm so that the holes for its screws correspond to the holes for the screws of the lower head.
10) Place the lower head (16) with the valve mounting (17), so that the holes for the air inlet of the two heads are aligned and the holes for the screws correspond to the holes of the diaphragm and lower head screws.
11) Compress the springs with proper tools in order to make the two heads come closer. **Caution! Make sure that the two heads do not come suddenly off before they are fastened with the screws.**
12) Insert washers (39) into the screws (36), insert the screws (36) into the holes of the upper head (15), insert washers (39) and (37) on the screws (36), torque tighten the hexagonal nuts (40), as indicated in Table 6.
13) The servocontrol is completely assembled and can be placed on the valve body.

1.1.50 Section Plane – 2-way SBS NO Valve ND 100 to 150



Dwg. nr. 020388 Rev.:00

Instructions for Disassembly, Replacement of Gaskets and re-assembly of NC double-headed Servocontrols for SBS with 30 mm stroke

Refer to annexed Dwg. Nr. 020394 for the disassembly and assembly operations of the NC double-headed servocontrol for all the SBS valves, ND 100 to 150

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All the disassembly and assembly operations shall be carried out by qualified personnel, adequately equipped for the hydraulic and pneumatic and provided with the proper safety equipment. Before carrying out any operation on systems and valves, get acquainted with operating temperatures and pressures and any other particular conditions. Whenever operations are to be carried out on valves, remove the fluid completely..

NOTE: Read the procedures thoroughly before starting any operation.

Instructions to disassemble and re-assemble the servocontrol from the valve body are described under item 5.15

1.1.51 Disassembly of NC double-headed servocontrol, ND 100 to 150

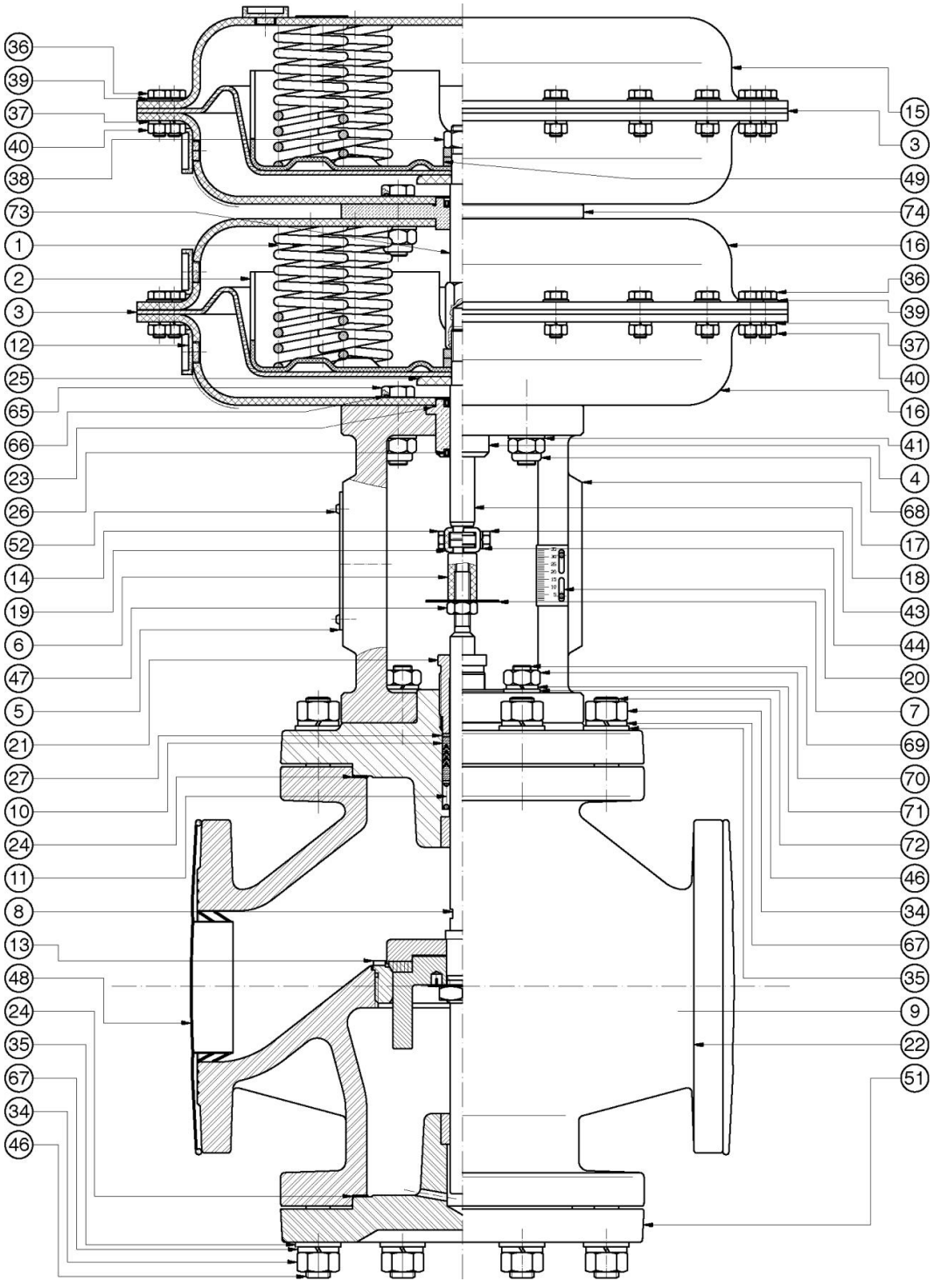
1) Withdraw the screws (36) and separate them from nuts (40) from washers (39) and washers (37).
2) **Caution! Compressed springs are located inside the upper servocontrol**: it is necessary to use proper tools to prevent the two heads from suddenly move away from the servocontrol when all the screws (36) are unloosen.
3) Remove the upper head (15).
4) Withdraw the first series of springs from the servocontrol (1).
5) Unloosen the nut (38).
6) Withdraw the first distance ring washers (49), the first disk plate (2), the first diaphragm (3) and the first diaphragm counterdisk (25) from the servocontrol shaft (73)).
7) Withdraw the screws (36) and separate them from the nuts (40), from the washers (39) and (37) of the lower servocontrol.
8) **Caution! Compressed springs are located inside the lower servocontrol**: it is necessary to use proper tools to prevent the two heads from suddenly move away from the servocontrol when all the screws (36) are unloosen.
9) Remove the two central heads of the servocontrol still fastened with the screws (65).
10) Withdraw the second series of springs (1) from the servocontrol.
11) Remove the two shafts of the servocontrol, still connected, from the lower head (16).
12) Locking the shaft (18), unloosen the stem (73), then remove the second distance ring washers (49), the second spring plate (2), the second diaphragm (3) and the second diaphragm counterdisk (25).
13) Unloosen screws (65) and remove the OR (66), then separate the intermediate heads of the servocontrol (16) from the mounting (17).
14) Remove the distance ring (74) and the guide bush (4), withdraw the BA gaskets (26) and the OR (23) from them.
15) At this point the servocontrol is completely disassembled. The required components can be then replaced.

1.1.52 Re-assembly of NC double-headed servocontrol, ND 100 to 150

1) Insert the BA gaskets (26) and OR gasket (23) into the guide bush (4).
2) Place the guide bush in the relevant seat of the valve mounting (17), place the lower head (16) on the mounting.
3) Insert the OR (66) into the screws (65), insert then the screws into the lower head and screw down the self-braking nuts (68).
4) Insert the diaphragm counterdisk (25), the diaphragm (3), the spring plate (2) and the distance ring washers (49) on the stem (18)
5) Torque tighten the shaft (73) on the stem (18), as indicated under Table 6, insert the stem (18) into the guide bush, so that the holes for the screws of the diaphragm correspond to the holes for the screws of the lower head.
6) Place the first series of springs (1) on the bosses of the first spring plate.
7) House the gasket BA (26) and the gasket OR (23) into the distance ring (74).
8) Interpose the distance ring (74) between the two heads (16).
9) Insert the remaining screws (65), with the OR (66) housed in the relevant seat, into the intermediate heads and screw down the self-braking nuts (68), in order to compact everything.
10) Insert the group of intermediate heads and the distance ring on the shaft (73) so that the holes for the screws of the heads correspond to the holes of the screws of the lower head.
11) Compress the springs with proper tools in order to make the two heads come closer. **Caution! Make sure that the two heads do not come suddenly off before they are fastened with the screws.**
12) Insert washers (39) into the screws (36), insert the screws (36) into the holes of the upper head, insert washers (37) on the screws (36), torque tighten the hexagonal nuts (40), as indicated in Table 6.
13) Insert the second diaphragm counterdisk (25), the second diaphragm (3), the second spring plate (2) and the relevant distance ring washers (49) on the stem (73).
14) Screw down the nut (38). After being screwed down, the nut has to be punched.
15) Place the remaining springs of the servocontrol.

16) Place the upper head (15), so that the holes for the air inlet of the two heads are aligned and the holes for the screws correspond to the holes of the diaphragm and lower head screws.
17) Compress the springs with proper tools in order to make the two heads come closer. **Caution! Make sure that the two heads do not come suddenly off before they are fastened with the screws.**
18) Insert washers (39) into the screws (36), insert the screws (36) into the holes of the upper head (15), insert washers (37) on the screws (36), torque tighten the hexagonal nuts (40), as indicated in Table 6.
19) The servocontrol is completely assembled and can be placed on the valve body.

1.1.53 Section Plane – 2-way SBS NC Valve ND 100 to 150 – double headed



Dwg. nr. 020394 Rev.:00

Instructions for Disassembly, Replacement of Gaskets and re-assembly of NO double-headed Servocontrols for SBS with 30 mm stroke

Refer to annexed Dwg. Nr. 020422 for the disassembly and assembly operations of the NO double-headed servocontrol for all the SBS valves, ND 100 to 150

All the disassembly and assembly operations shall be carried out by qualified personnel, adequately equipped for the hydraulic and pneumatic and provided with the proper safety equipment. Before carrying out any operation on systems and valves, get acquainted with operating temperatures and pressures and any other particular conditions. Whenever operations are to be carried out on valves, remove the fluid completely..

NOTE: Read the procedures thoroughly before starting any operation.

Instructions to disassemble and re-assemble the servocontrol from the valve body are described under item 5.15

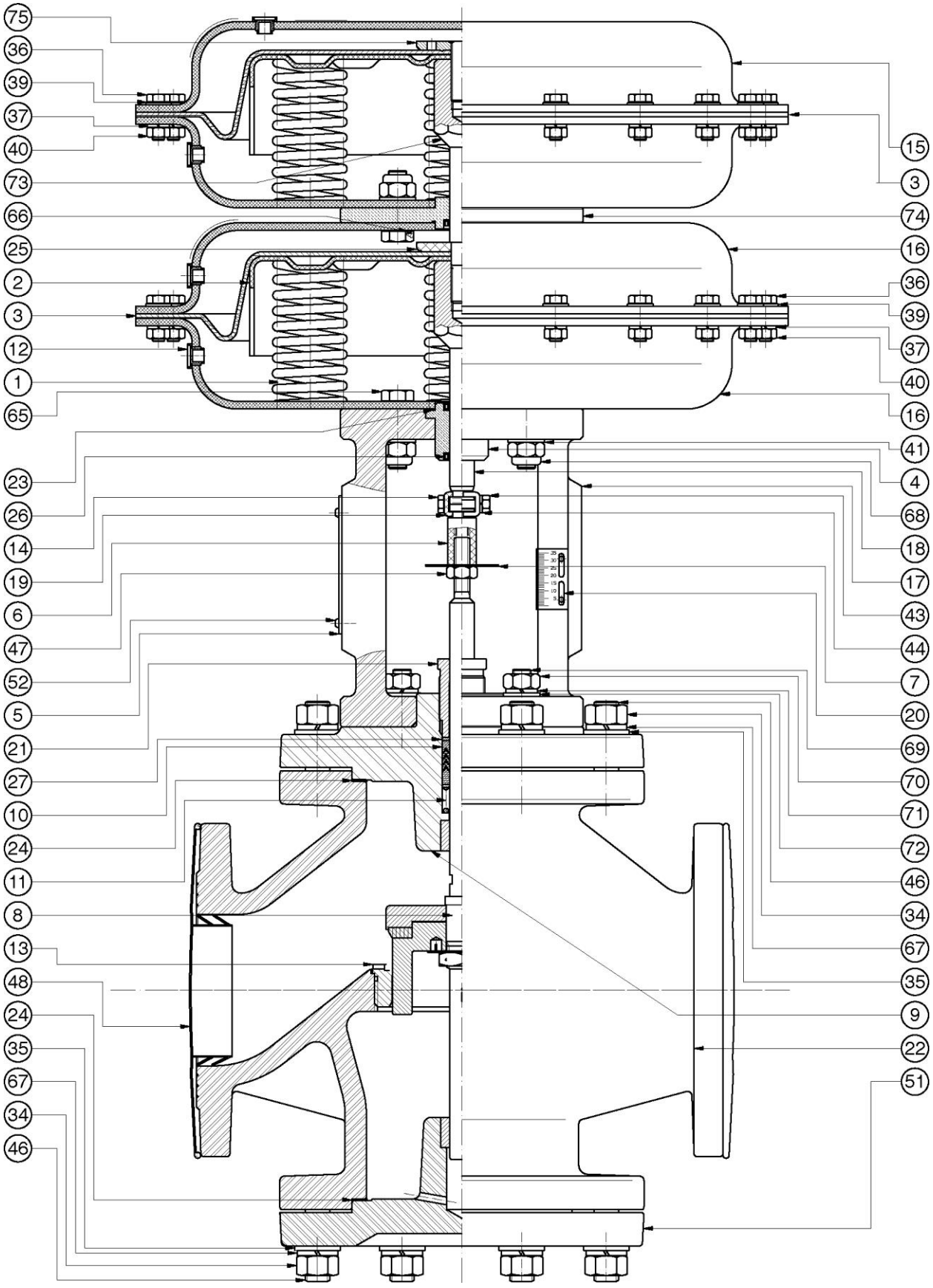
1.1.54 Disassembly of NO double-headed servocontrol, ND 100 to 150

1) Withdraw the screws (36) and separate them from nuts (40) from washers (39) and washers (37).
2) **Caution! Compressed springs are located inside the servocontrols**: it is necessary to use proper tools to prevent the two heads from suddenly move away from the servocontrol when all the screws (36) are unloosen.
3) Remove the upper head (15).
4) Unloosen the diaphragm counterdisk (75).
5) Withdraw the first diaphragm (3), the first spring plate (2) and the first series of springs (1).
6) Withdraw the two stems still connected to the group of intermediate heads and the second series of diaphragm and spring plate.
7) Withdraw the remaining springs (1) from the lower servocontrol.
8) Fasten the servocontrol shaft (18) and unloosen the servocontrol shaft (73), then separate them.
9) Remove the group of intermediate heads.
10) Withdraw the diaphragm counterdisk (25), the second diaphragm (3) and the second spring plate (2).
11) Withdraw all the screws (65) and separate them from the self-braking nuts (68), remove the OR gaskets (66) from the screws.
12) Separate then the two intermediate heads (16) from the distance ring (74) and remove the BA gasket (26) and OR gasket (23) from it.
13) Separate the lower head (16) from the valve mounting (17), remove the guide bush (4) and withdraw the BA gasket (26) and OR gasket (23) from it.
14) At this point the servocontrol is completely disassembled. The required components can be then replaced.

1.1.55 Re-assembly of NC servocontrol, ND 100 to 150

1) Insert the BA gaskets (26) and OR gasket (23) into the guide bush (4).
2) Place the guide bush in the relevant seat of the valve mounting (17).
3) Place the lower head (16) on the valve mounting.
4) Insert the OR (66) into the screws (65), insert then the screws into the lower head and screw down the self-braking nuts (68).
5) House the gasket BA (26) and the gasket OR (23) into the distance ring (74).
6) Place the two intermediate heads (16) with the distance ring between them (74); place the air inlet holes on the same vertical line.
7) Fasten the head group with the screws (65), provided with OR (66) and self-braking nuts (68).
8) Insert the servocontrol shaft (73) into the distance ring, insert the diaphragm counterdisk (25), the diaphragm (3) and the spring plate (2) on it, then torque tighten the servocontrol shaft (18), as indicated under Table 6.
9) Place the springs (1) on the lower head (16), then insert the servocontrol stem (18) into the guide bush (4). In this phase, the springs (1) are to be centered on the spring plate bosses (2).
10) Place the springs (1) into the intermediate head of the upper head, place the spring plate so that the springs are placed on the centering bosses of the spring plate.
11) Insert then the diaphragm (3) and place it so that the holes for the screws correspond to the holes of the lower diaphragm.
12) Torque tighten the diaphragm counterdisk (75).
13) Place the upper head (15), so that the holes for the air inlet are on the same vertical line.
14) Compress the springs with propre tools in order to make the two heads come closer. **Caution! Make sure that the two heads do not come suddenly off before they are fastened with the screws.**
15) Insert washers (39) into the screws (36), insert the screws (36) into the holes of the upper head (15), insert washers (39) and (37) on the screws (36), torque tighten the hexagonal nuts (40), as indicated in Table 6. This operation shall be carried out for the two head groups.
16) The servocontrol is completely assembled and can be placed on the valve body.

1.1.56 Section Plane – 2-way SBS NO Valve ND 100 to 150 – double headed



Dwg. nr. 020422 Rev.:00

Instructions for Disassembly, Replacement of Gaskets and Re-assembly of 2-way SBS Valve Bodies - ND 100 to 150

Refer to annexed Dwg. Nr. 020387 for the disassembly and assembly operations of the 2-way SBS valve body - ND 100 to 150.

All the disassembly and assembly operations shall be carried out by qualified personnel, adequately equipped for the hydraulic and pneumatic and provided with the proper safety equipment. Before carrying out any operation on systems and valves, get acquainted with operating temperatures and pressures and any other particular conditions.

Whenever operations are to be carried out on valves, remove the fluid completely..

NOTE: Read the procedures thoroughly before starting any operation.

Instructions to disassemble and re-assemble the servocontrol from the valve body are described under item 5.15

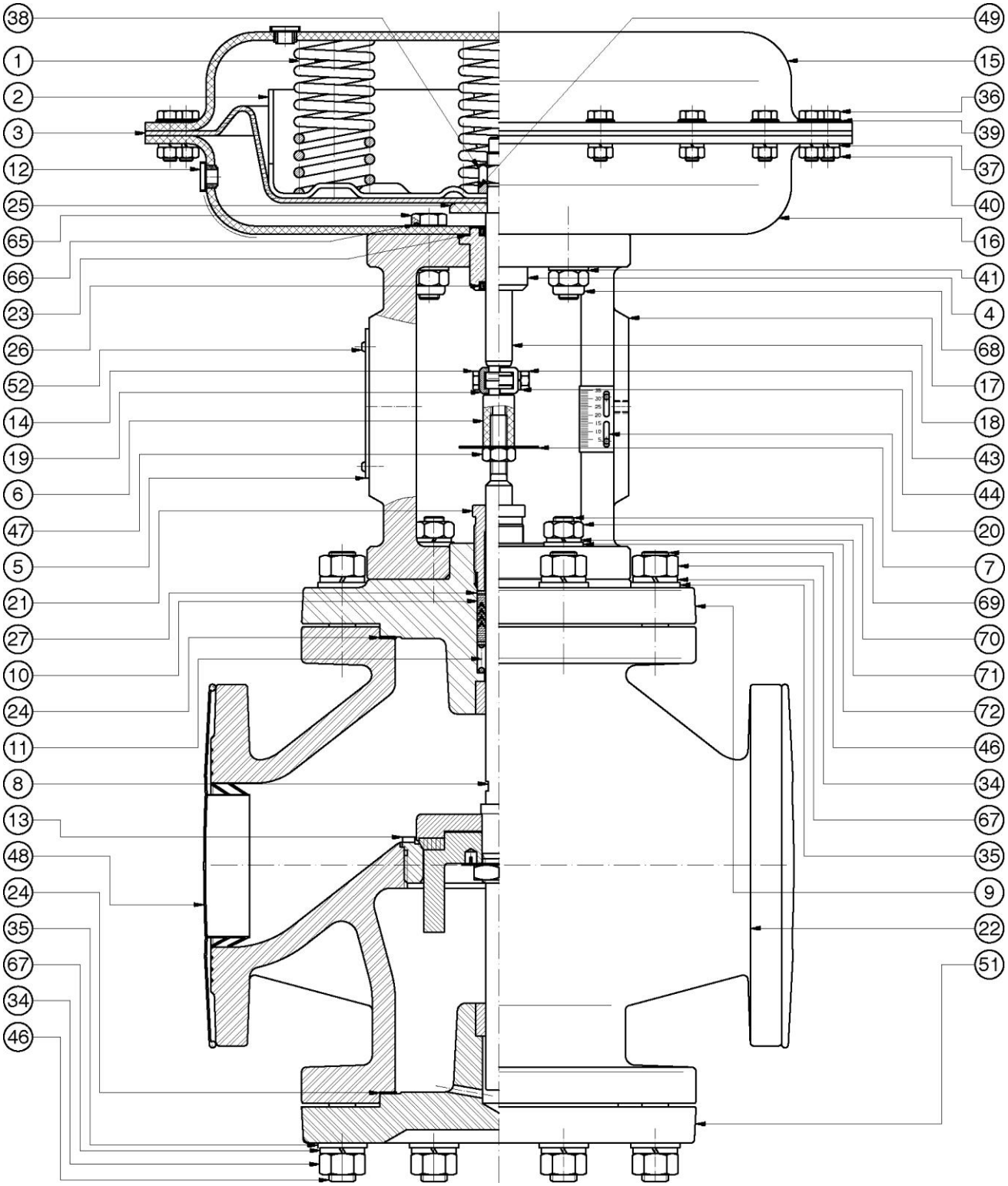
1.1.57 Disassembly of 2-way valve body, ND 100 to 150

1) Unloosen the preloaded adjusting nut (6), withdraw the stroke indicator disk (7) and the hexagonal nut (47).
2) Withdraw the nuts (34) of the intermediate body (9), withdraw then washers (67) and washers (35).
3) Withdraw the intermediate body (9).
4) Remove the body gasket (24) from the valve body.
5) Unloosen the packing gland screw (21). **Caution! The packing gland screw (21) keeps the packing gland spring (11) compressed. Pay attention that the inner components of the intermediate body do not come off once the packing gland screw (21) is no longer compressed.**
6) Withdraw the first packing gland washer (27), the packing gland (10), the second packing gland washer (27) and packing gland spring (11) from the intermediate body.
7) Withdraw the obturator (8) from the valve body (22).
8) Unloosen the nuts (34) of the bottom (51), withdraw then washers (67) and (35).
9) Remove the bottom (51) and the body gasket (24).
10) At this point the valve body is completely disassembled. The required components can be then replaced.

1.1.58 Re-assembly of 2-way valve bodies, ND 100 to 150

1) Place the body gasket (24) in the lower seat of the body valve (22).
2) Insert the bottom (51) on the lower stud bolts (46).
3) Insert the washers (35) and (67) on the stud bolts, then torque tighten the nuts (34) as indicated under Table 6.
4) Insert the obturator (8) on the valve body (22).
5) Insert the packing gland spring (11), the packing gland washer (27), the packing gland (10), the second packing gland washer (27) into the intermediate body (9).
6) Screw down the packing gland screw (21) until it protrudes 10 mm from the upper side of the intermediate body. **Caution! The packing gland screw keeps the packing gland spring compressed. Pay attention that the components located on the spring do not come off during the assembly.**
7) Insert the intermediate body on the obturator stem and on the stud bolts of the valve body.
8) Insert the washers (35) and (67) on the stud bolts (46) of the valve body, then torque tighten the nuts (34) as indicated under Table 6.
9) Screw down the hexagonal nut (47), insert the indicator disk (7), then screw down the preloaded adjusting nut (6).
10) At this point the valve body is completely assembled and can be reconnected to the servocontrol.

Section Plane – 2-way SBS NC Valve ND 100 to 150



Dwg. nr. 020387 Rev.:00

Instructions for Disassembly, Replacement of Gaskets and Re-assembly of 3-way SBS Valve Bodies – ND 100 to 150

Refer to annexed Dwg. Nr. 020433 for the disassembly and assembly operations of the 3-way SBS valve body - ND 100 to 150.

All the disassembly and assembly operations shall be carried out by qualified personnel, adequately equipped for the hydraulic and pneumatic and provided with the proper safety equipment. Before carrying out any operation on systems and valves, get acquainted with operating temperatures and pressures and any other particular conditions.

Whenever operations are to be carried out on valves, remove the fluid completely..

NOTE: Read the procedures thoroughly before starting any operation.

Instructions to disassemble and re-assemble the servocontrol from the valve body are described under item 5.15

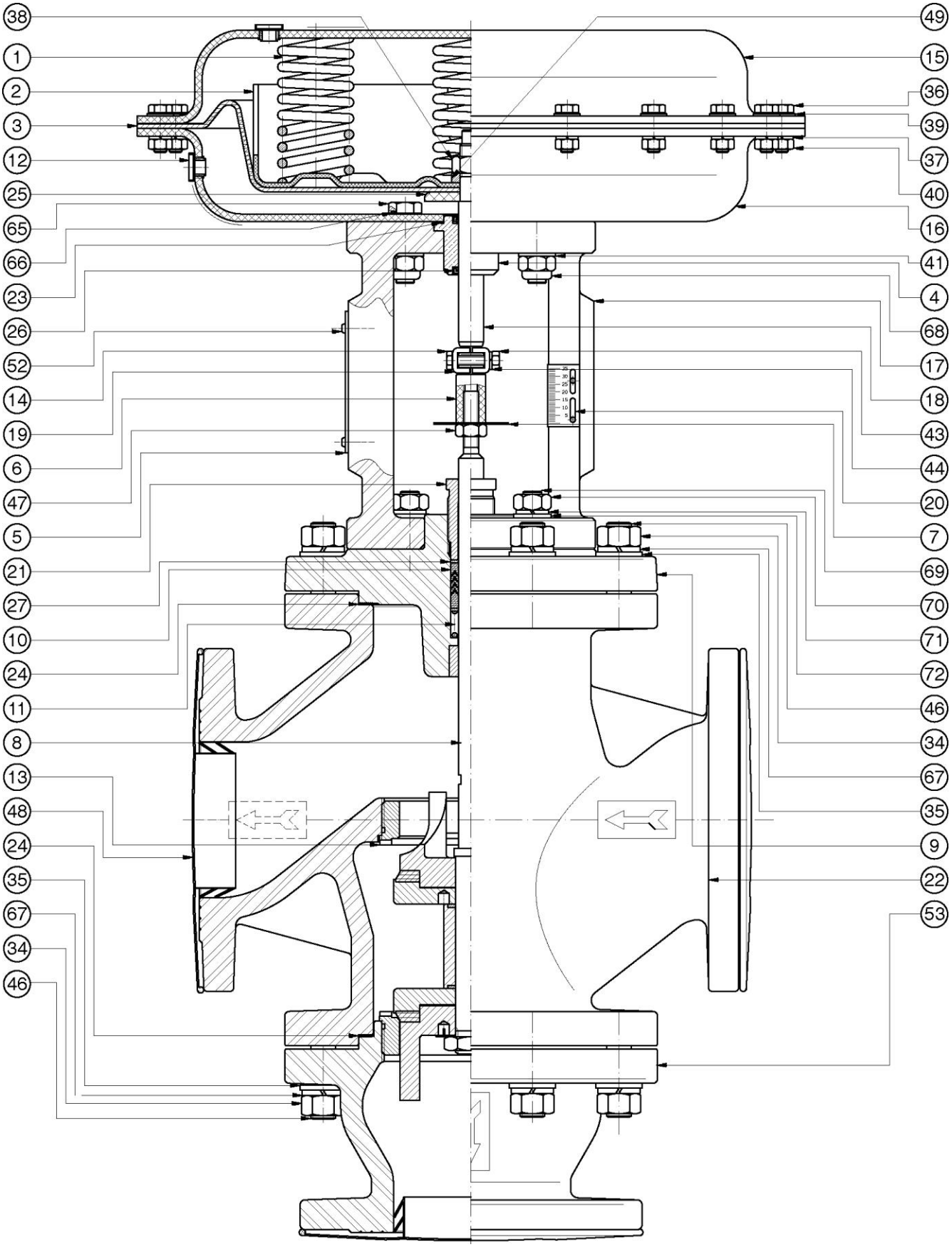
1.1.59 Disassembly of 3-way SBS Valve Bodies ND 100 to 150

1) Withdraw the preloaded adjusting nut (6), withdraw the stroke indicator disk (7) and withdraw the hexagonal nut (47).
2) Withdraw the nuts (34) of the intermediate body (9), withdraw then washers (67) and washers (35).
3) Withdraw the intermediate body (9) from the valve body (22) and remove the body gasket (24).
4) Unloosen the nuts (34) of the three-way bottom body (53), then withdraw washers (67) and washers (35).
5) Withdraw the bottom (53) and the body gasket (24).
6) Withdraw the obturator (8) from the valve body (22).
7) Unloosen the packing gland screw (21). **Caution! The packing gland screw (21) keeps the packing gland spring (11) compressed. Pay attention that the inner components of the intermediate body do not come off once the packing gland screw (21) is no longer compressed.**
8) Withdraw the first packing gland washer (27), the packing gland (10), the second packing gland washer (27) and packing gland spring (11) from the intermediate body.
9) At this point the valve body is completely disassembled. The required components can be then replaced.

1.1.60 Re-assembly of 3-way SBS Valve Bodies ND 100 to 150

1) Insert the obturator (8) on the valve body (22).
2) Place the body gasket (24) in the lower seat of the body valve (22).
3) Insert the bottom (53) on the stud bolts (46).
4) Insert the washers (35) and (67) on the stud bolts, then torque tighten the nuts (34) as indicated under Table 6.
5) Insert the packing gland spring (11), the packing gland washer (27), the packing gland (10), the second packing gland washer (27) into the intermediate body (9).
6) Screw down the packing gland screw (21) until it protrudes 10 mm from the upper side of the intermediate body. **Caution! The packing gland screw keeps the packing gland spring compressed. Pay attention that the components located on the spring do not come off during the assembly.**
7) Insert the intermediate body on the obturator stem and on the stud bolts of the valve body.
8) Insert the washers (35) and (67) on the stud bolts (46) of the valve body, then torque tighten the nuts (34) as indicated under Table 6.
9) Screw down the hexagonal nut (46), insert the indicator disk (7), then screw down the preloaded adjusting nut (6).
10) At this point the valve body is completely assembled and can be reconnected to the servocontrol.

1.1.61 Section Plane – 2-way SBS NC Valve ND 100 to 150



Dwg. nr. 020433 Rev.:00

Instructions for Disassembly, Replacement of Gaskets and Re-assembly of 2-way SBS Valve Bodies - ND 100 to 150 with bellows

Refer to annexed Dwg. Nr. 020435 for the disassembly and assembly operations of the 2-way SBS valve body - ND 100 to 150 with bellows.

All the disassembly and assembly operations shall be carried out by qualified personnel, adequately equipped for the hydraulic and pneumatic and provided with the proper safety equipment. Before carrying out any operation on systems and valves, get acquainted with operating temperatures and pressures and any other particular conditions.

Whenever operations are to be carried out on valves, remove the fluid completely..

NOTE: Read the procedures thoroughly before starting any operation.

Instructions to disassemble and re-assemble the servocontrol from the valve body are described under item 5.15

1.1.62 Disassembly of 2-way valve body, ND 100 to 150 with bellows

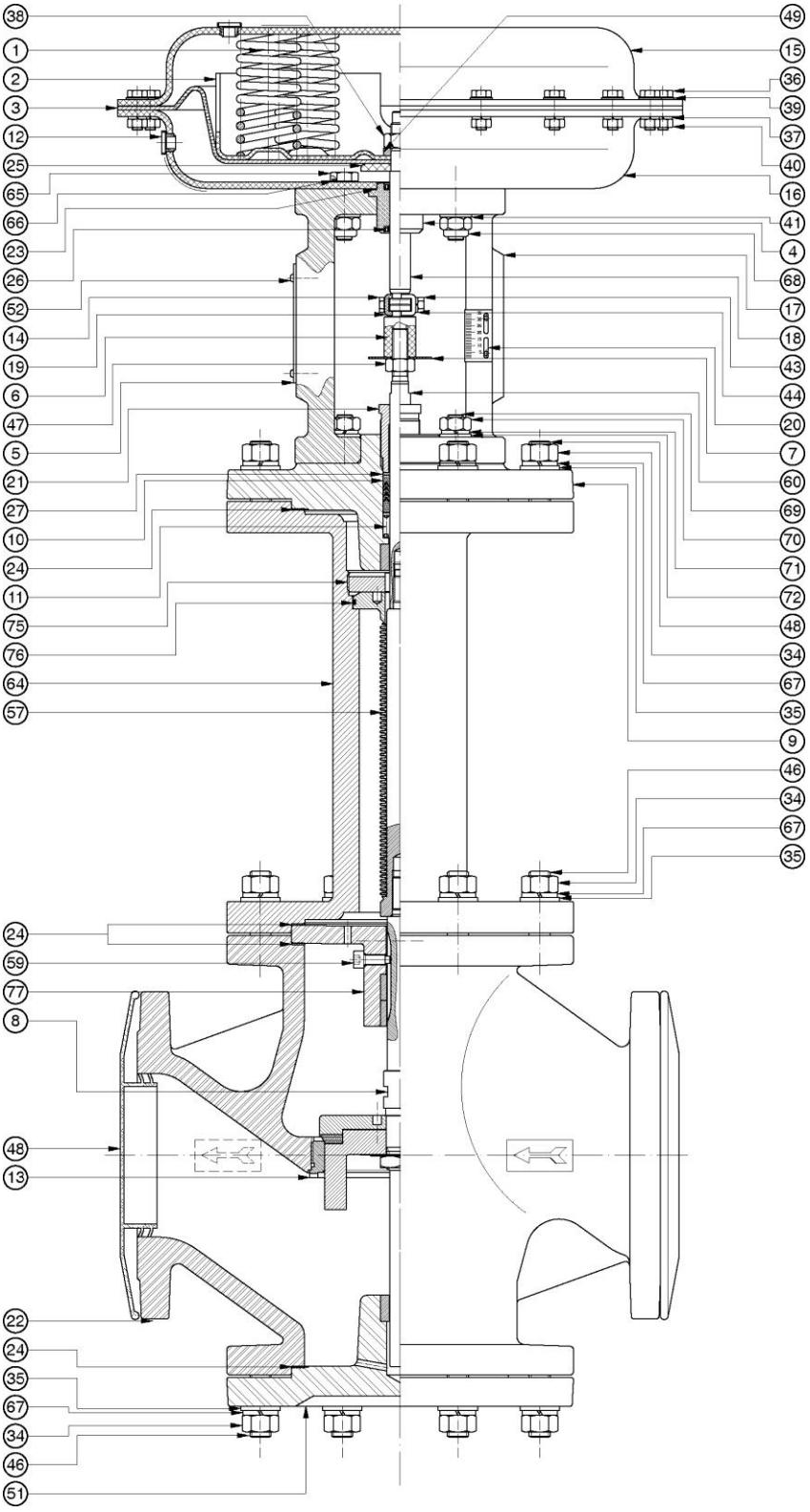
1) Withdraw the preloaded adjusting nut (6), withdraw the stroke indicator disk (7) and withdraw the hexagonal nut (47).
2) Withdraw the nuts (34) of the intermediate body (9), withdraw then washers (67) and washers (35).
3) Withdraw the intermediate body (9).
4) Withdraw the body gasket (24) from the mounting extension (64).
5) Unloosen the packing gland screw (21). **Caution! The packing gland screw (21) keeps the packing gland spring (11) compressed. Pay attention that the inner components of the intermediate body do not come off once the packing gland screw (21) is no longer compressed.**
6) Withdraw the first packing gland washer (27), the packing gland (10), the second packing gland washer (27) and packing gland spring (11) from the intermediate body.
7) Unloosen and remove the obturator stem (60) from the intermediate body with bellows (57).
8) Unloosen the nuts (34) of the mounting extension (64), withdraw then washers (67) and (35).
9) Remove the mounting extension, with bellows and obturator still assembled.
10) Remove the body gasket (24) which is the most distant from the valve body (22).
11) Unscrew the HSH cap screw (59). Then withdraw the obturator. Pay attention while handling the bellows, as it is a very delicate component when it is not assembled. To keep steady the stem inside the bellows, do not torque the bellows. It is possible to counterbalance the disassembly torque keeping the stem (57) steady by means of a screwdriver with a proper slot made on the upper side of the bellows stem (57).
12) Remove the intermediate body (77) and the body gasket (24) from the mounting extension seat.
13) Unscrew the bellows fastening nut (75), then separate the intermediate with bellows (57) from the mounting extension and remove the OR gasket (76) from it.
14) Unloosen the nuts (34) of the bottom (51), then withdraw washers (67) and (35).
15) Remove the bottom (51) and the body gasket (24).
16) At this point the valve body is completely disassembled. The required components can be then replaced.

1.1.63 Re-assembly of 3-way valve body, ND 100 to 150 with bellows

1) Place the body gasket (24) in the lower seat of the valve body (22).
2) Insert the bottom (51) on the stud bolts (46).
3) Insert the washers (35) and (67) on the stud bolts, then torque tighten the nuts (34) as indicated under Table 6.
4) Insert the OR gasket (76) into the relevant seat of the intermediate body with bellows (57). Pay attention while handling the bellows, as it is a very delicate component when it is not assembled.
5) Insert the intermediate body with bellows into the mounting extension (64).
6) Place the body gasket (24) and the intermediate body (77) into the mounting extension seat.
7) Screw down the obturator (8) to the intermediate body with bellows (57), then fasten it with a HSH screw (59).
8) Torque tighten the bellows fastening nut (75) and the obturator stem (60) as indicated under Table 6.
9) Place the body gasket (24) into the upper seat of the valve body (22).
10) Introduce the obturator (8) into the valve body, together with bellows and mounting extension.
11) Insert the washers (35) and (67) on the stud bolts (46) of the valve body, then torque tighten the nuts (34) as indicated under Table 6.
12) Insert the packing gland spring (11), the packing gland washer (27), the packing gland (10), the second packing gland washer (27) into the intermediate body (9).
13) Screw down the packing gland screw (21) until it protrudes 10 mm from the upper side of the intermediate body. **Caution! The packing gland screw keeps the packing gland spring compressed. Pay attention that the components located on the spring do not come off during the assembly.**
14) Insert the intermediate body on the obturator stem and on the stud bolts of the valve body.

15) Insert the washers (35) and (67) on the stud bolts (46) of the valve body, then torque tighten the nuts (34) as indicated under Table 6.
16) Screw down the hexagonal nut (46), insert the indicator disk (7), then screw down the preloaded adjusting nut (6)..
17) At this point the valve body is completely assembled and can be reconnected to the servocontrol.

1.1.64 Section Plane – 2-way SBS NC Valve ND 100 to 150 with bellows



Dwg. nr. 020435 Rev.:00

Instructions for Disassembly, Replacement of Gaskets and Re-assembly of 3-way SBS Valve Bodies - ND 100 to 150 with bellows

Refer to annexed Dwg. Nr. 020435 for the disassembly and assembly operations of the 2-way SBS valve body - ND 100 to 150 with bellows.

All the disassembly and assembly operations shall be carried out by qualified personnel, adequately equipped for the hydraulic and pneumatic and provided with the proper safety equipment. Before carrying out any operation on systems and valves, get acquainted with operating temperatures and pressures and any other particular conditions. Whenever operations are to be carried out on valves, remove the fluid completely..

NOTE: Read the procedures thoroughly before starting any operation.

Instructions to disassemble and re-assemble the servocontrol from the valve body are described under item 5.15

1.1.65 Disassembly of 2-way valve body, ND 100 to 150 with bellows

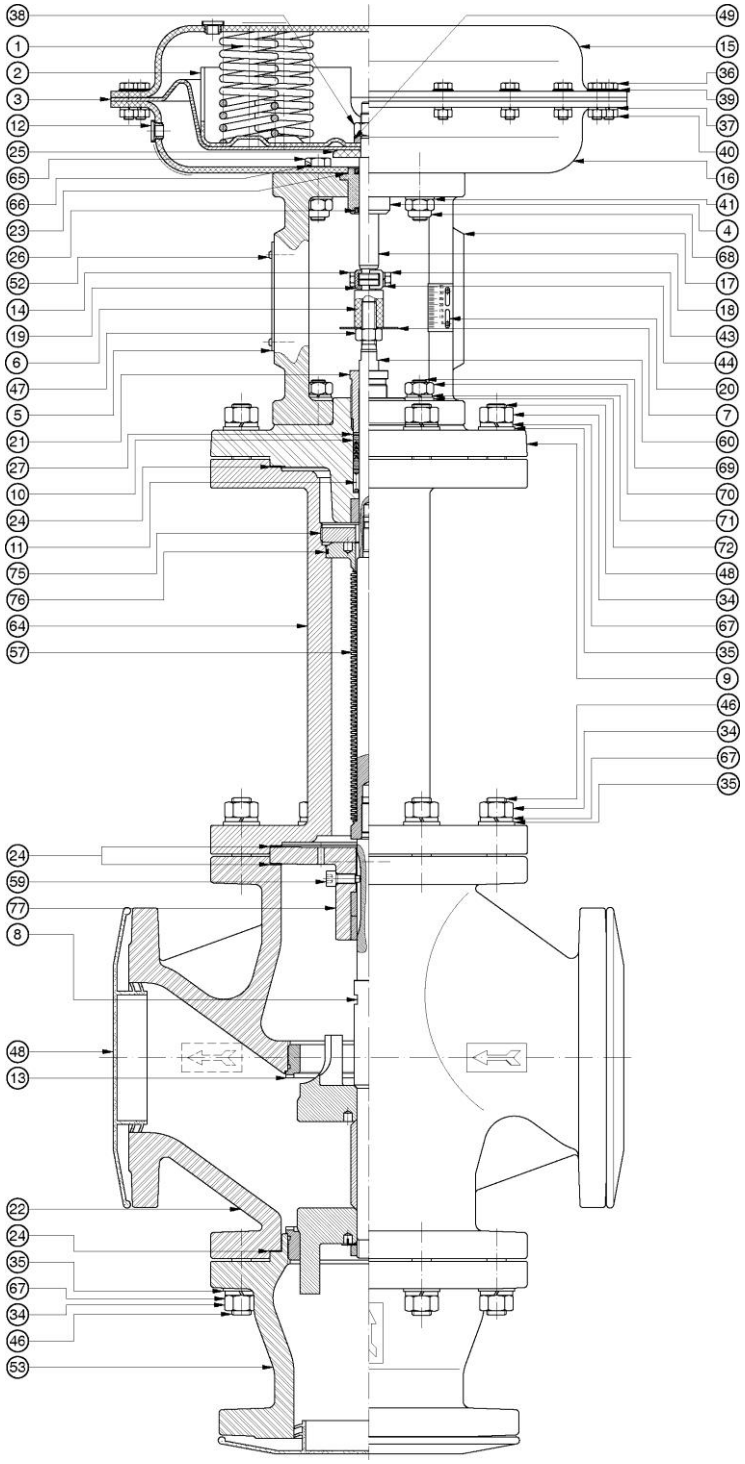
1) Withdraw the preloaded adjusting nut (6), withdraw the stroke indicator disk (7) and withdraw the hexagonal nut (47).
2) Withdraw the nuts (34) of the intermediate body (9), withdraw then washers (67) and washers (35).
3) Withdraw the intermediate body (9) and withdraw the body gasket (24) from the mounting extension (64).
4) Unloosen the packing gland screw (21). **Caution! The packing gland screw (21) keeps the packing gland spring (11) compressed. Pay attention that the inner components of the intermediate body do not come off once the packing gland screw (21) is no longer compressed.**
5) Withdraw the first packing gland washer (27), the packing gland (10), the second packing gland washer (27) and packing gland spring (11) from the intermediate body.
6) Unloosen and remove the obturator stem (60) from the intermediate body with bellows (57).
7) Unloosen the nuts (34) of the mounting extension (64), withdraw then washers (67) and (35).
8) Lift the mounting extension (64) and the intermediate body (77), with bellows and obturator still assembled, until the HSH cap screw (59) comes out and can then be unscrewed. Pay attention while handling the bellows, as it is a very delicate component when it is not assembled.
9) Unloosen the nuts (34) of the three-way bottom (53); then withdraw washers (67) and (35).
10) Remove the three- way bottom (53) and the body gasket (24).
11) Withdraw the obturator (8) from the intermediate body with bellows (57). To keep steady the stem inside the bellows, do not torque the bellows. It is possible to counterbalance the disassembly torque keeping the stem (57) steady by means of a screwdriver with a proper slot made on the upper side of the bellows stem (57).
12) Remove the mounting extension with the bellows still assembled.
13) Remove the body gasket (24) from the mounting extension (64), remove the intermediate body (77) and the body gasket (24) from the valve body (22).
14) Unscrew the bellows fastening nut (75), then separate the intermediate with bellows (57) from the mounting extension.
15) Remove the OR gasket (76) from the intermediate body with bellows.
16) At this point the valve body is completely disassembled. The required components can be then replaced.

1.1.66 Re-assembly of 2-way valve body, ND 100 to 150 with bellows

1) Insert the OR gasket (76) into the relevant seat of the intermediate body with bellows (57). Pay attention while handling the bellows, as it is a very delicate component when it is not assembled.
2) Insert the intermediate body with bellows into the mounting extension (64).
3) Screw down the HSH screw (59) into the intermediate body (77).
4) Place the body gasket (24) into the upper seat of the valve body (22).
5) Place the intermediate body (77) into the valve body (22), then place the body gasket (24) on the intermediate body.
6) Insert the mounting extension, together with the bellows, on the intermediate body (77) and on the stud bolts (46).
7) Torque tighten the obturator (8) to the intermediate with bellows.
8) Lift the mounting extension and the intermediate body (77) until the HSH cap screw (59) comes out,. then screw it down paying attention that the screw enters the milling of the obturator stem.
9) Insert the washers (35) and (67) on the stud bolts (46) of the valve body, then torque tighten the nuts (34) as indicated under Table 6.
10) Torque tighten the bellows fastening nut (75) and the obturator stem (60), as indicated under Table 6.
11) Place the body gasket (24) into the lower seat of the valve body (22).
12) Insert the three-way bottom (53) on the stud bolts (46).
13) Insert the washers (35) and (67) on the stud bolts (46) of the valve body, then torque tighten the nuts (34) as indicated under Table 6.
14) Insert the packing gland spring (11), the packing gland washer (27), the packing gland (10), the second packing gland washer (27) into the intermediate body (9).

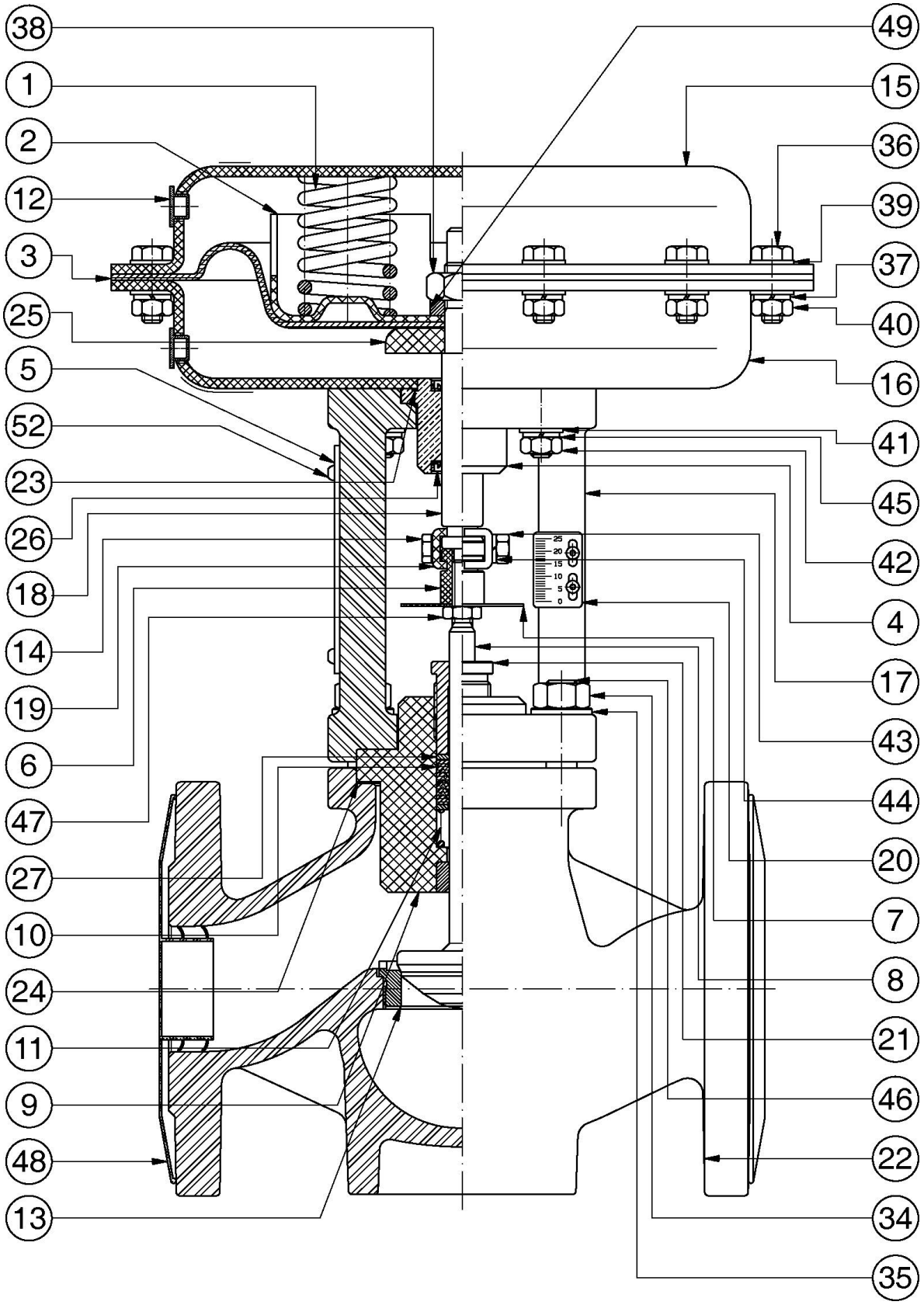
15) Screw down the packing gland screw (21) until it protrudes 10 mm from the upper side of the intermediate body. **Caution! The packing gland screw keeps the packing gland spring compressed. Pay attention that the components located on the spring do not come off during the assembly.**
16) Place the body gasket (24) into the upper seat of the mounting extension (64).
17) Insert the intermediate body on the obturator stem and on the stud bolts of the valve body.
18) Insert the washers (35) and (67) on the stud bolts (46) of the mounting extension, then torque tighten the nuts (34) as indicated under Table 6
19) Screw down the hexagonal nut (46), insert the indicator disk (7), then screw down the preloaded adjusting nut (6).
20) At this point the valve body is completely assembled and can be reconnected to the servocontrol.

1.1.67 Section Plane – 3-way SBS NC Valve ND 100 to 150 with bellows



Dwg. nr. 020434 Rev.:00

Section Plane – 2-way SBS Valve NC ND 15 to 50 NC



Dwg. nr. 020279 Rev.:01

Details and Spare Parts of SBS NC Servocontrols - 15 mm stroke

Part Nr.	Q.ty	DESCRIPTION	MATERIAL	GROUP	CODES			
					SERV Ø 200	SERV Ø 275	SERV Ø 360	SERV Ø 430
1	□	Servocontrol spring	Phosphate steel	552	SEE TABLE 5 PAGE 84			
2	1	Spring plate	Fe 360	591	PPMD86250	PPMD86248	PPMD86249	PPMD86247
3	1	Diaphragm	NBR	584	1425	1426	1714	1715
4	1	Guide bush	Brass	581	BGD086114			
5	1	Rating plate	Polyester	506	ERD086150			
12	2	EP/400 threaded caps	Polyethylene	505	TEP400G018	TEP400G014		
14	2	Hexagon head screw	Fe 360	607	VTE0630FE			
15	1	Upper head	Fe 360	592	TSD086200	TSD086207	TSD086203	TSD086210
16	1	Lower head	Fe 360	592	TSD086201	TSD086208	TSD086204	TSD086211
18	1	Servocontrol shaft	AISI 304	561	ASD086120	ASD086121		ASD086122
19	2	Connection block	Fe 360	593	BVD086251			
23	1	O-Ring gasket	GACO	548	OR02137GA			
25	1	Diaphragm counterdisk	Fe 360	557	CDD086117	CDD086118		CDD086119
26	2	BA gasket	GACO	567	BA0016244			
36	□□	Hexagon head screw	Fe 360	607	VTE0620FE	VTE0825FE		
37	□□	Spring washer	Fe 360	610	RE06000FE	RE08000FE		
38	1	Hexagon nut	Fe 360	608	D1005588F	D1405588F		
39	□□□	Flat washer	Fe 360	609	RP06000FE	RP08000FE		
40	□□	Hexagon nut	Fe 360	608	D0605588F	D0805588F		
41	4	Flat washer	Fe 360	609	RP08000FE			
42	4	Hexagon nut	Fe 360	608	D0805588F			
43	2	Hexagon nut	Fe 360	608	D0605588F			
44	2	Spring washer	Fe 360	610	RE06000FE			
45	4	Spring washer	Fe 360	610	RE08000FE			
49	1	Distance ring washer	AISI 304	703	RNDS011229			
52	2	Tear rivets	Aluminum	589	RIV32510A			

□ The number depends upon the control signal

□□ Nr. 12 for the 200 and 275 servocontrols, Nr. 16 for the 360 servocontrols, Nr. 20 for the 430 servocontrol

□□□ Nr. 24 for the 200 and 275 servocontrols, Nr. 32 for the 360 servocontrols, Nr. 40 for the 430 servocontrols

GROUP 100

Servocontrol spare parts (without spring)

SPARE PART CODE		2655	5401	5402	5403
Part No.	Q.ty	SERV Ø 200	SERV Ø 275	SERV Ø 360	SERV Ø 430
3	1	1425	1426	1714	1715
23	1	OR02137GA			
26	2	BA0016244			

Details and Spare Parts of SBS NO Servocontrols - 15 mm stroke

Part Nr.	Q.ty	DESCRIPTION	MATERIAL	GROUP	CODES			
					SERV Ø 200	SERV Ø 275	SERV Ø 360	SERV Ø 430
1	□	Servocontrol spring	Phosphate steel	552	SEE TABLE 5 PAGE 84			
2	1	Spring plate	Fe 360	591	PPMD86250	PPMD86248	PPMD86249	PPMD86247
3	1	Diaphragm	NBR	584	1425	1426	1714	1715
4	1	Guide bush	Brass	581	BGD086114			
5	1	Rating plate	Polyester	506	ERD086150			
12	2	EP/400 threaded caps	Polyethylene	505	TEP400G018	TEP400G014		
14	2	Hexagon head screw	Fe 360	607	VTE0630FE			
15	1	Upper head	Fe 360	592	TSD086200	TSD086207	TSD086203	TSD086210
16	1	Lower head	Fe 360	592	TSD086201	TSD086208	TSD086204	TSD086211
18	1	Servocontrol shaft	AISI 304	561	ASD086148	ASD086149		ALSC960353
19	2	Connection block	Fe 360	593	BVD086251			
23	1	O-Ring gasket	GACO	548	OR02137GA			
25	1	Diaphragm counterdisk	Fe 360	557	CDD086198	CDD086199		
26	2	BA gasket	GACO	567	BA0016244			
36	□□	Hexagon head screw	Fe 360	607	VTE0620FE	VTE0825FE		
37	□□	Spring washer	Fe 360	610	RE06000FE	RE08000FE		
38	1	Hexagon nut	Fe 360	608		D1405588F		
39	□□□	Flat washer	Fe 360	609	RP06000FE	RP08000FE		
40	□□	Hexagon nut	Fe 360	608	D0605588F	D0805588F		
41	4	Flat washer	Fe 360	609	RP08000FE			
42	4	Hexagon nut	Fe 360	608	D0805588F			
43	2	Hexagon nut	Fe 360	608	D0605588F			
44	2	Spring washer	Fe 360	610	RE06000FE			
45	4	Spring washer	Fe 360	610	RE08000FE			
49	1	Distance ring washer	AISI 304	703	RNDS011229			
52	2	Tear rivets	Aluminum	589	RIV32510A			

□ The number depends upon the control signal

□□ Nr. 12 for the 200 and 275 servocontrols, Nr. 16 for the 360 servocontrols, Nr. 20 for the 430 servocontrol

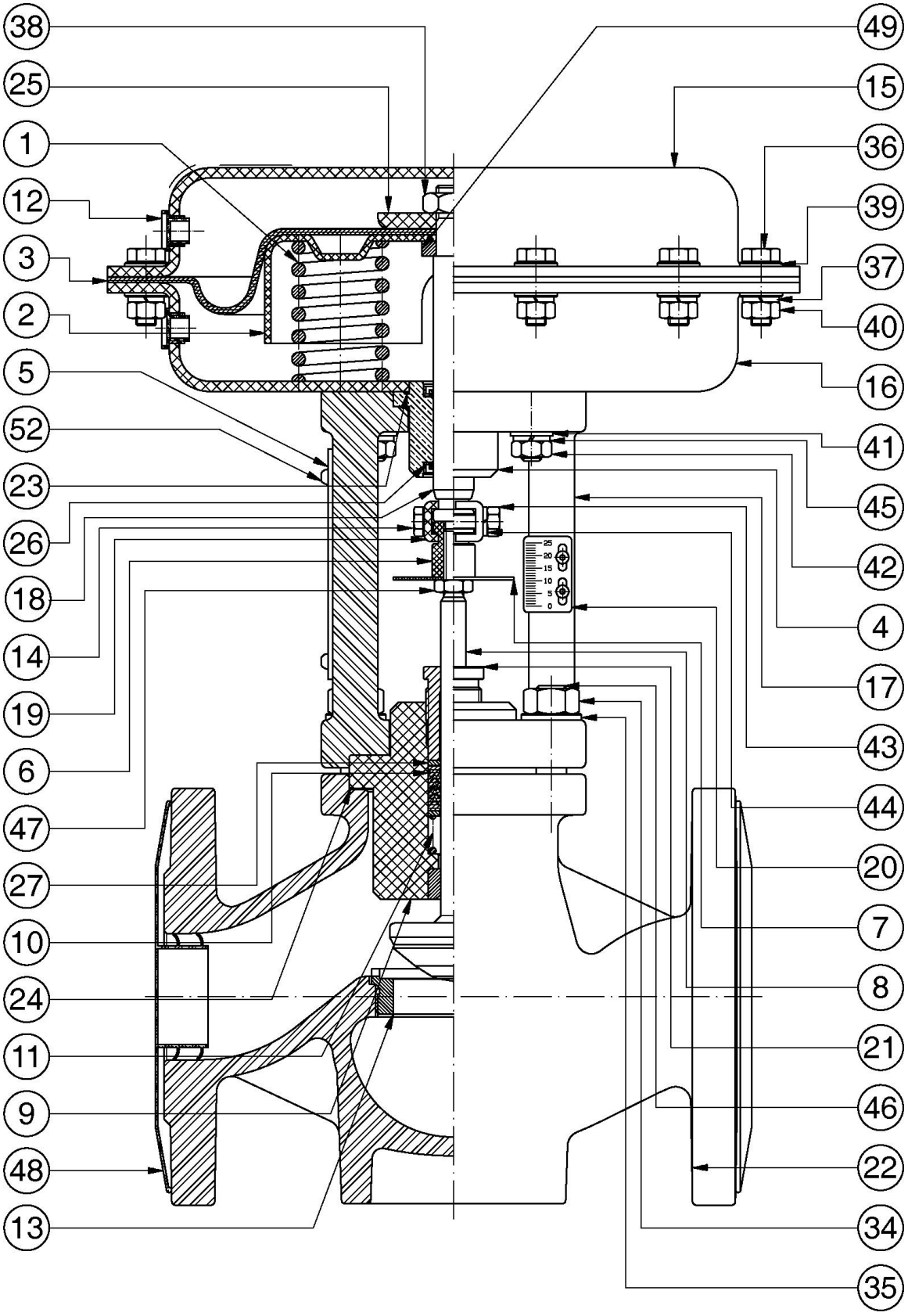
□□□ Nr. 24 for the 200 and 275 servocontrols, Nr. 32 for the 360 servocontrols, Nr. 40 for the 430 servocontrols

GROUP 100

Servocontrol spare parts (without spring)

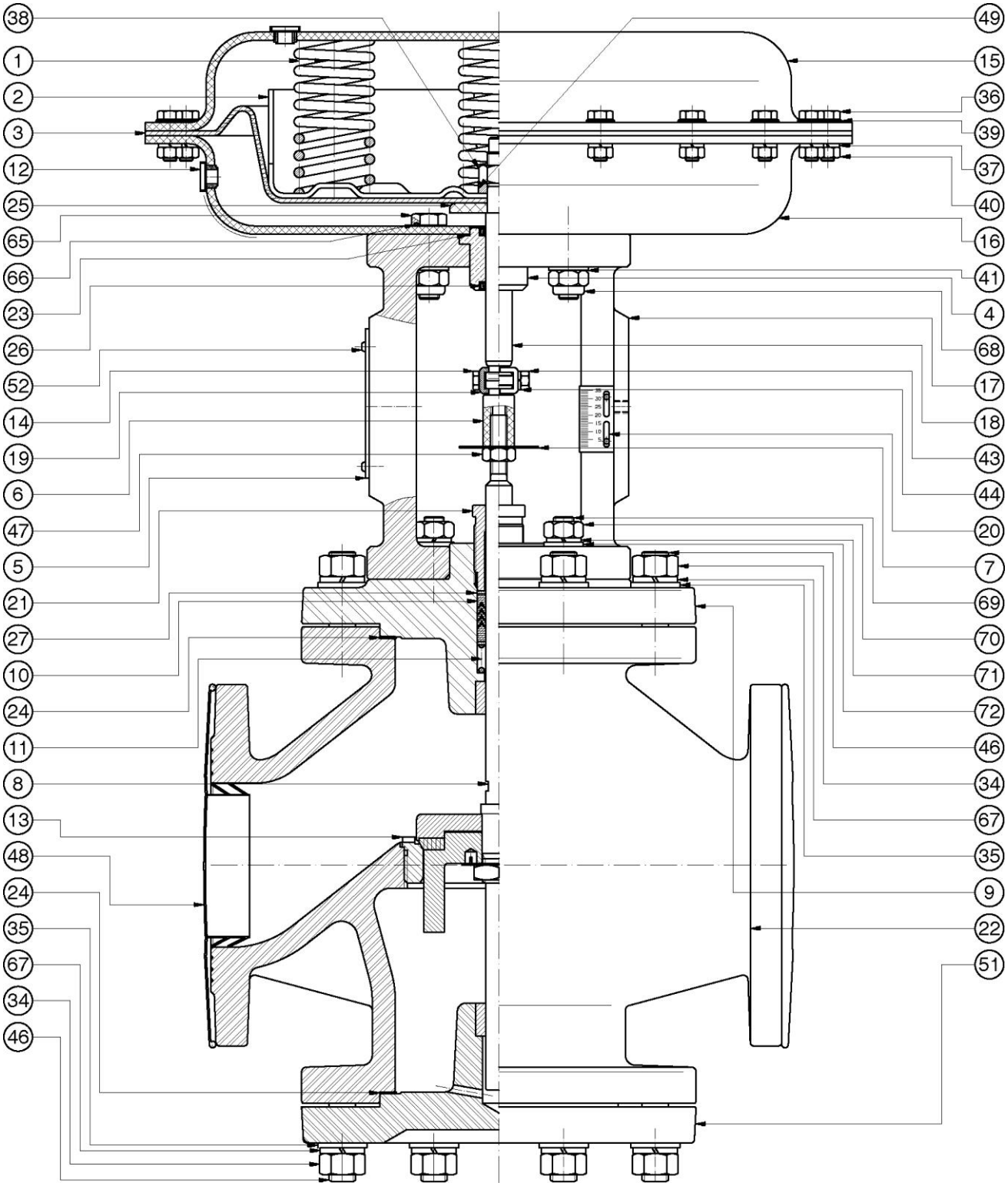
SPARE PART CODE		2655	5401	5402	5403
Part No.	Q.ty	SERV Ø 200	SERV Ø 275	SERV Ø 360	SERV Ø 430
3	1	1425	1426	1714	1715
23	1	OR02137GA			
26	2	BA0016244			

Section Plane – 2-way NO SBS Valve ND 15 to 50



Dwg. nr. 020361 Rev.:00

Section Plane – 2-way NC SBS Valve, ND 100 to 150



Dwg. nr. 020387 Rev.:00

Details and Spare Parts of SBS NC Servocontrols- simple head – 30 mm stroke

Part Nr.	Q.ty	DESCRIPTION	MATERIAL	GROUP	CODES
					SERV Ø 430
1	□	Servocontrol spring	Phosphate steel	552	SEE TABLE 5 PAGE 84
2	1	Spring plate	Fe 360	591	PPMD86247
3	1	Diaphragm	NBR	584	1715
4	1	Guide bush	Brass	581	BGD086114
5	1	Rating plate	Polyester	506	ERD086150
12	2	EP/400 threaded caps	Polyethylene	505	EP400G014
14	2	Hexagon head screw	Fe 360	607	VTE0630FE
15	1	Upper head	Fe 360	592	TSD086210
16	1	Lower head	Fe 360	592	TSER940494
17	1	Valve mounting	CAST IRON	570	CAST940269
18	1	Servocontrol shaft	AISI 304	561	ALSC940253
19	2	Connection block	Fe 360	593	BVD086251
23	1	O-Ring gasket	GACO	548	OR02137GA
25	1	Diaphragm counterdisk	Fe 360	557	CDD086199
26	2	BA gasket	GACO	567	BA0016244
36	20	Hexagon head screw	Fe 360	607	VTE0825FE
37	20	Spring washer	Fe 360	610	RE08000FE
38	1	Hexagon nut	Fe 360	608	D1405588F
39	20	Flat washer	Fe 360	609	RP08000FE
40	20	Hexagon nut	Fe 360	608	D0805588F
41	4	Flat washer	Fe 360	609	RP12000FE
43	2	Hexagon nut	Fe 360	608	D0605588F
44	2	Spring washer	Fe 360	610	RE06000FE
49	1	Distance ring washer	AISI 304	703	RNDS011229
52	2	Tear rivets	Aluminum	589	RIV32510A
65	4	Hexagon head screw	Fe 360	687	VDIS950359
66	4	O-Ring gasket	GACO	548	OR00115GA
68	4	Self-braking nut	Fe 360	576	D12AUTOFE

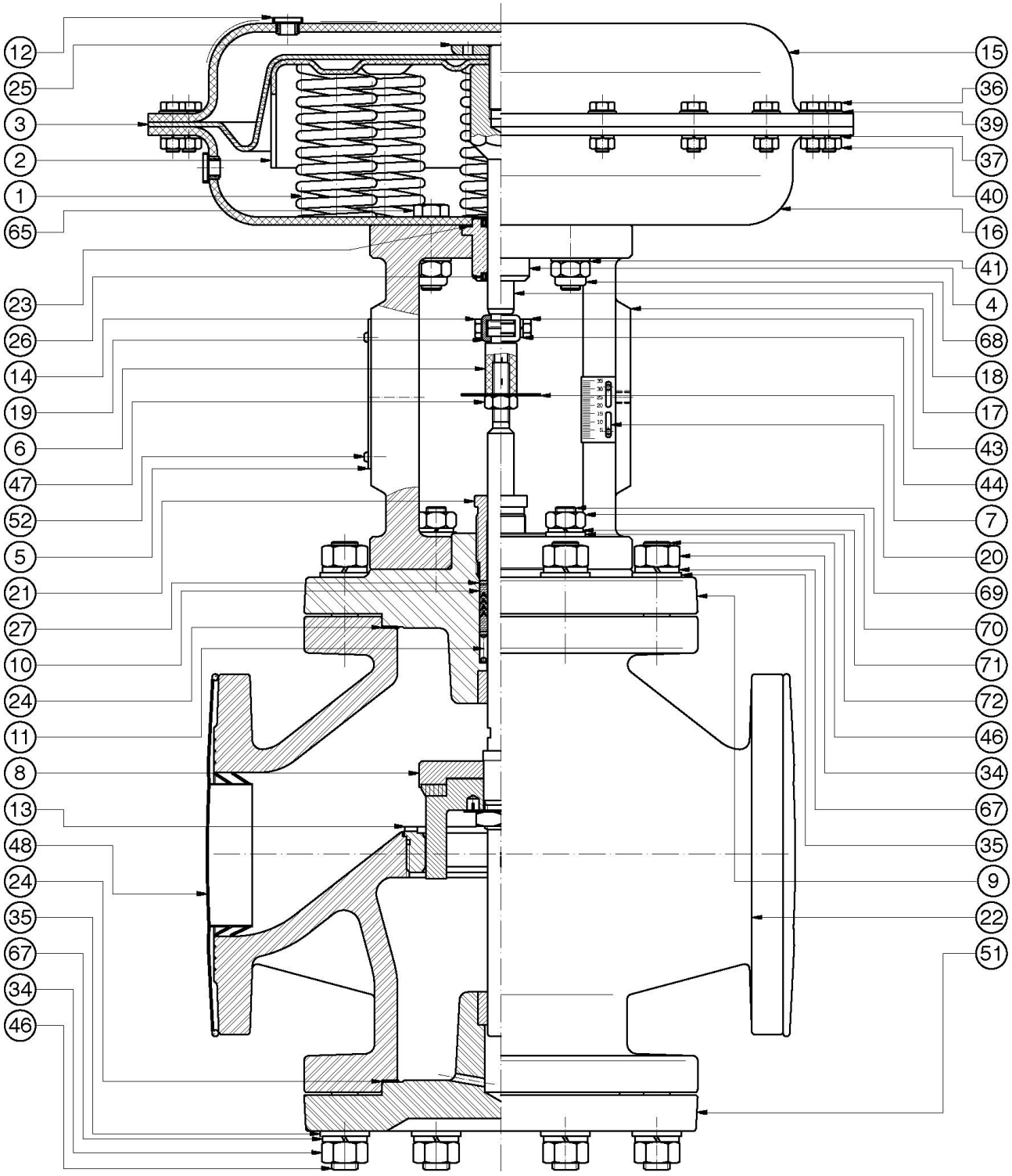
□ The number depends upon the control signal

GROUP 100

Servocontrol spare parts (without spring)

SPARE PART CODE		5412
Part No.	Q.ty	SERV Ø 430
3	1	1715
23	1	OR02137GA
26	2	BA0016244
66	4	OR00115GA

Section Plane – 2-way NO SBS Valve, ND 100 to 150



Dwg. nr. 020388 Rev.:00

Details and Spare Parts of SBS NO Servocontrols- simple head – 30 mm stroke

Part Nr.	Q.ty	DESCRIPTION	MATERIAL	GROUP	CODES
					SERV Ø 430
1	□	Servocontrol spring	Phosphate steel	552	SEE TABLE 5 PAGE 84
2	1	Spring plate	Fe 360	591	PPMD86247
3	1	Diaphragm	NBR	584	1715
4	1	Guide bush	Brass	581	BGD086114
5	1	Rating plate	Polyester	506	ERD086150
12	2	EP/400 threaded caps	Polyethylene	505	EP400G014
14	2	Hexagon head screw	Fe 360	607	VTE0630FE
15	1	Upper head	Fe 360	592	TSD086210
16	1	Lower head	Fe 360	592	TSER940494
17	1	Valve mounting	CAST IRON	570	CAST940269
18	1	Servocontrol shaft	AISI 304	561	ALSC960504
19	2	Connection block	Fe 360	593	BVD086251
23	1	O-Ring gasket	GACO	548	OR02137GA
25	1	Diaphragm counterdisk	Fe 360	557	CTDF960505
26	2	BA gasket	GACO	567	BA0016244
36	20	Hexagon head screw	Fe 360	607	VTE0825FE
37	20	Spring washer	Fe 360	610	RE08000FE
39	20	Flat washer	Fe 360	609	RP08000FE
40	20	Hexagon nut	Fe 360	608	D0805588F
41	4	Flat washer	Fe 360	609	RP12000FE
43	2	Hexagon nut	Fe 360	608	D0605588F
44	2	Spring washer	Fe 360	610	RE06000FE
52	2	Tear rivets	Aluminum	589	RIV32510A
65	4	Hexagon head screw	Fe 360	687	VDIS950359
68	4	Self-braking nut	Fe 360	576	D12AUTOFE

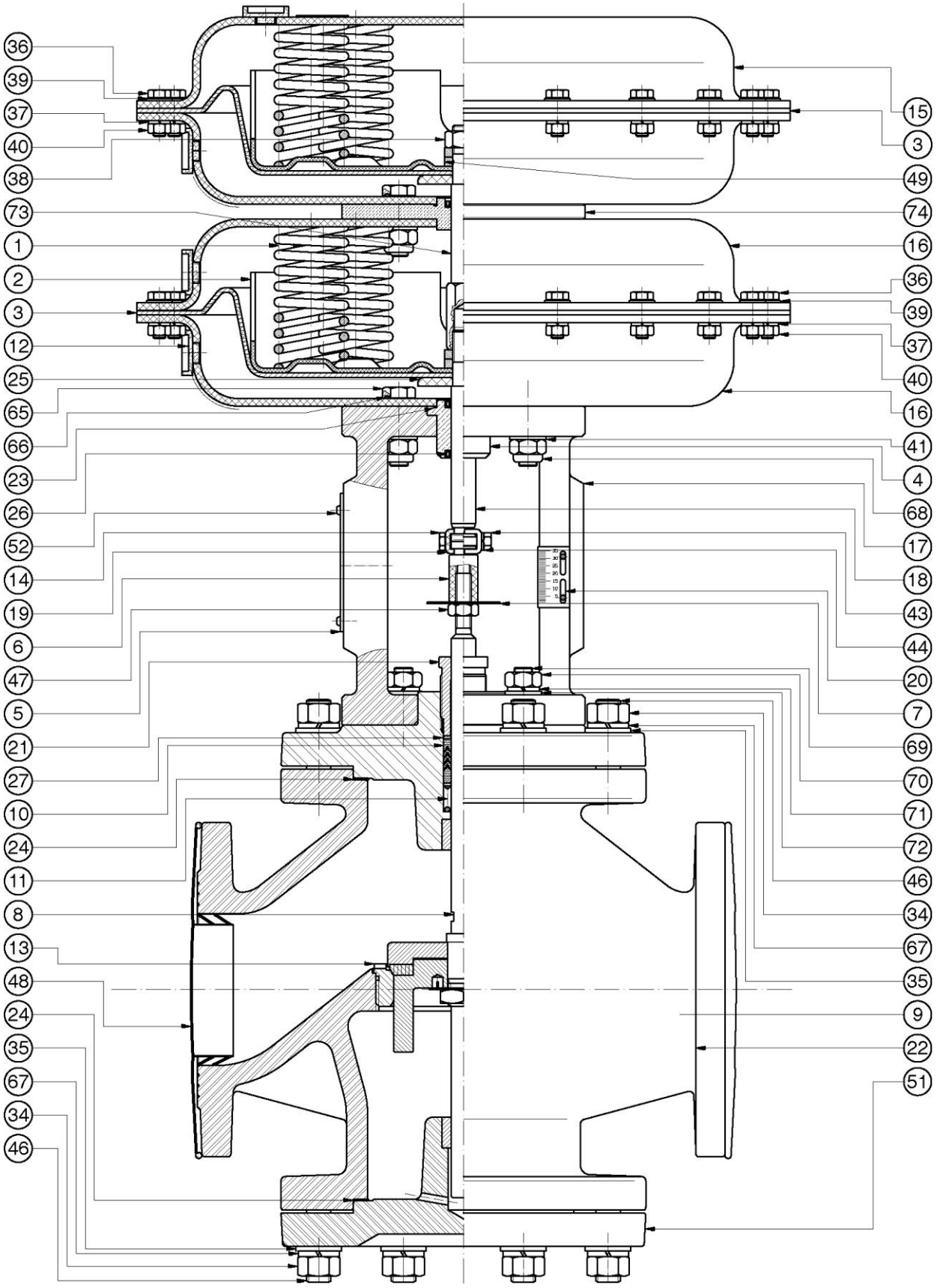
□ The number depends upon the control signal

GROUP 100

Servocontrol spare parts (without spring)

SPARE PART CODE		5412
Part No.	Q.ty	SERV Ø 430
3	1	1715
23	1	OR02137GA
26	2	BA0016244
66	4	OR00115GA

Section Plane – 2-way NC SBS valve, ND 100 to 150 – double head



Dwg. nr. 020394 Rev.:00

Details and Spare Parts of SBS NC Servocontrols- double head – 30 mm stroke

Part Nr.	Q.ty	DESCRIPTION	MATERIAL	GROUP	CODES
					SERV Ø 430
1	□	Servocontrol spring	Phosphate steel	552	SEE TABLE 5 PAGE 84
2	2	Spring plate	Fe 360	591	PPMD86247
3	2	Diaphragm	NBR	584	1715
4	1	Guide bush	Brass	581	BGD086114
5	1	Rating plate	Polyester	506	ERD086150
12	4	EP/400 threaded caps	Polyethylene	505	EP400G014
14	2	Hexagon head screw	Fe 360	607	VTE0630FE
15	1	Upper head	Fe 360	592	TSD086210
16	3	Lower head	Fe 360	592	TSER940494
17	1	Valve mounting	CAST IRON	570	CAST940269
18	1	Servocontrol shaft	AISI 304	561	ALSC940253
19	2	Connection block	Fe 360	593	BVD086251
23	2	O-Ring gasket	GACO	548	OR02137GA
25	2	Diaphragm counterdisk	Fe 360	557	CDD086199
26	3	BA gasket	GACO	567	BA0016244
36	40	Hexagon head screw	Fe 360	607	VTE0825FE
37	40	Spring washer	Fe 360	610	RE08000FE
38	1	Hexagon nut	Fe 360	608	D1405588F
39	40	Flat washer	Fe 360	609	RP08000FE
40	40	Hexagon nut	Fe 360	608	D0805588F
41	4	Flat washer	Fe 360	609	RP12000FE
43	2	Hexagon nut	Fe 360	608	D0605588F
44	2	Spring washer	Fe 360	610	RE06000FE
49	4	Distance ring washer	AISI 304	703	RNDS011229
52	2	Tear rivets	Aluminum	589	RIV32510A
65	8	Hexagon head screw	Fe 360	687	VDIS950359
66	8	O-Ring gasket	GACO	548	OR00115GA
68	8	Self-braking nut	Fe 360	576	D12AUTOFE
73	1	Servocontrol shaft	AISI 304	561	ALSC950357
74	1	Servocontrol distance ring	Aluminum	522	DIST950358

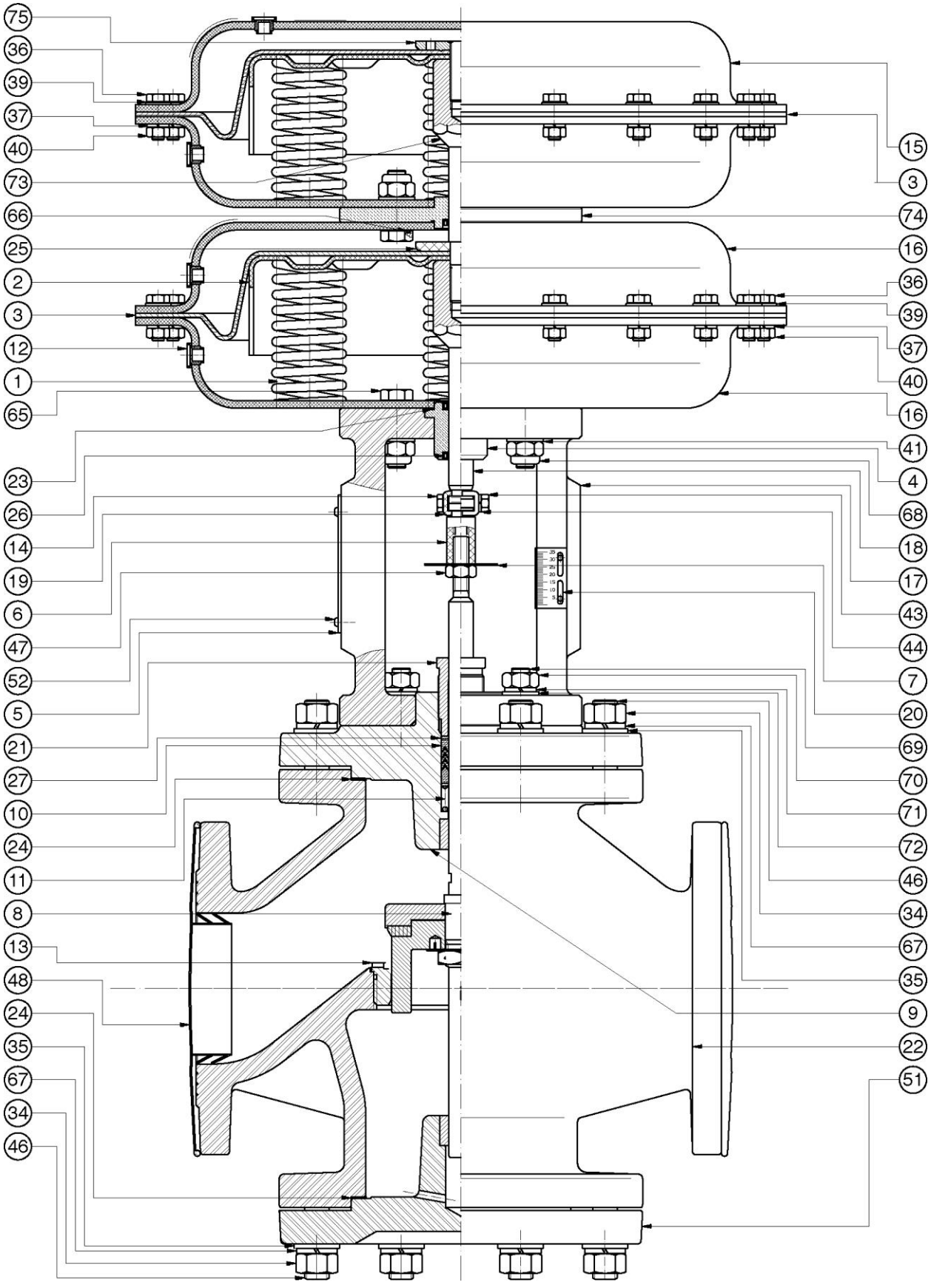
□ The number depends upon the control signal

GROUP 100

Servocontrol spare parts (without spring)

SPARE PART CODE		5413
Part No.	Q.ty	SERV Ø 430
3	2	1715
23	2	OR02137GA
26	3	BA0016244
66	8	OR00115GA

Section Plane – 2-way NO SBS Valve, ND 100 to 150 – double head



Dwg. nr. 020422 Rev.:00

Details and Spare Parts of SBS NO Servocontrols- double head – 30 mm stroke

Part Nr.	Q.ty	DESCRIPTION	MATERIAL	GROUP	CODES
					SERV Ø 430
1	□	Servocontrol spring	Phosphate steel	552	SEE TABLE 5 PAGE 84
2	2	Spring plate	Fe 360	591	PPMD86247
3	2	Diaphragm	NBR	584	1715
4	1	Guide bush	Brass	581	BGD086114
5	1	Rating plate	Polyester	506	ERD086150
12	4	EP/400 threaded caps	Polyethylene	505	EP400G014
14	2	Hexagon head screw	Fe 360	607	VTE0630FE
15	1	Upper head	Fe 360	592	TSD086210
16	3	Lower head	Fe 360	592	TSER940494
17	1	Valve mounting	CAST IRON	570	CAST940269
18	1	Servocontrol shaft	AISI 304	561	ALSC960504
19	2	Connection block	Fe 360	593	BVD086251
23	2	O-Ring gasket	GACO	548	OR02137GA
25	1	Diaphragm counterdisk	Fe 360	557	CDD086199
26	3	BA gasket	GACO	567	BA0016244
36	40	Hexagon head screw	Fe 360	607	VTE0825FE
37	40	Spring washer	Fe 360	610	RE08000FE
39	40	Flat washer	Fe 360	609	RP08000FE
40	40	Hexagon nut	Fe 360	608	D0805588F
41	4	Flat washer	Fe 360	609	RP12000FE
43	2	Hexagon nut	Fe 360	608	D0605588F
44	2	Spring washer	Fe 360	610	RE06000FE
52	2	Tear rivets	Aluminum	589	RIV32510A
65	8	Hexagon head screw	Fe 360	687	VDIS950359
66	4	O-Ring gasket	GACO	548	OR00115GA
68	8	Self-braking nut	Fe 360	576	D12AUTOFE
73	1	Servocontrol shaft	AISI 304	561	ALSC960671
74	1	Servocontrol distance ring	Aluminum	525	DIST950358
75	1	Diaphragm counterdisk	Fe 360	557	CTDF960505

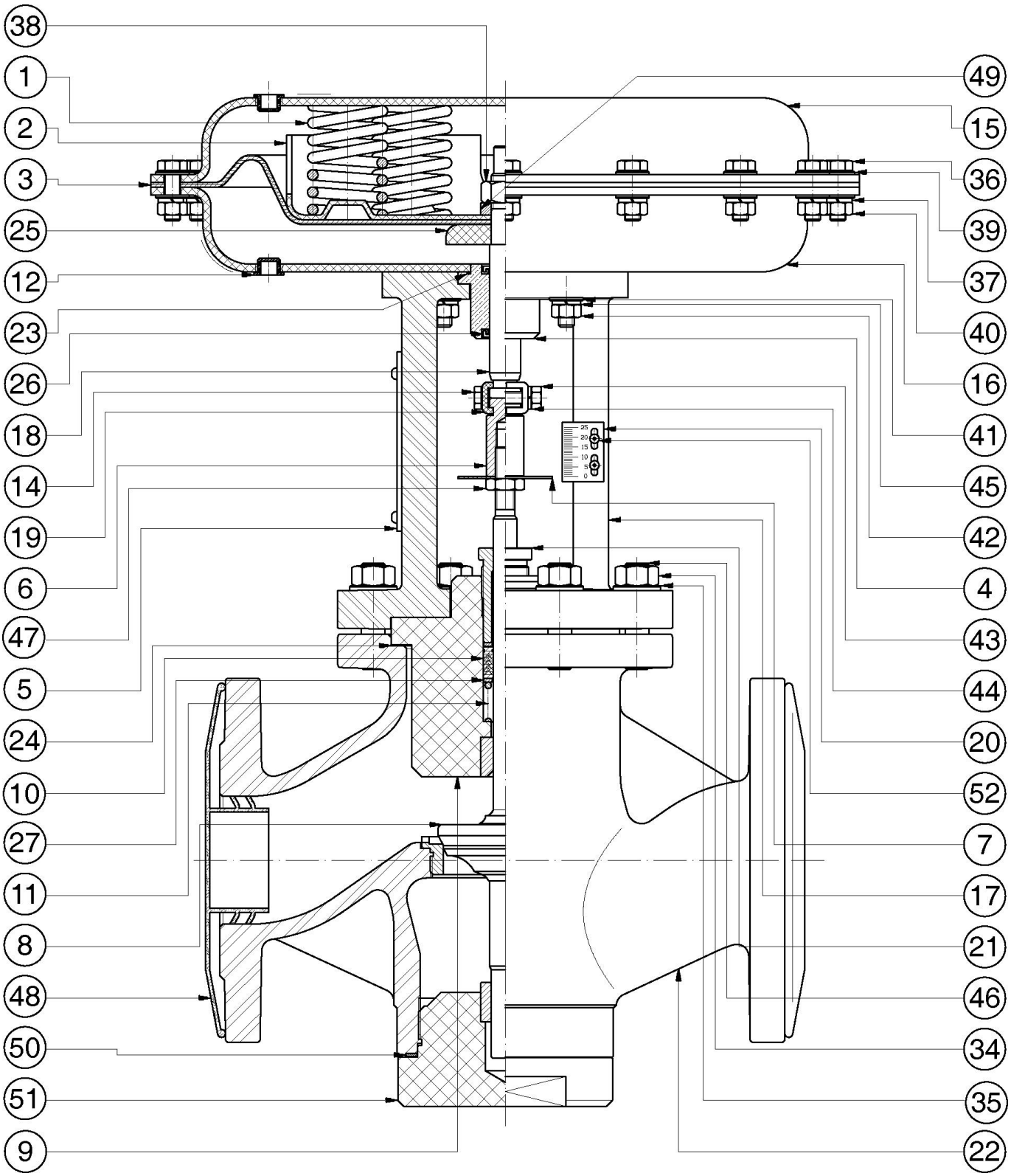
□ The number depends upon the control signal

GROUP 100

Servocontrol spare parts (without spring)

SPARE PART CODE		5414
Part No.	Q.ty	SERV Ø 430
3	2	1715
23	2	OR02137GA
26	3	BA0016244
66	4	OR00115GA

Section Plane – 2-way NC SBS Valve, ND 65 to 80



Dwg. nr. 020362 Rev.:00

Details and Spare Parts of 2-way SBS Valve Body, ND 15 to 80

Part Nr.	Q.ty	DESCRIPTION		MATERIAL	GROUP	ND 15	ND 20	ND 25	ND 32	ND 40	ND 50	ND 65	ND 80
6	1	Load adjusting nut		Fe 360	558	DRD086048						DRD086049	
7	1	Stroke indicator disk		Fe 360	585	DCD086096						DCD086097	
8	1	Obturator	Plastic seal	AISI 316 TEFLON –CARBON	675	OVD088084	OVD088085	OVD088086	OVD088087	OVD088088	OVD088089	OVD089287	OVD089288
			Metallic seal	AISI 316	595	OVD086053	OVD086054	OVD086055	OVD086056	OVD086057	OVD086058	OVD086060	OVD086062
			Stellited seal	AISI 316 STELLITE		OTTR092234	OTTR092239	OTTR092244	OTTR092250	OTTR092255	OTTR092261	OTTR092266	OTTR092271
9	1	Intermediate body		ASTM A105	594	CIFD86034			CIFD86035		CIFD86036	CIFD86037	
10	1	Packing gland		TEFLON GRAPHITE	587	PT00810TT			PT01020TT			PT01222TT	
11	1	Packing gland spring		AISI 316	552	MTD086109			MTD086110			MTD086111	
17	1	Valve mounting		Cast iron G25	570	CSD086000			CSD086115		CSD086116	CSD086002	
20	1	Stroke plate		Aluminum	590	ERD086151							
21	1	Packing gland screw		AISI 420	559	VVD086076			VVD086077			VVD086078	
22	1	Valve body	Standard	Cast iron G25	597	CGD086024	CGD086025	CGD086026	CGD086027	CGD086028	CGD086029	CGD086031	CGD086033
			Stellited			C2VG092237	C2VG092242	C2VG092247	C2VG092253	C2VG092258	C2VG092264	C2VG092269	C2VG092274
24	1	Body gasket		□	511	GCD086194			OR003237VI		GCD086196	GCD086197	
27	2	Packing gland washer		AISI 316	703	RDD086256			RDD086274			RDD086297	
34	□□	Hexagon nut		Fe 360	608	D1005588F			D1205588F				
35	□□	Flat washer		Fe 360	609	RP10000FE			RP12000FE				
46	□□	Stud bolts		Fe 360	558	PVFD86011			PVFD86012			PVFD86013	
47	1	Hexagon nut		Fe 360	608	D0805588F						D1005588F	
48	2	Flange cap		Polyethylene	505	TEP3050015	TEP3050020	TEP3050025	TEP3050032	TEP3050040	TEP3050050	TEP3050065	TEP3050080
50	1	Bottom gasket		FASIT 400	511							GD0091407	GD0091408
51	1	Bottom		ASTM A105	756							FFD086130	FFD086132

□ For the ND 15-20-25-50-65-80 the gasket is FASIT 400 For the ND 32-40 the gasket is a silicone OR

□□ Nr. 4 from ND 15 to ND 50 Nr. 8 from ND 65 to the ND 80

GROUP 100

Body side spare parts

Spare part code		2651			2652		2653	2654	5415
N° Part.	Q.ty	ND 15	ND 20	ND 25	ND 32	ND 40	ND 50	ND 65	ND 80
10	1	PT00810TT			PT01020TT			PT01222TT	
11	1	MTD086109			MTD086110			MTD086111	
24	1	GCD086194			OR003237VI		GCD086196	GCD086197	
50	1							GD0091407	GD0091408

Details and Spare Parts of 3-way SBS Valve Body, ND 15 to 80

Part Nr.	Q.ty	DESCRIPTION		MATERIAL	GROUP	ND 15	ND 20	ND 25	ND 32	ND 40	ND 50	ND 65	ND 80
6	1	Load adjusting nut		Fe 360	558	DRD086048						DRD086049	
7	1	Stroke indicator disk		Fe 360	585	DCD086096						DCD086097	
8	1	Obturator	Plastic seal	AISI 316 TEFLON -CARBON	807	OV3D88215	OV3D88214	OV3D88178	OV3D88179	OV3D88177	OV3D88180	OV3D88176	OV3D88175
			Metallic seal	AISI 316	654	OV3D86245	OV3D86234	OV3D86231	OV3D86226	OV3D96223	OV3D86220	OV3D86169	OV3D86168
			Stellited seal	AISI 316 STELLITE					OT3MXX0391	OT3MXX0392	OT3M990662	OT3MXX0393	OT3MXX0394
9	1	Intermediate body		ASTM A105	594	CIFD86034			CIFD86035		CIFD86036	CIFD86037	
10	1	Packing gland		TEFLON GRAPHITE	587	PT00810TT			PT01020TT			PT01222TT	
11	1	Packing gland spring		AISI 316	552	MTD086109			MTD086110			MTD086111	
17	1	Valve mounting		Cast iron G25	570	CSD086000			CSD086115		CSD086116	CSD086002	
20	1	Stroke plate		Aluminum	590	ERD086151							
21	1	Packing gland screw		AISI 420	559	VVD086076			VVD086077			VVD086078	
22	1	Valve body	Standard	Cast iron G25	655	CG3N990047	CG3N990029	CG3N981135	CG3N990031	CG3N981071	CG3N990034	CG3N990261	CG3N990326
			Stellited					CG3SXX0303	CG3S990946		CG3S990661		
24	1	Body gasket		□	511	GCD086194			GD0960677		GCD086196	GCD086197	
27	2	Packing gland washer		AISI 316	703	RDD086256			RDD086274			RDD086297	
34	□□	Hexagon nut		Fe 360	608	D1005588F			D1205588F				
35	□□	Flat washer		Fe 360	609	RP10000FE			RP12000FE				
46	□□	Stud bolts		Fe 360	558	PVFD86011			PVFD86012			PVFD86013	
47	1	Hexagon nut		Fe 360	608	D0805588F						D1005588F	
48	3	Flange cap		Polyethylene	505	TEP3050015	TEP3050020	TEP3050025	TEP3050032	TEP3050040	TEP3050050	TEP3050065	TEP3050080
50	1	Bottom gasket		FASIT 400	511	GD0960673	GD0960674	GD0960675	GD0960676	GD0960677	GD0960678	GD0091407	GD0091408
53	1	Three-way bottom		ASTM A105	756	FONDXX0142	FONDXX0143	FONDXX0144	FONDXX0145	FONDXX0146	FONDXX0147	FF3D86140	FF3D86141
54	1	Three-way iron flange		Fe 360	578	F3VD86152	F3VD86152	F3VD86154	F3VD86155	F3VD86156	F3VD86157	F3VD86158	F3VD86159

□ For the ND 15-20-25-50-65-80 the gasket is FASIT 400 For the ND 32-40 the gasket is a silicone OR

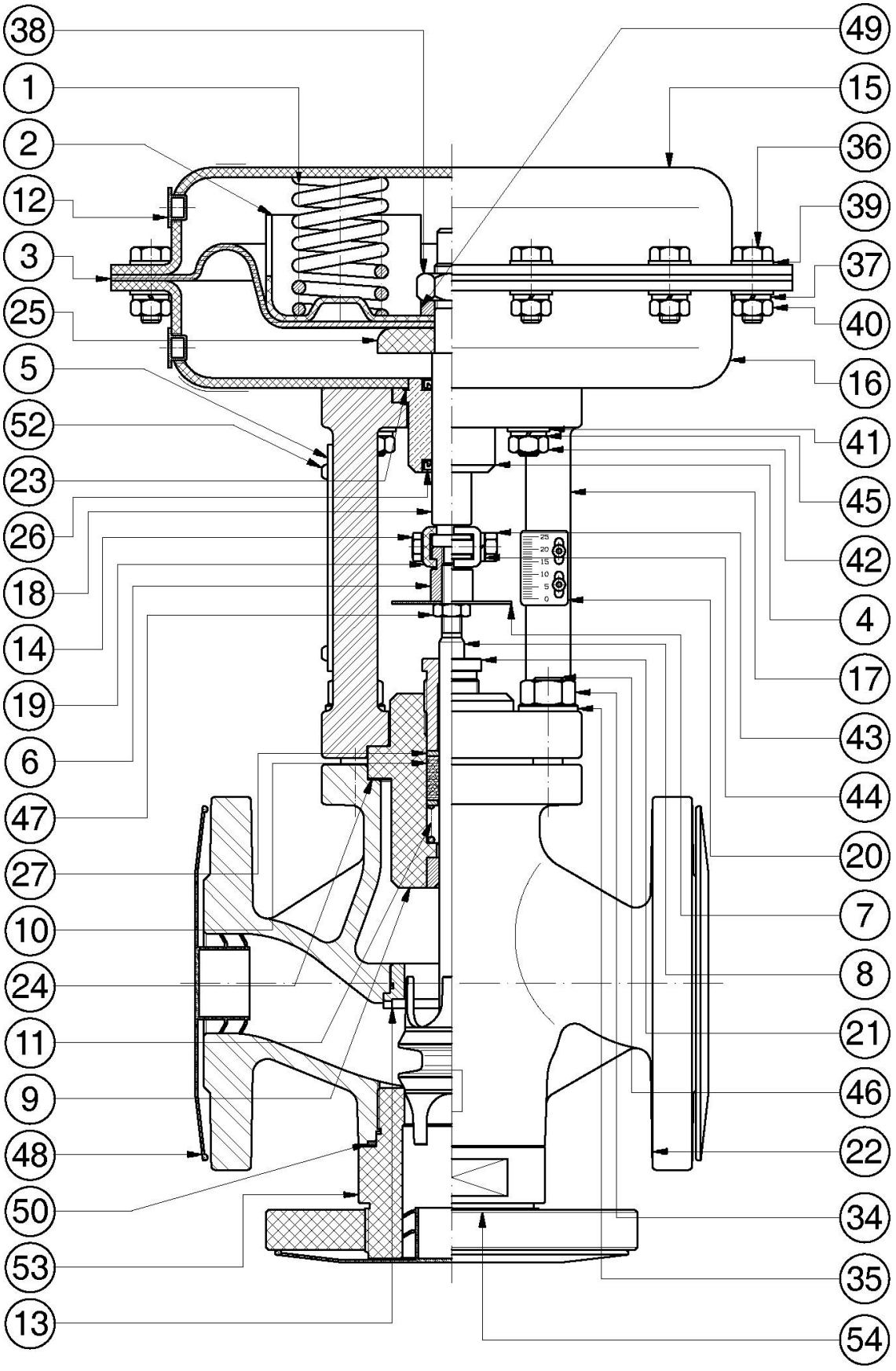
□□ Nr. 4 from ND 15 to ND 50 Nr. 8 from ND 65 to the ND 80

GROUP 100

Body side spare parts

Spare part code		5419	5420	5421	5422	5423	5424	2654	5415
N° Part.	Q.ty	ND 15	ND 20	ND 25	ND 32	ND 40	ND 50	ND 65	ND 80
10	1	PT00810TT			PT01020TT			PT01222TT	
11	1	MTD086109			MTD086110			MTD086111	
24	1	GCD086194			OR003237VI		GCD086196	GCD086197	
50	1	GD0960673	GD0960674	GD0960675	GD0960676	GD0960677	GD0960678	GD0091407	GD0091408

Section Plane – 3-way NC SBS Valve, ND 15 to 80



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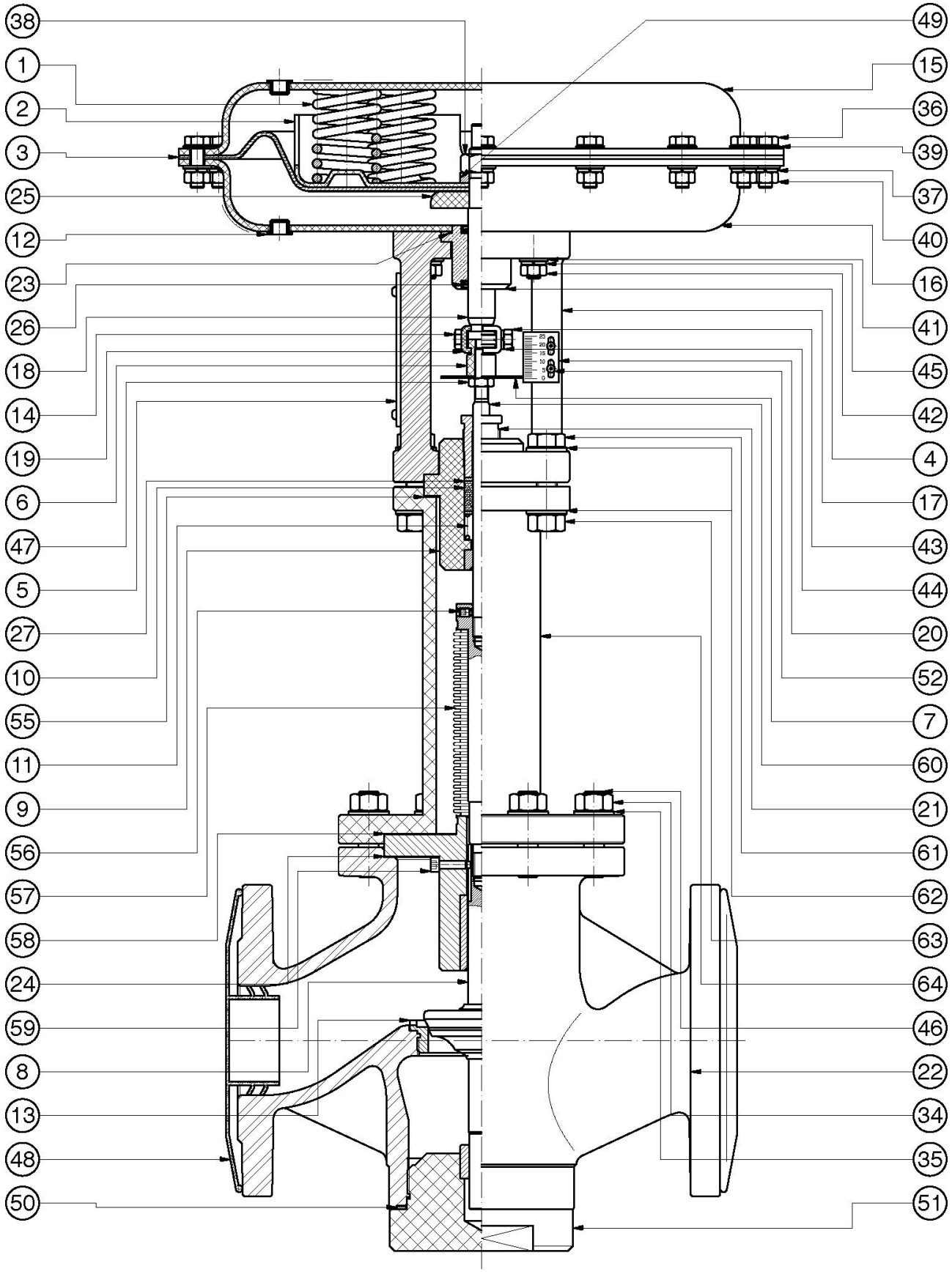
Section Plane – 2-way NC SBS Valve, ND 65 to 80



Dwg. nr. 020372 Rev.:00

Details and Spare Parts of 2-way SBS Valve, ND 15 to 80 with bellows

Part Nr	Q.ty	DESCRIPTION		MATERIAL	GROUP	ND 15	ND 20	ND 25	ND 32	ND 40	ND 50	ND 65	ND 80
6	1	Load adjusting nut		Fe 360	558	DRD086048							
7	1	Stroke indicator disk		Fe 360	585	DCD086096							
8	1	Obturator	Metallic seal	AISI 316	595	OTTR091345	OTTR091346	OTTR091347	OTTR091348	OTTR091349	OTTR091350	OTTR091351	OTTR091352
			Stellited seal	AISI 316 STELLITE		OTTR980765	OTTR980710	OTTR980105	OTTR990634	OTTR970511	OTTR980689	OTTR981029	OTTR990618
9	1	Intermediate body		ASTM A105	594	CIFD86034			CIFD86035				
10	1	Packing gland		TEFLON GRAPHITE	587	PT00810TT			PT01020TT				
11	1	Packing gland spring		AISI 316	552	MTD086109			MTD086110				
17	1	Valve mounting		Cast iron G25	570	CSD086000			CSD086115				
20	1	Stroke plate		Aluminum	590	ERD086151							
21	1	Packing gland screw		AISI 420	559	VVD086076			VVD086077				
22	1	Valve body	Standard	Cast iron G25	597	CGD086024	CGD086025	CGD086026	CGD086027	CGD086028	CGD086029	CGD086031	CGD086033
			Stellited			C2VG092237	C2VG092242	C2VG092247	C2VG092253	C2VG092258	C2VG092264	C2VG092269	C2VG092274
24	1	Body gasket		FASIT 400	511	GCD086194			GCD086195		GCD086196	GCD086197	
27	2	Packing gland washer		AISI 316	703	RDD086256			RDD086274				
34	□	Hexagon nut		Fe 360	608	D1005588F			D1205588F				
35	□	Flat washer		Fe 360	609	RP10000FE			RP12000FE				
46	□	Stud bolts		Fe 360	558	PVFD86011			PVFD86012			PVFD86013	
47	1	Hexagon nut		Fe 360	608	D0805588F							
48	2	Flange cap		Polyethylene	505	TEP3050015	TEP3050020	TEP3050025	TEP3050032	TEP3050040	TEP3050050	TEP3050065	TEP3050080
50	1	Bottom gasket		FASIT 400	511							GD0091407	GD0091408
51	1	Bottom		ASTM A105	756							FFD086130	FFD086132
55	1	Body gasket		□□	511	GCD086194			OR003237VI				
56	1	Grub screw		AISI 304	542	VST050804							
57	1	Intermediate with bellows		AISI 316	855	INSF089002			INSF089003		INSF089004	INSF089005	
58	1	Body gasket		FASIT 400	511	GCD086194			GCD086195			GCD086197	
59	1	HSH cap screws		AISI 316	855	ZSVD88126			ZSVD88127			ZSVD88128	
60	1	Upper stem for bellows		AISI 304	676	STOT091362			STOT091363				
61	4	Hexagonal-head screw		Fe 360	607	VTE10045PF			VTE12050PF				
62	8	Flat washer		Fe 360	609	RP10000FE			RP12000FE				
63	4	Hexagon nut		Fe 360	608	D1005588F			D1205588F				
64	1	Mounting extension		Fe 360	857	PRCA091365			PRCA091366			PRCA091368	

□ Nr. 4 from ND 15 to ND 50 Nr. 8 from ND 65 to ND 80

□□ For the ND 15-20-25 the gasket is FASIT 400 For ND 32-40-50-65-80 the gasket is silicone OR

GROUP 100

Body side spare parts

Spare part code		5426			5427		5427	5435	5436
N° Part.	Q.ty	ND 15	ND 20	ND 25	ND 32	ND 40	ND 50	ND 65	ND 80
10	1	PT00810TT			PT01020TT				
11	1	MTD086109			MTD086110				
24	1	GCD086194			GCD086195		GCD086196	GCD086197	
50	1							GD0091407	GD0091408
55	1	GCD086194			OR003237VI				
58	1	GCD086194			GCD086195			GCD086197	

Details and Spare Parts of 3-way SBS Valve Body, ND 15 to 80 with bellows

Part Nr.	Q.ty	DESCRIPTION		MATERIAL	GROUP	ND 15	ND 20	ND 25	ND 32	ND 40	ND 50	ND 65	ND 80
6	1	Load adjusting nut		Fe 360	558	DRD086048							
7	1	Stroke indicator disk		Fe 360	585	DCD086096							
8	1	Obturator	Metallic seal	AISI 316	654	OT3M091353	OT3M091354	OT3M091355	OT3M980985	OT3M091357	OT3M091358	OT3M091359	OT3M980901
			Stellited seal	AISI 316 STELLITE		OT3M980996	OT3MXX0140	OT3M990934	OT3M980954	OT3M990209	OT3MXX0227	OT3M981128	OT3M980859
9	1	Intermediate body		ASTM A105	594	CIFD86034			CIFD86035				
10	1	Packing gland		TEFLON GRAPHITE	587	PT00810TT			PT01020TT				
11	1	Packing gland spring		AISI 316	552	MTD086109			MTD086110				
17	1	Valve mounting		Cast iron G25	570	CSD086000			CSD086115				
20	1	Stroke plate		Aluminum	590	ERD086151							
21	1	Packing gland screw		AISI 420	559	VVD086076			VVD086077				
22	1	Valve body	Standard	Cast iron G25	655	CG3N990047	CG3N990029	CG3N981135	CG3N990031	CG3N981071	CG3N990034	CG3N990261	CG3N990326
			Stellited					CG3SXX0303	CG3S990946		CG3S990661		
24	1	Body gasket		FASIT 400	511	GCD086194			GCD086195		GCD086196	GCD086197	
27	2	Packing gland washer		AISI 316	703	RDD086256			RDD086274				
34	□	Hexagon nut		Fe 360	608	D1005588F			D1205588F				
35	□	Flat washer		Fe 360	609	RP10000FE			RP12000FE				
46	□	Stud bolts		Fe 360	558	PVFD86011			PVFD86012			PVFD86013	
47	1	Hexagon nut		Fe 360	608	D0805588F							
48	3	Flange cap		Polyethylene	505	TEP3050015	TEP3050020	TEP3050025	TEP3050032	TEP3050040	TEP3050050	TEP3050065	TEP3050080
50	1	Bottom gasket		FASIT 400	511	GD0960673	GD0960674	GD0960675	GD0960676	GD0960677	GD0960678	GD0091407	GD0091408
51	1	Three-way bottom		ASTM A105	756	FONDXX0142	FONDXX0143	FONDXX0144	FONDXX0145	FONDXX0146	FONDXX0147	FF3D86140	FF3D86141
54	1	Three-way iron flange		Fe 360	578	F3VD86152	F3VD86152	F3VD86154	F3VD86155	F3VD86156	F3VD86157	F3VD86158	F3VD86159
55	1	Body gasket		□□	511	GCD086194			OR003237VI				
56	1	Grub screw		AISI 304	542	VST050804							
57	1	Intermediate with bellows		AISI 316	855	INSF089002			INSF089003		INSF089004	INSF089005	
58	1	Body gasket		FASIT 400	511	GCD086194			GCD086195			GCD086197	
59	1	HSH cap screws		AISI 316	855	ZSVD88126			ZSVD88127			ZSVD88128	
60	1	Upper stem for bellows		AISI 304	676	STOT091362			STOT091363				
61	4	Hexagonal-head screw		Fe 360	607	VTE10045PF			VTE12050PF				
62	8	Flat washer		Fe 360	609	RP10000FE			RP12000FE				
63	4	Hexagon nut		Fe 360	608	D1005588F			D1205588F				
64	1	Mounting extension		Fe 360	857	PRCA091365			PRCA091366			PRCA091368	

□ Nr. 4 from ND 15 to ND 50 Nr. 8 from ND 65 to ND 80

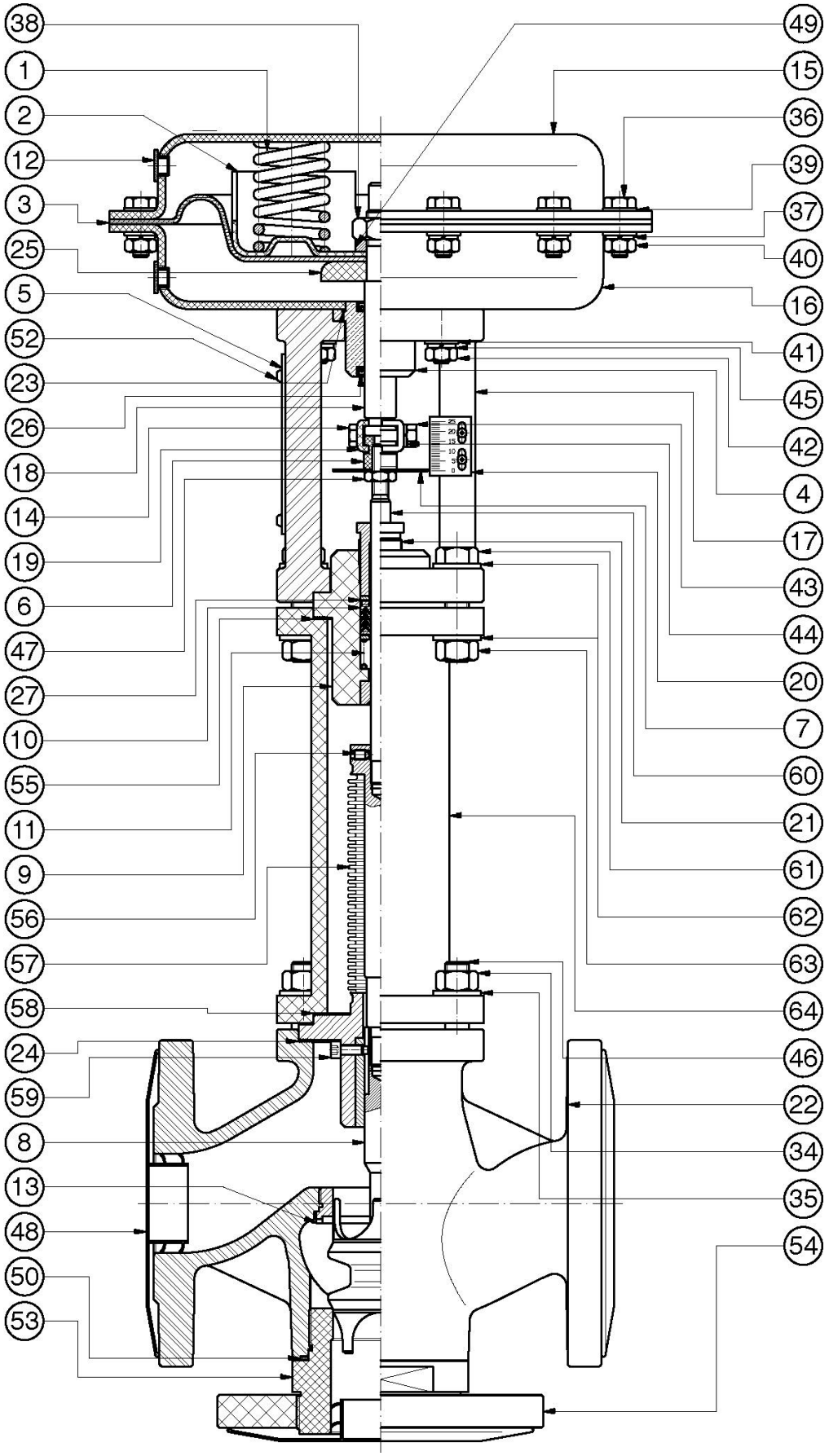
□□ For the ND 15-20-25 the gasket is FASIT 400 For ND 32-40-50-65-80 the gasket is silicone OR

GROUP 100

Body side spare parts

Spare part code		5429	5430	5431	5432	5433	5434	5435	5436
N° Part.	Q.ty	ND 15	ND 20	ND 25	ND 32	ND 40	ND 50	ND 65	ND 80
10	1	PT00810TT			PT01020TT				
11	1	MTD086109			MTD086110				
24	1	GCD086194			GCD086195		GCD086196	GCD086197	
50	1	GD0960673	GD0960674	GD0960675	GD0960676	GD0960677	GD0960678	GD0091407	GD0091408
55	1	GCD086194			OR003237VI				
58	1	GCD086194			GCD086195			GCD086197	

Section Plane – 3-way NC SBS Valve, ND 15 to 80 NC with bellows



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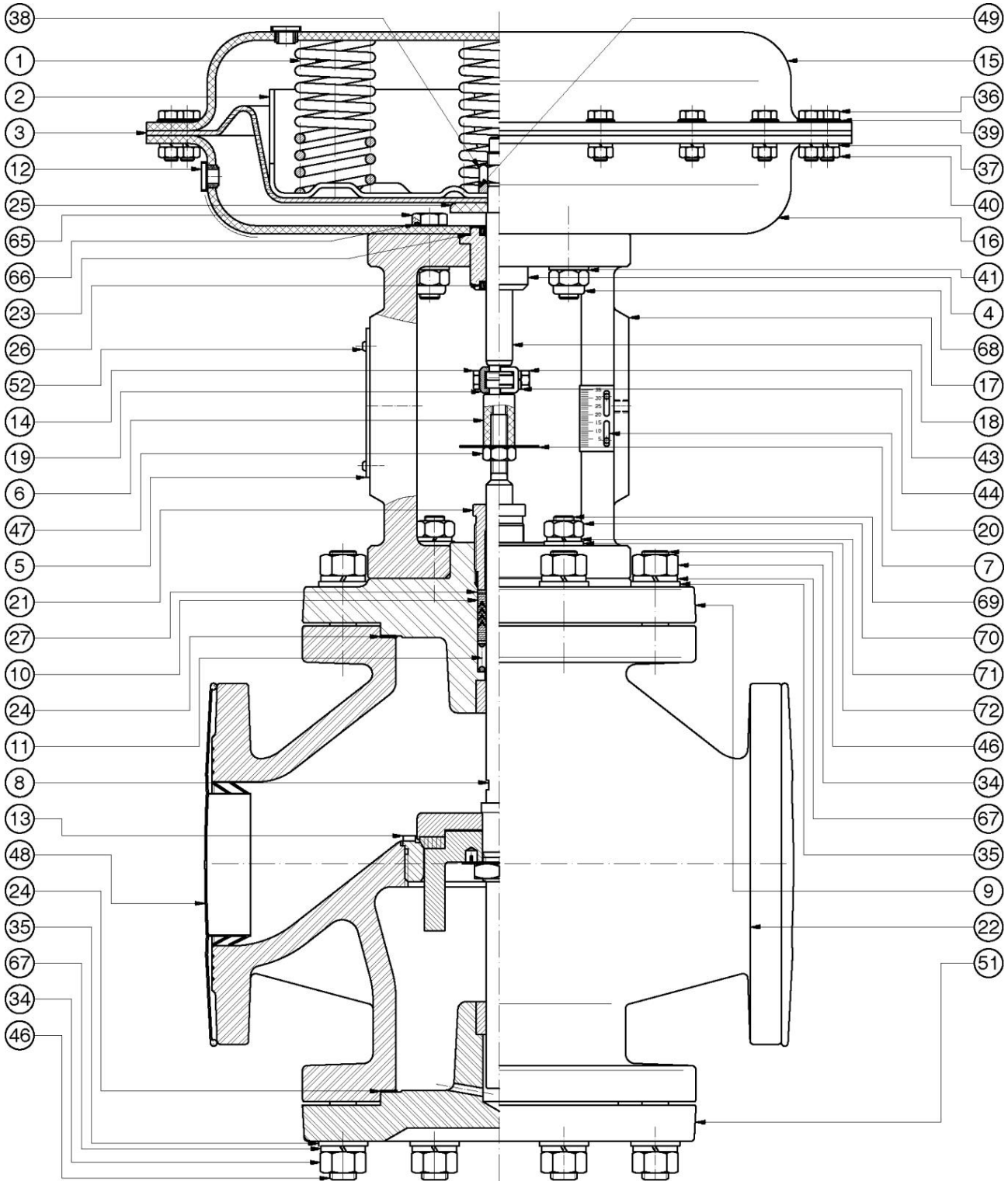
Section Plane – 2-way NC SBS Valve, ND 100 to 150



Dwg. nr. 020387 Rev.:00

Details and spare parts of 2-way SBS Valve Body, ND 100 to 150

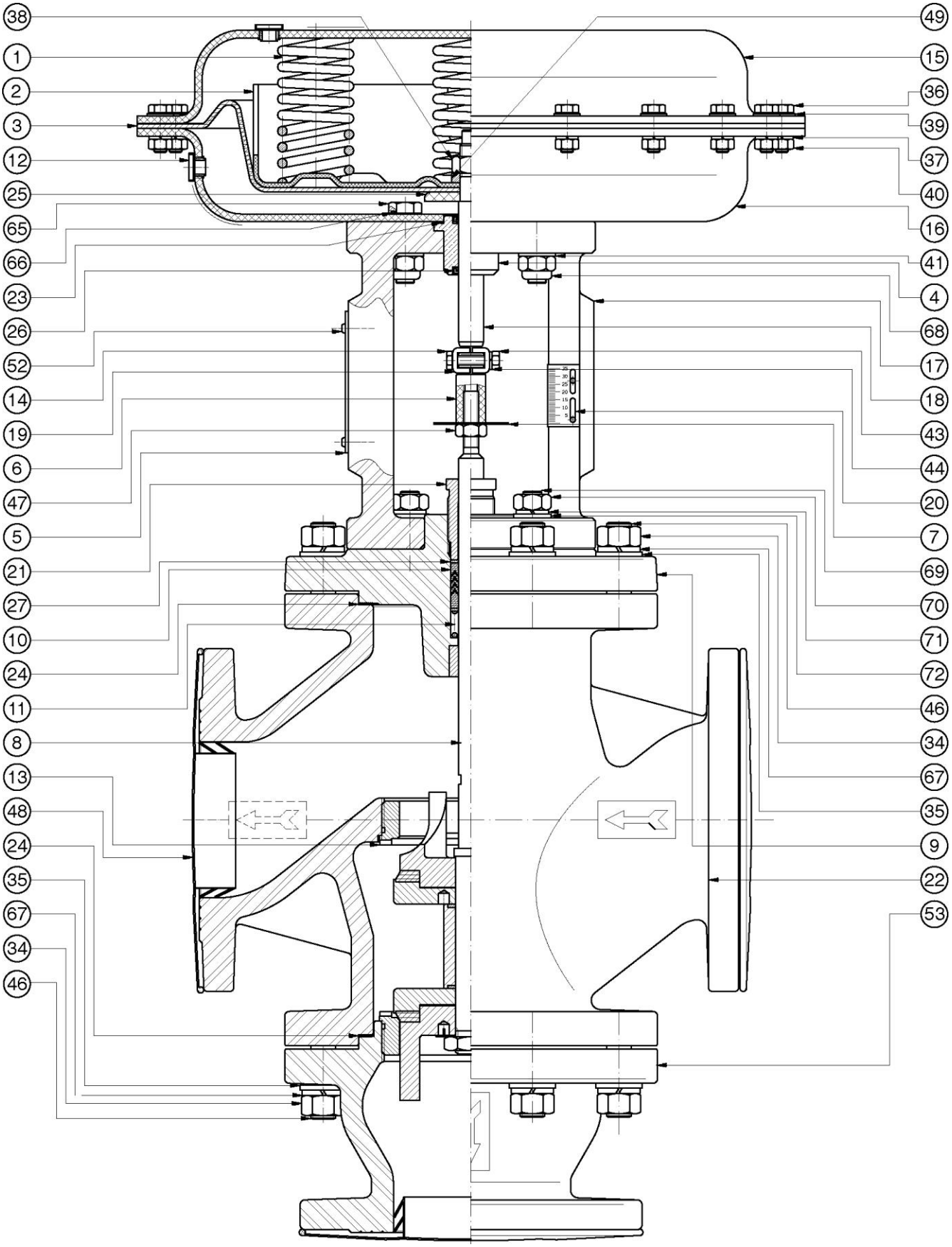
Part Nr.	Q.	DESCRIPTION		MATERIAL	GR.	ND 100	ND 125	ND 150
6	1	Load adjusting nut		Fe 360	558	DRD086049	DARG010454	DARG940595
7	1	Stroke indicator disk		Fe 360	585	DCD086096	DCD086097	
8	1	Obturator	Plastic seal	AISI 316 TEFLON -	675	OTTR950636	OTTR010458	OTTR950990
			Stellited seal	AISI 316 STELLITED	595	OTTRXX0246		
9	1	Intermediate body		Cast iron	594	CIGS940454	CIGS940522	CIGS940600
10	1	Packing gland		TEFLON GRAPHITE	587	PT01626TG		PT02236TG
11	1	Packing gland spring		AISI 316	552	MTD088172		MTD088163
13	1	Obturator seat	normal	AISI 316	598	SOD0940156	SOD0940524	SOD0940598
			Stelitted	AISI 316 STELLITE		SDOT970267	SDOT970268	SDOT970269
20	1	Stroke plate		Aluminum	590	TARG940496		
21	1	Packing gland screw		AISI 420	559	VPRS940455		VPRS940596
22	1	Valve body	Normal	Cast iron G500	864	CVGS940152	CVGS940431	CVGS940435
			Stelitted			CVGSXX0674		
24	2	Body gasket		FASIT 400	511	GCRP940452	GCRP940527	GCRP940577
27	2	Packing gland washer		AISI 316	703	RDD088157		RDD092180
34	16	Hexagon nut		Fe 360	608	D1605588F		D20055896
35	16	Flat washer		Fe 360	609	RP16000FE		RP2000304
46	16	Stud bolts		Fe 360	558	PVFD970368		PVFDXX0179
47	1	Hexagon nut		Fe 360	608	D1005588F	D1205588F	D1605588F
48	2	Flange cap		Polyethylen	505	TEP3050100	TEP3050125	TEP3050150
51	1	Bottom		Cast iron	756	FSGS940155	FSGS940531	FSGS940576
67	16	Spring washer		Fe 360	609	RE16000FE		REL2017514
69	4	Stud bolts		Fe 360	555	PVFD970369		
70	4	Hexagon nut		Fe 360	608	D1205588F		
71	4	Spring washer		Fe 360	609	RE12000FE		
72	4	Flat washer		Fe 360	610	RE12000FE		

GROUP 100

Body side spare parts

Spare part code		5416	5417	5418
N° Part.	Q.ty	ND 100	ND 125	ND 150
10	1	PT01626TG		PT02236TG
11	1	MTD088172		MTD088163
24	2	GCRP940452	GCRP940527	GCRP940577

Section Plane – 3-way NC SBS Valve ND 100 to 150



Dwg. nr. 020387 Rev.:00

Details and Spare Parts of 3-way SBS Valve, ND 100 to 150

Part Nr.	Q.	DESCRIPTION		MATERIAL	GR.	ND 100	ND 125	ND 150
6	1	Load adjusting nut		Fe 360	558	DRD086049	DARG010454	DARG940595
7	1	Stroke indicator disk		Fe 360	585	DCD086096	DCD086097	
8	1	Obturator	Deflecting	AISI 316 TEFLON - CARBON	807	OTTR950275		
			Mixing			OT3V950276		
9	1	Intermediate body		Cast iron G500	594	CIGS940454	CIGS940522	CIGS940600
10	1	Packing gland		TEFLON GRAPHITE	587	PT01626TG		PT02236TG
11	1	Packing gland spring		AISI 316	552	MTD088172		MTD088163
13	1	Obturator seat	normal	AISI 316	598	SOD0940156	SOD0940524	SOD0940598
			Stelitted	AISI 316 STELLITE		SDOT970267	SDOT970268	SDOT970269
20	1	Stroke plate		Aluminum	590	TARG940496		
21	1	Packing gland screw		AISI 420	559	VPRS940455		VPRS940596
22	1	Valve body	Normal	Cast iron G500	864	CVGS940152	CVGS940431	CVGS940435
			Stelitted			CVGSXX0674		
24	2	Body gasket		FASIT 400	511	GCRP940452	GCRP940527	GCRP940577
27	2	Packing gland washer		AISI 316	703	RDD088157		RDD092180
34	16	Hexagon nut		Fe 360	608	D1605588F		D20055896
35	16	Flat washer		Fe 360	609	RP16000FE		RP2000304
46	16	Stud bolts		Fe 360	558	PVFD970368		PVFDXX0179
47	1	Hexagon nut		Fe 360	608	D1005588F	D1205588F	D1605588F
48	2	Flange cap		Polyethylen	505	TEP3050100	TEP3050125	TEP3050150
51	1	Three-way bottom		Cast iron	756	FSGS940154	FSGS940433	FSGS940437
67	16	Spring washer		Fe 360	609	RE16000FE		REL2017514
69	4	Stud bolts		Fe 360	555	PVFD970369		
70	4	Hexagon nut		Fe 360	608	D1205588F		
71	4	Spring washer		Fe 360	609	RE12000FE		
72	4	Flat washer		Fe 360	610	RE12000FE		

GROUP 100

Body side spare parts

Spare part code		5416	5417	5418
N° Part.	Q.ty	ND 100	ND 125	ND 150
10	1	PT01626TG		PT02236TG
11	1	MTD088172		MTD088163
24	2	GCRP940452	GCRP940527	GCRP940577

Table 5: Servocontrol Springs

SERV DIA	STROKE (mm)	SIGNAL											
		3 to 15		6 to 18		6 to 30		9 to 32		3 to 9		9 to 15	
		Nr.	Gasket	Nr.	Gasket	Nr.	Gasket	Nr.	Gasket	Nr.	Gasket	Nr.	Gasket
200	15	3	MTD086100	3	MTD086101	6	MTD086100	6	MTD086102	3	MOLL092037	3	MOLL940412
275	15	3	MTD086106	6	MTD086107	6	MTD086106	6	MTD086108	3	MTD086107	3	MOLL092038
360	15	6	MTD086106	12	MTD086107	12	MTD086106	12	MTD086108	6	MTD086107		
430	15	4	MTD086103	8	MTD086104	8	MTD086103	8	MTD086105	4	MTD086104		
	30	4	MOLL950278	8	MOLL950279	8	MOLL950278						

Table 6: Tightening Torques

Details Combination	Tightening torque for threaded couplings in SBS valves [$Kg_f \cdot m$]															
	Servocontrol Couplings $Ø_e$ Serv.					Body couplings ND										
	200	275	360	430 C0.15	430 C0.30	15	20	25	32	40	50	65	80	100	125	150
P. 42	1.6															
P.14 - P.43	0.6															
P.36 - P.40	0.6	1.6														
P.73 - P.18					9.3											
P.69 - P.70														5.8		
P.46 - P.34						3.3			5.8					14.7		28.8
P.47 - P.6						1.6						3.3			5.8	14.7
P.51 - P.22												60	60			
P.53 - P.22						40	60	60	60	60	60	60	60			
P.56 - P.57						0.4										
P.61 - P.63						3.3			5.8							
P.64 - P.75														60		

Valve Life

The SBS series valve has been designed and constructed to guarantee the proper operation under the conditions and limits provided by the technical characteristic.
All the fixed metallic parts, which do not have a seal function, have a life of 10 years. Seal parts and moving ones shall undergo a complete overhauling in the minor time interval between 500000 maneuvers and three years.
The overhauling operations must be performed by qualified personnel only.
Periodic maintenance operations must be performed independently of those carried out as a result of possible damages, which always require an immediate intervention.

Disposal

After use, for the valve disposal, it is necessary to disassemble the valve and separate the different materials the valve is composed of, according to the tables annexed to the valve working drawings, then dispose of the different materials in compliance with the laws in force.
The disassembly operations must be performed by qualified personnel only, equipped with the necessary processing and safety equipment. **CAUTION! Compressed springs are present inside the servocontrol.** For this reason, during the valve disassembly, for the disposal of components, proper safety equipment shall be used, which, once the fastening screws of the servocontrol upper head have been removed, prevent the upper head from suddenly come off the lower head.

NOTES:

- Safety conditions ca not be warranted and wrong workings can not be attributed to our valves if:
  - Disassembly, assembly and maintenance operations are not carried out following the instructions described in this manual.
  - Original spare parts are not used.
- It is forbidden to remove pages from this document or to make any correction.
- In case of doubt, make reference to Italian version of the manual.
- ITALVALVOLE® S.A.S. reserves the right to make modification and/or amendment to its products and relevant documentation without giving notice.
- The use of the handbook does not exempt from the observance of the laws in force.