CAST IRON GRS VALVES
FAMILY 01 - GROUP 33,34

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

Code: 7680
Category: 9999
Group: 900
Revision no.: 04
Date: January 25th, 2013
Drawn up by: LF
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DECLARATION OF CONFORMITY

Code: **DPED00933** REV. 00 Date: March 1st, 2002

Family nr 1 **ON-OFF GLOBE VALVES – SERIES CAST IRON GRS EN – GJL250 EN1561;**

Groups: **33, 34**

We ITALVALVOLE S.A.S. of Spadon Oscar & C., via Amendola 125, 13836 Cossato (BI), declare that:
the on-off globe valve, series GRS 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: **DPED009C1** REV. 00 Date: March 1st, 2002

Family nr 1 **ON-OFF GLOBE VALVES - SERIES GRS**
CAST IRON EN – GJL250 EN1561
CAST IRON EN – GJS500-7 EN1563

Groups: **33, 34**

We ITALVALVOLE S.A.S. of Spadon Oscar & C., via Amendola 125, 13836 Cossato (BI), declare that:
the on-off globe valve – series GRS 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

Table of contents

1. Foreword

The valves series GRS 93 are used to control the flow of overheated water, liquids, gas and vapours inside pipes.
The valve shall be normally operated by a pilot automatic on-off valve using air as servocontrol fluid or by an hand-operated pneumatic remote control panel.
The opening and closing of the valves are possible thanks to the variation of the pneumatic signal arriving to the servomotor (pneumatic head of the valve).
The piston, the springs and valves shutters 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 on-off valves GRS 93 shall be supplied normally closed NC (air opens), or normally open NO (air closes).
In any case, being the servomotor reversible, a NC valve can be turned into a NO one, or vice-versa, just replacing the spring and a few detail components.

2. Legend

- **$\Delta p_{\text{allowable}}$** (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 no dimensional whole number which is indirectly related to the physical dimension, expressed in millimetres, 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).

3. Technical Characteristics

SBS GRS 93 TWO-WAY PN 16 CAST IRON D.V.

General notice: ⇒ all the pressure values indicated hereinafter are gauge pressure values.
⇒ **valve destined to fluids of group 2 (directive 97/23/EC).**
ND: ⇒ 15 to 80
Connections: ⇒ flanged in compliance with UNI PN 16
Pmax allowable: ⇒ 16 bar (1)
Pmin allowable: ⇒ 0 bar.
Seal: ⇒ PEEK, metallic and stellited (the stellited seat is suggested for $\Delta p>10$ bar)
Shutter characteristic: ⇒ equally percentage, linear
Tmax allowable.: ⇒ +200 °C PEEK
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.
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): ⇒ 6 bar.
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

3.1. 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% E (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 the 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.

3.2. Table2: Δp of 2-way GRS ND 15 to 80 valves, without bellows

					Δp						
					NC VALVES			NO VALVES			N. FOR VALVE DEFINITION
Control Min pressure BAR					2	4	6	2	4	6	
ND	**Φ seat [mm]**	**Kvs**	**CV**	**Φi servocontrol [mm]**	Letters for valve definition						
					A	B	C	M	N	O	
15	3	0.1	0.117	70	16	16	16	16	16	16	1
	6	0.42	0.49		16	16	16	16	16	16	2
	15	2.8	3.2		16	16	16	16	16	16	3
20	8	1.1	1.28	70	16	16	16	16	16	16	4
	15	2.5	2.9		16	16	16	16	16	16	5
	20	7.8	9.1		11	16	16	13	16	16	6
25	15	2.4	2.8	70	16	16	16	16	16	16	7
	20	7	8.2		11	16	16	13	16	16	8
	24	13.5	15.7		8	14	14	9	16	16	9
32	20	6.6	7.7	80	14	16	16	16	16	16	10
	24	12.2	14.2		12	16	16	14	16	16	11
	31	15.2	17.7		7,5	15	16	8	16	16	12
40	24	11.5	13.4	80	12	16	16	14	16	16	13
	31	13.7	16		7,5	15	16	8	16	16	14
	38	25.8	30.1		5	10	14	5,5	14	16	15
50	31	12.9	15	80	7,5	15	16	8	16	16	16
	38	23.2	27.1		5	10	14	5,5	14	16	17
	48	33	38.6		3	6	9	3,5	9	14	18
65	38	21.9	25.6	125		14	16		14	16	19
	48	29.7	34.7			9	16		11	16	20
	63	62	72.5			5	14		9	14	21
80	48	28	25.6	125		9	16		11	16	22
	63	55.8	65.2			5	14		9	14	23
	78	119	139			3,3	9		5,9	9,2	24

3.3. Table 3: Δp of 2-way GRS ND 15 to 80 valves, with bellows

					Δp						N. FOR VALVE DEFINITION
					NC Valves			NO Valves			
Control Min pressure BAR					2	4	6	2	4	6	
ND	**Φ seat [mm]**	**Kvs**	**CV**	**Φi servocontrol [mm]**	Letters for valve definition						
					A	B	C	M	N	O	
15	3	0.1	0.117	70	6,4	7	7	2	9,7	16	1
	6	0.42	0.49		6,4	7	7	2	9,7	16	2
	15	2.8	3.2		6,3	6,8	6,8	1,8	9,5	16	3
20	8	1.1	1.28	70	6,4	7	7	2	9,7	16	4
	15	2.5	2.9		6,3	6,9	6,9	1,9	9,6	16	5
	20	7.8	9.1		6,1	6,8	6,8	1,7	9,5	16	6
25	15	2.4	2.8	70	6,3	6,9	6,9	1,9	9,6	16	7
	20	7	8.2		6,1	6,8	6,8	1,7	9,5	16	8
	24	13.5	15.7		6	6,6	6,6	1,6	9,3	16	9
32	20	6.6	7.7	80	7,3	12,5	16	4	13,7	16	10
	24	12.2	14.2		7,2	12,4	16	3,8	13,6	16	11
	31	15.2	17.7		6,9	12,1	16	3,6	13,3	16	12
40	24	11.5	13.4	80	7,2	12,4	16	3,8	13,6	16	13
	31	13.7	16		6,9	12,1	16	3,6	13,3	16	14
	38	25.8	30.1		5	10	14	3,2	12,9	16	15
50	31	12.9	15	80	6,9	12,1	16	3,6	13,3	16	16
	38	23.2	27.1		5	10	14	3,2	12,9	16	17
	48	33	38.6		3	6	9	2,5	9	14	18
65	38	21.9	25.6	125		14	16		14	16	19
	48	29.7	34.7			9	16		11	16	20
	63	62	72.5			5	14		9	14	21
80	48	28	25.8	125		9	16		11	16	22
	63	55.8	65.2			5	14		9	14	23
	78	119	139			3,3	9		5,9	9,2	24

3.4. Table2: Δp of 2-way maggiorate GRS ND 15 to 80 valves, without bellows

					Δp		Δ p
					NC Valves	NC Valves	
Control Min pressure BAR					6	6	
ND	**Φ seat [mm]**	**Kvs**	**CV**	**Φi** servocontrol **[mm]**	Letters for valve definition		
					C	O	
15	3	0.1	0.117	80	16	16	1
	6	0.42	0.49		16	16	2
	15	2.8	3.2		16	16	3
20	8	1.1	1.28	80	16	16	4
	15	2.5	2.9		16	16	5
	20	7.8	9.1		16	16	6
25	15	2.4	2.8	80	16	16	7
	20	7	8.2		16	16	8
	24	13.5	15.7		16	16	9
32	20	6.6	7.7	125	16	16	10
	24	12.2	14.2		16	16	11
	31	15.2	17.7		16	16	12
40	24	11.5	13.4	125	16	16	13
	31	13.7	16		16	16	14
	38	25.8	30.1		16	16	15
50	31	12.9	15	125	16	16	16
	38	23.2	27.1		16	16	17
	48	33	38.6		16	16	18
65	38	21.9	25.6	160	16	16	19
	48	29.7	34.7		16	16	20
	63	62	72.5		16	16	21
80	48	28	25.6	160	16	16	22
	63	55.8	65.2		16	16	23
	78	119	139		13,9	16	24

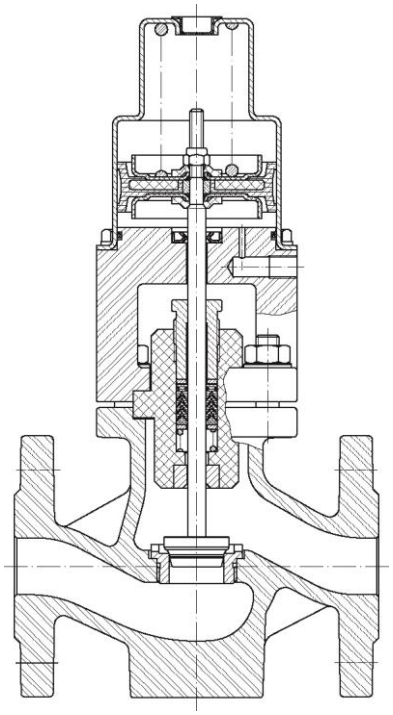
3.5. Table2: Δp of 2-way maggiorate GRS ND 15 to 80 valves, with bellows

					Δp		Δ p
					NC Valves	NC Valves	
Control Min pressure BAR					6	6	
ND	**Φ seat [mm]**	**Kvs**	**CV**	**Φi** servocontrol **[mm]**	Letters for valve definition		
					C	O	
15	3	0.1	0.117	80	16	16	1
	6	0.42	0.49		16	16	2
	15	2.8	3.2		16	16	3
20	8	1.1	1.28	80	16	16	4
	15	2.5	2.9		16	16	5
	20	7.8	9.1		16	16	6
25	15	2.4	2.8	80	16	16	7
	20	7	8.2		16	16	8
	24	13.5	15.7		16	16	9
32	20	6.6	7.7	125	16	16	10
	24	12.2	14.2		16	16	11
	31	15.2	17.7		16	16	12
40	24	11.5	13.4	125	16	16	13
	31	13.7	16		16	16	14
	38	25.8	30.1		16	16	15
50	31	12.9	15	125	16	16	16
	38	23.2	27.1		16	16	17
	48	33	38.6		16	16	18
65	38	21.9	25.6	160	16	16	19
	48	29.7	34.7		16	16	20
	63	62	72.5		16	16	21
80	48	28	25.6	160	16	16	22
	63	55.8	65.2		16	16	23
	78	119	139		13,9	16	24

3.6. Safety Notes

- The valve body, under the maximum operating temperature depending upon the system, may reach a temperature T equal to 200° C. 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.

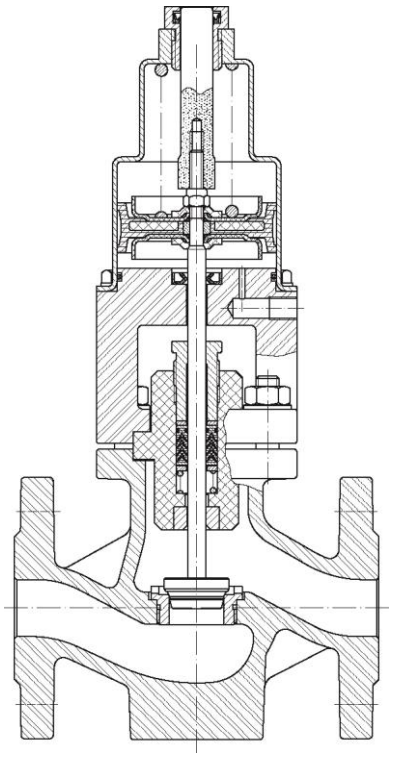
3.7. Types of GRS Valves Manufactured since 1987



POS.1

Valves manufactured from 1987 to 1991

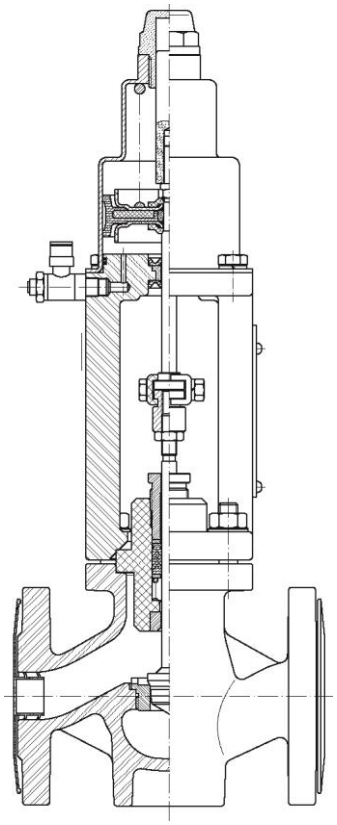
The GRS valves manufactured from 1987 to 1991 used, on the body side, the SBS valve details: they had a fast-opening type plug. Another important feature was a very low valve mount, which enabled the use of a single plug stem as a stem for the cylinder servocontrol with TDUOP seal.



POS.2

Valves manufactured from 1991 to 1993

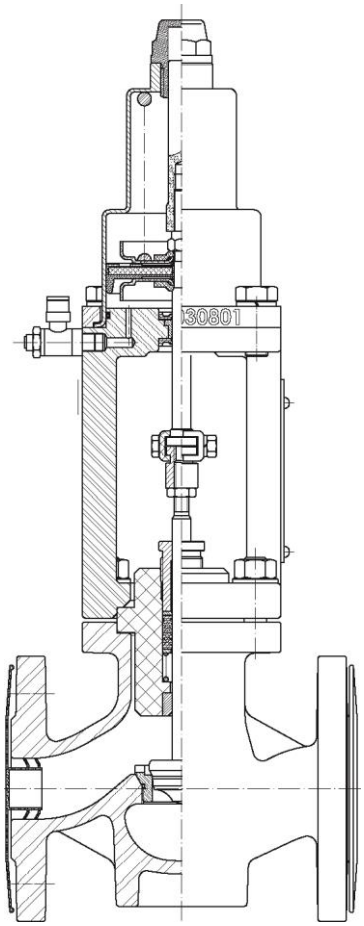
The GRS valves manufactured from 1991 to 1993 have the same characteristics as those of the previous versions. The only innovation was the introduction of a visual device consisting of a red PVC travel indicator sticking out from above the spring-holding cylinder.



POS.3

Valves manufactured from 1993 to mid 2004

The GRS valves manufactured from 1993 to mid 2004 differ from those produced before 1993 for a few important aspects. First of all, the lengthening of the valve mount, to avoid excessive overheating of the seals inside the servocontrol, by the introduction of a stem connecting the plug with the TDUOP sealed piston. Secondly, the fitting of a transparent plastic cap, inside which the red PVC travel indicator is sliding.



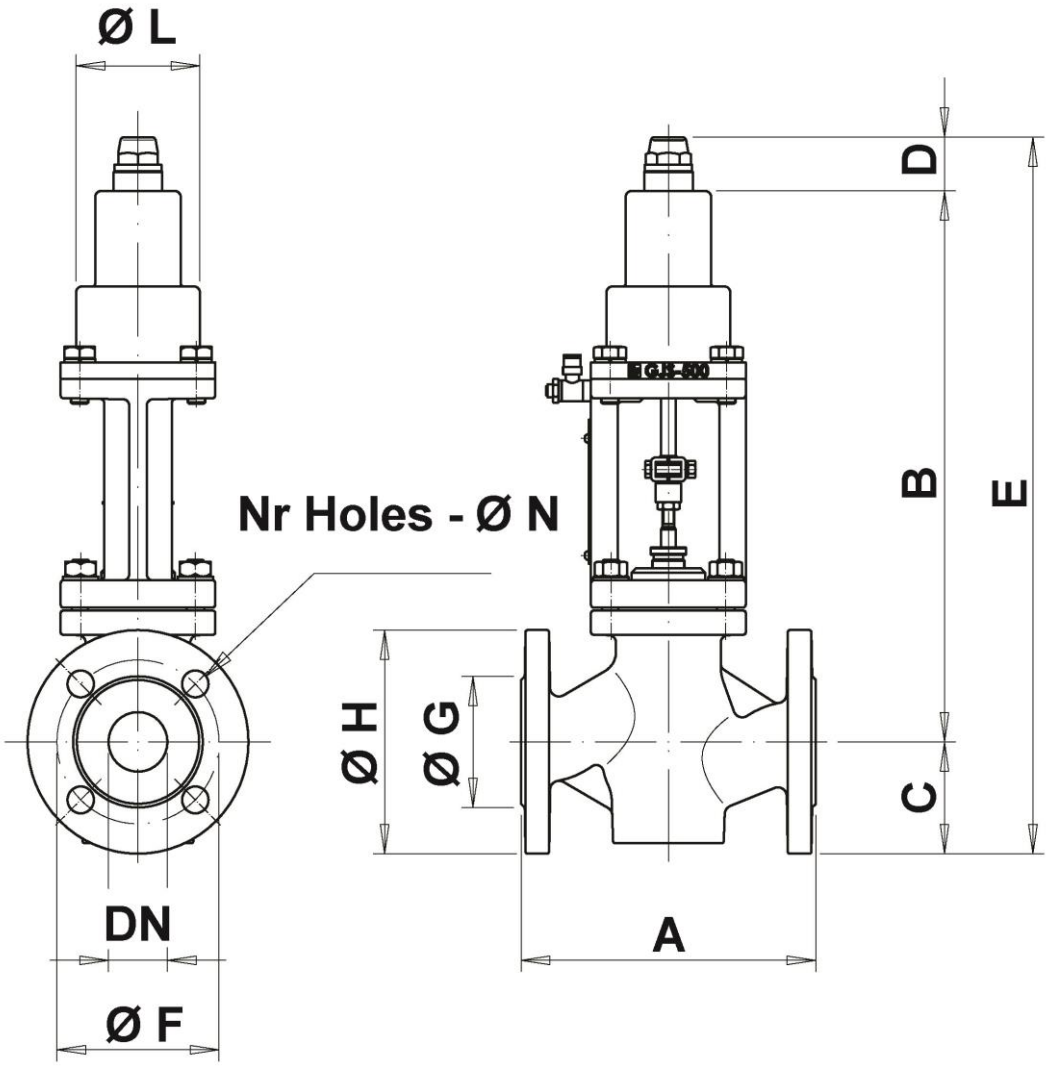
POS.4

Valves manufactured from mid 2004

The GRS valves manufactured from mid 2004 differ from those produced since 1993 for a few essential aspects. The spring-holding cylinder with square base is no longer used and it is replaced by that with round base already used in the STAINLESS STEEL series valves; to fix it to the valve mount, a cast-iron plate is used. The double-lip TDUOP sealed piston is replaced by the single-lip version. The seat housing in the valve body is tapered to ensure a perfect centering of the seat itself on the inside of the body.

3.8. Overall Dimensions of GRS Valves

3.8.1. 2-way GRS Cast Iron Valves ND 15 to 80 D.V. group: 33

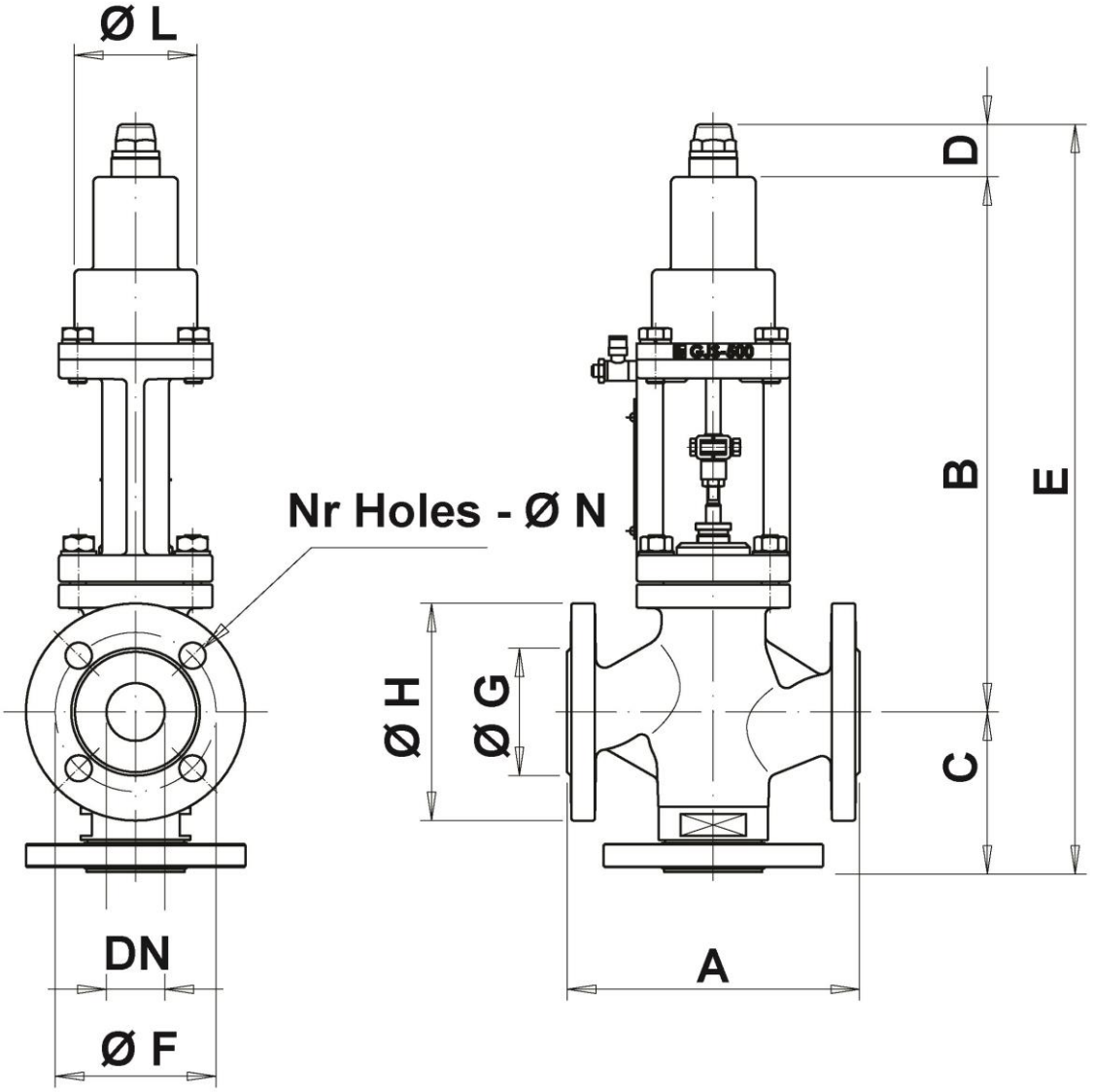


Drawing nr. 030009 Rev:01

ND	A	B	C	D	E	Ø F	Ø G	Ø H	Ø L	Ø N	holes nr.
15	130	325,5	48	36,5	410	65	45	95	70	14	4
20	150	325,5	53	36,5	415	75	58	105	70	14	4
25	160	325,5	58	36,5	420	85	68	115	70	14	4
32	180	369,5	70	36,5	476	100	78	140	80	18	4
40	200	369,5	75	36,5	481	110	88	150	80	18	4
50	230	369,5	82.5	36,5	488,5	125	102	165	80	18	4
65	290	515,5	125	60,5	701	145	122	185	125	18	4
80	310	515,5	136.5	60,5	712,5	160	138	200	125	18	8

Dimensions are in millimeters

3.8.2. 3-way GRS Cast Iron Valves ND 15 to 80 D.V. group: 34

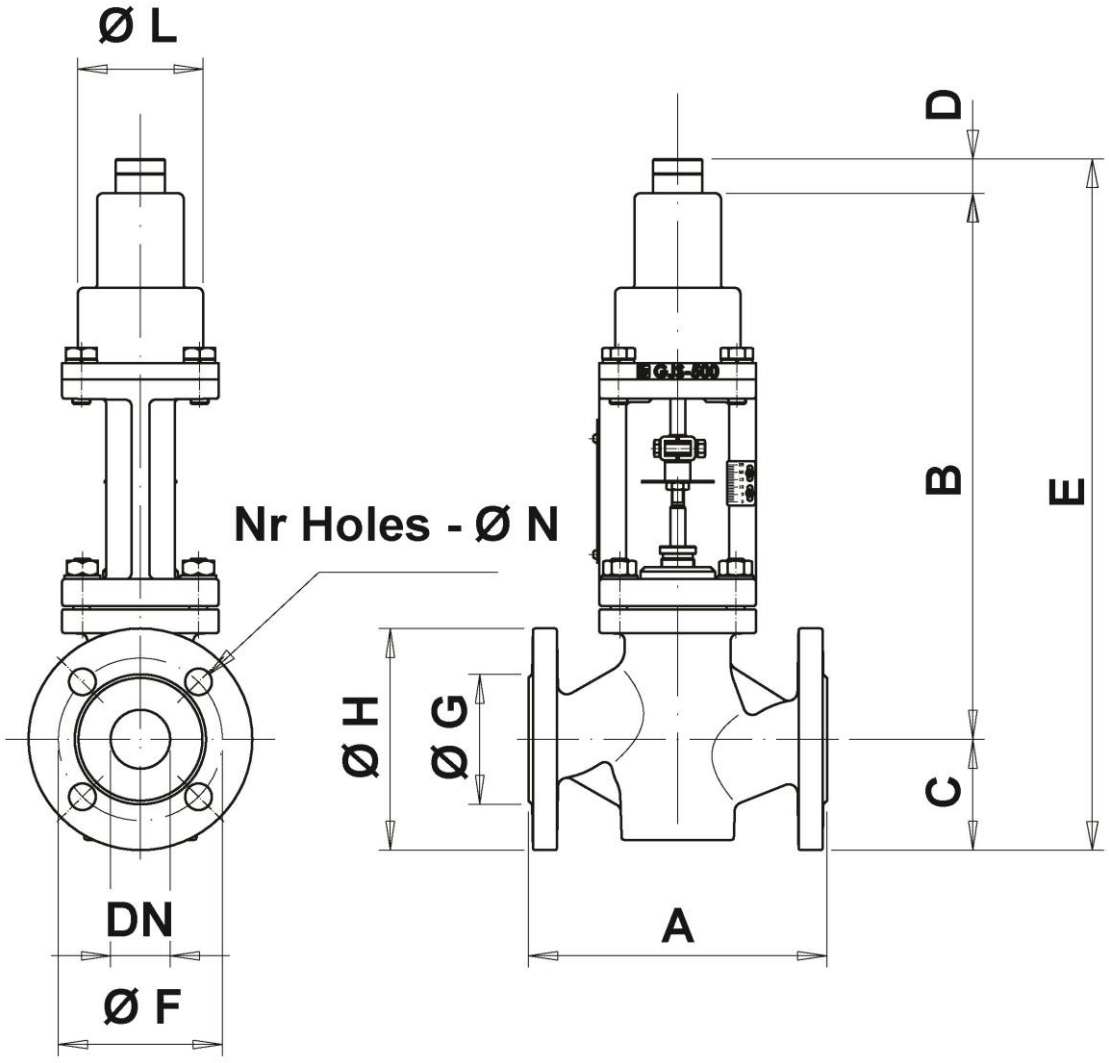


Drawing nr. 030010 Rev:01

ND	A	B	C	D	E	Ø F	Ø G	Ø H	Ø L	Ø N	holes nr.
15	130	325,5	84	36,5	446	65	45	95	70	14	4
20	150	325,5	87,5	36,5	449,5	75	58	105	70	14	4
25	160	325,5	92,5	36,5	454,5	85	68	115	70	14	4
32	180	369,5	100,5	36,5	506,5	100	78	140	80	18	4
40	200	369,5	110,5	36,5	516.5	110	88	150	80	18	4
50	230	369,5	116,5	36,5	522,5	125	102	165	80	18	4
65	290	515,5	145	60,5	721	145	122	185	125	18	4
80	310	515,5	154,5	60,5	730,5	160	138	200	125	18	8

Dimensions are in millimeters

3.8.3. 2-way GRS NO Cast Iron Valves ND 15 to 80 D.V. group: 33

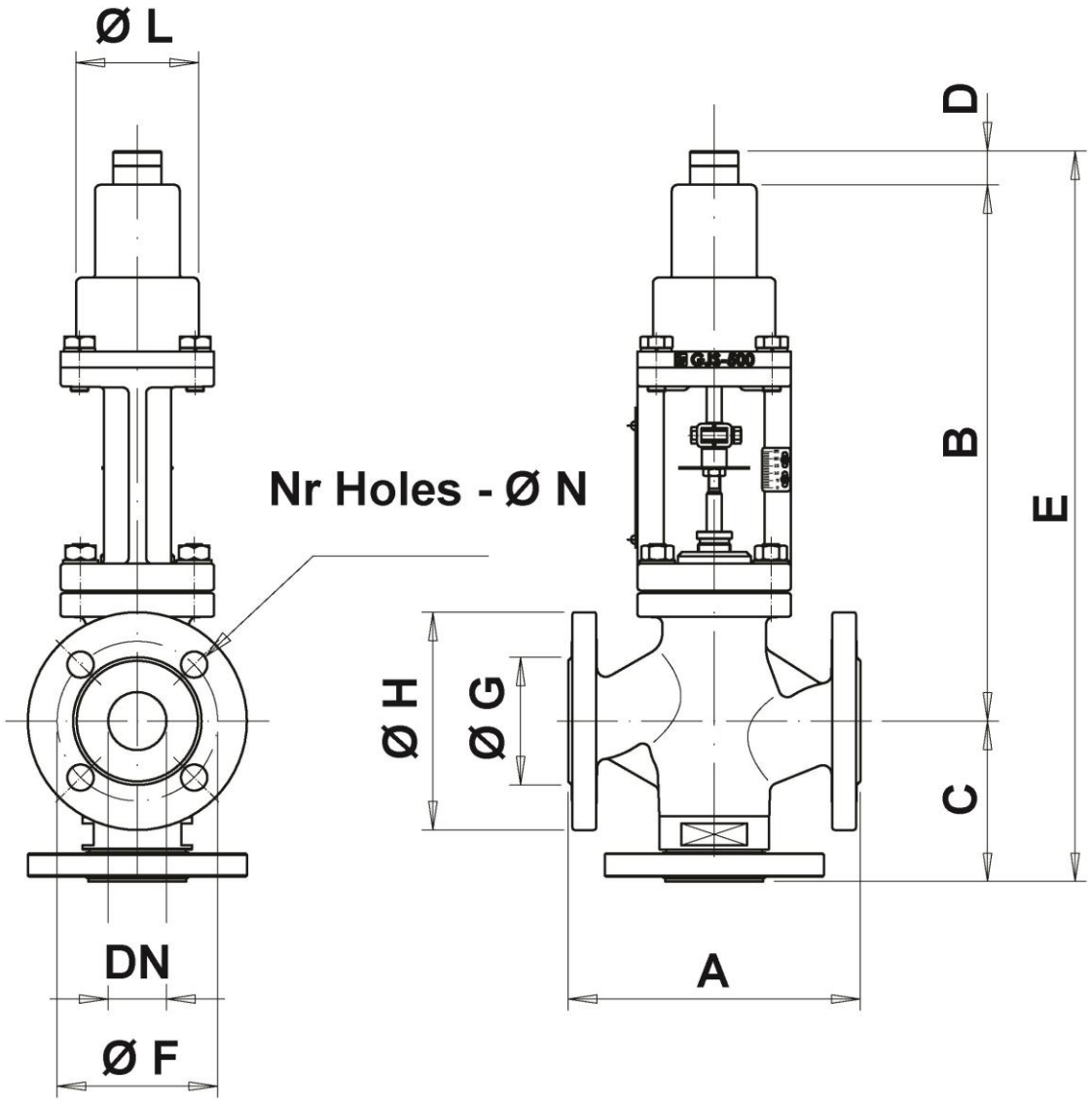


Drawing nr. 030011 Rev:01

ND	A	B	C	D	E	Ø F	Ø G	Ø H	Ø L	Ø N	holes nr.
15	130	325,5	48	23	396,5	65	45	95	70	14	4
20	150	325,5	53	23	401,5	75	58	105	70	14	4
25	160	325,5	58	23	406,5	85	68	115	70	14	4
32	180	369,5	70	23	462,5	100	78	140	80	18	4
40	200	369,5	75	23	467,5	110	88	150	80	18	4
50	230	369,5	82,5	23	475	125	102	165	80	18	4
65	290	567,5	125	28	720,5	145	122	185	125	18	4
80	310	567,5	136,5	28	732	160	138	200	125	18	8

Dimensions are in millimeters

3.8.4. 3 -way GRS NO Cast Iron Valves ND 15 to 80 D.V. group: 34

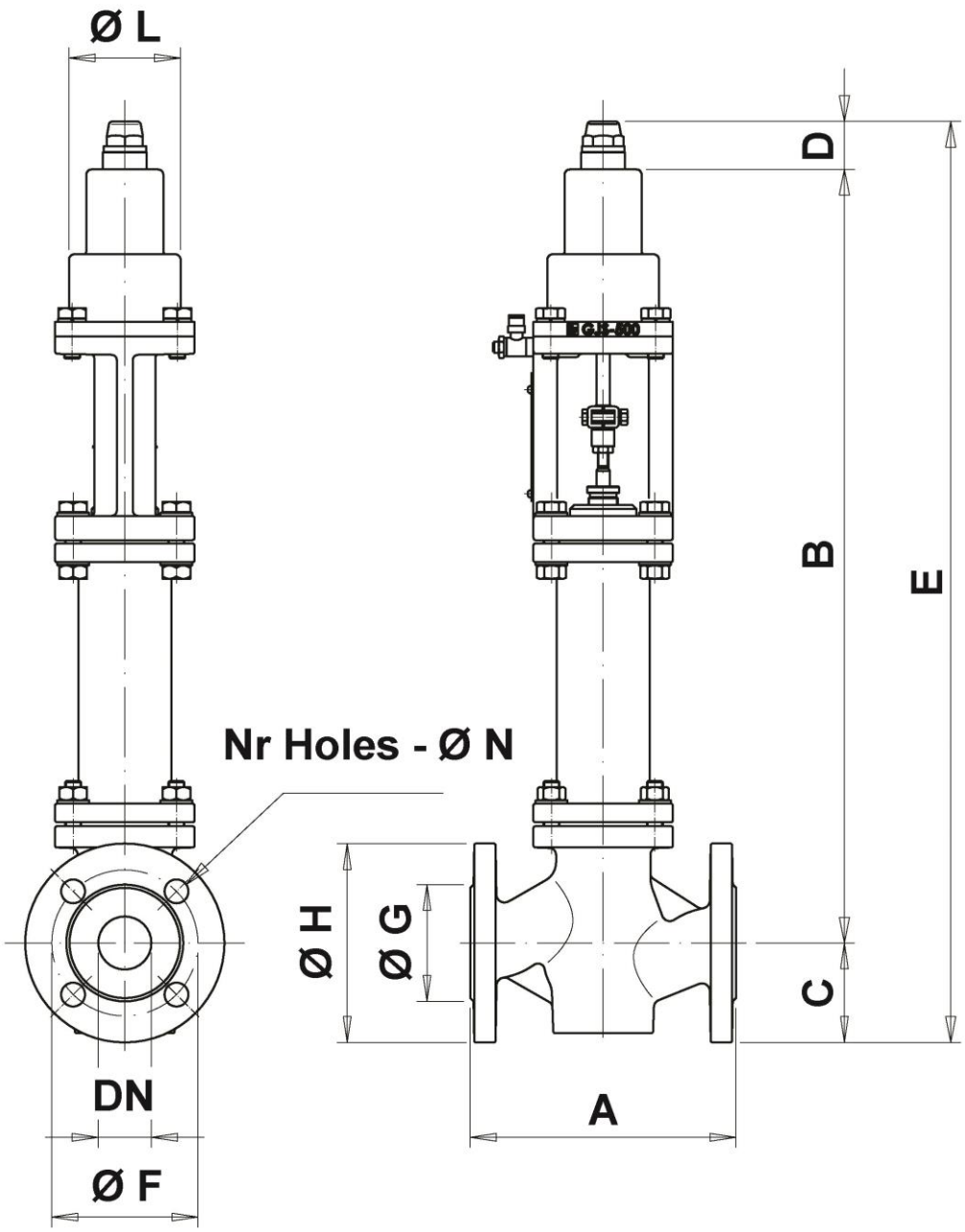


Drawing nr. 030012 Rev:01

ND	A	B	C	D	E	Ø F	Ø G	Ø H	Ø L	Ø N	holes nr.
15	130	325,5	84	23	432,5	65	45	95	70	14	4
20	150	325,5	87,5	23	436	75	58	105	70	14	4
25	160	325,5	92,5	23	441	85	68	115	70	14	4
32	180	369,5	100,5	23	493	100	78	140	80	18	4
40	200	369,5	110,5	23	503	110	88	150	80	18	4
50	230	369,5	116,5	23	509	125	102	165	80	18	4
65	290	567,5	145	28	740,5	145	122	185	125	18	4
80	310	567,5	154,5	28	750	160	138	200	125	18	8

Dimensions are in millimeters

3.8.5. 2-way GRS Cast Iron Valves ND 15 to 80 D.V. with bellows group: 33

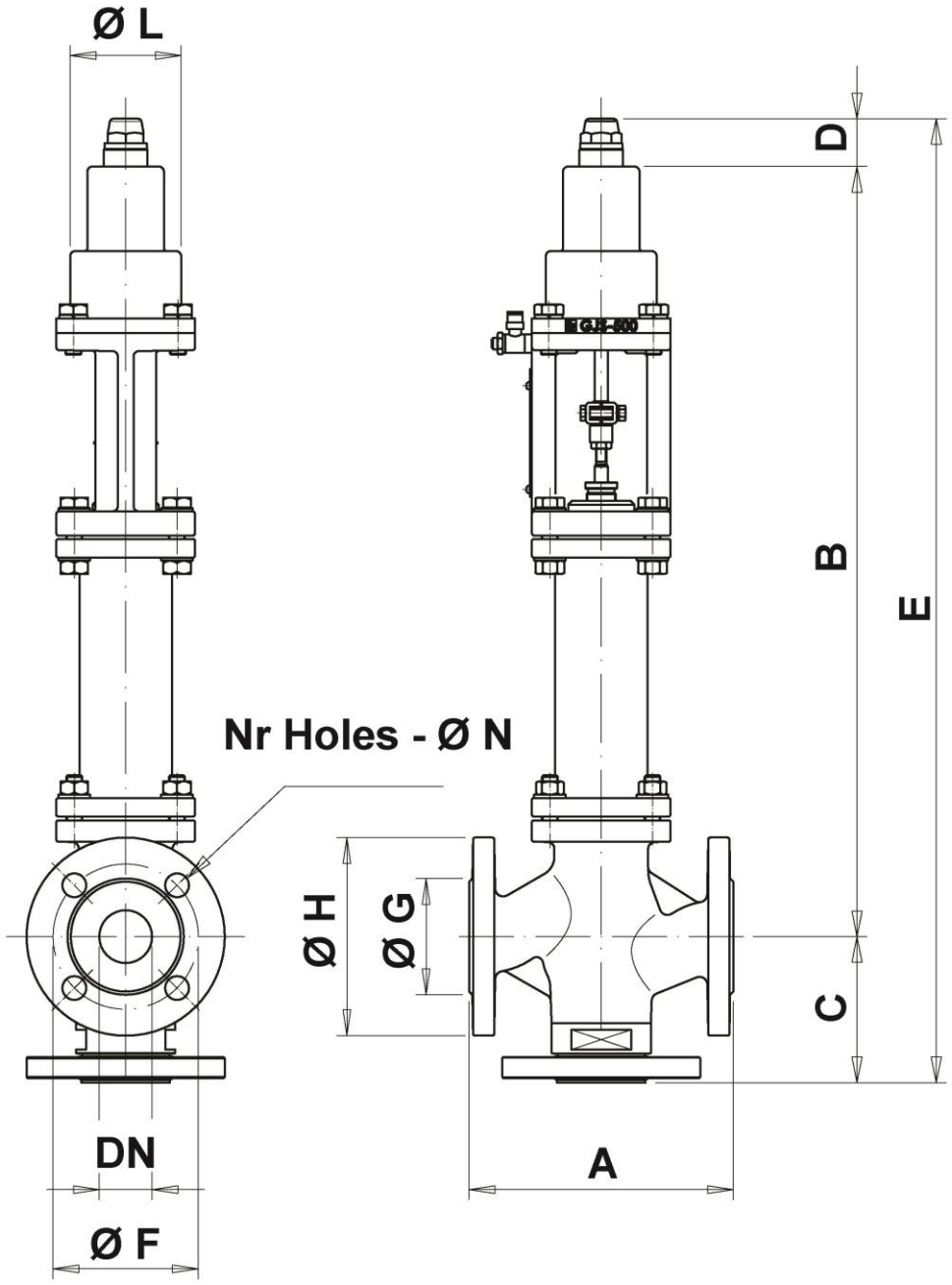


Drawing nr. 030013 Rev:01

ND	A	B	C	D	E	Ø F	Ø G	Ø H	Ø L	Ø N	holes nr.
15	130	525,5	48	36,5	610	65	45	95	70	14	4
20	150	525,5	53	36,5	615	75	58	105	70	14	4
25	160	525,5	58	36,5	620	85	68	115	70	14	4
32	180	583	70	36,5	689,5	100	78	140	80	18	4
40	200	583	75	36,5	694,5	110	88	150	80	18	4
50	230	583	82,5	36,5	702	125	102	165	80	18	4
65	290	697	125	60,5	882,5	145	122	185	125	18	4
80	310	697	136,5	60,5	894	160	138	200	125	18	8

Dimensions are in millimeters

3.8.6. 3-way GRS Cast Iron Valves ND 15 to 80 D.V. with bellows group: 34

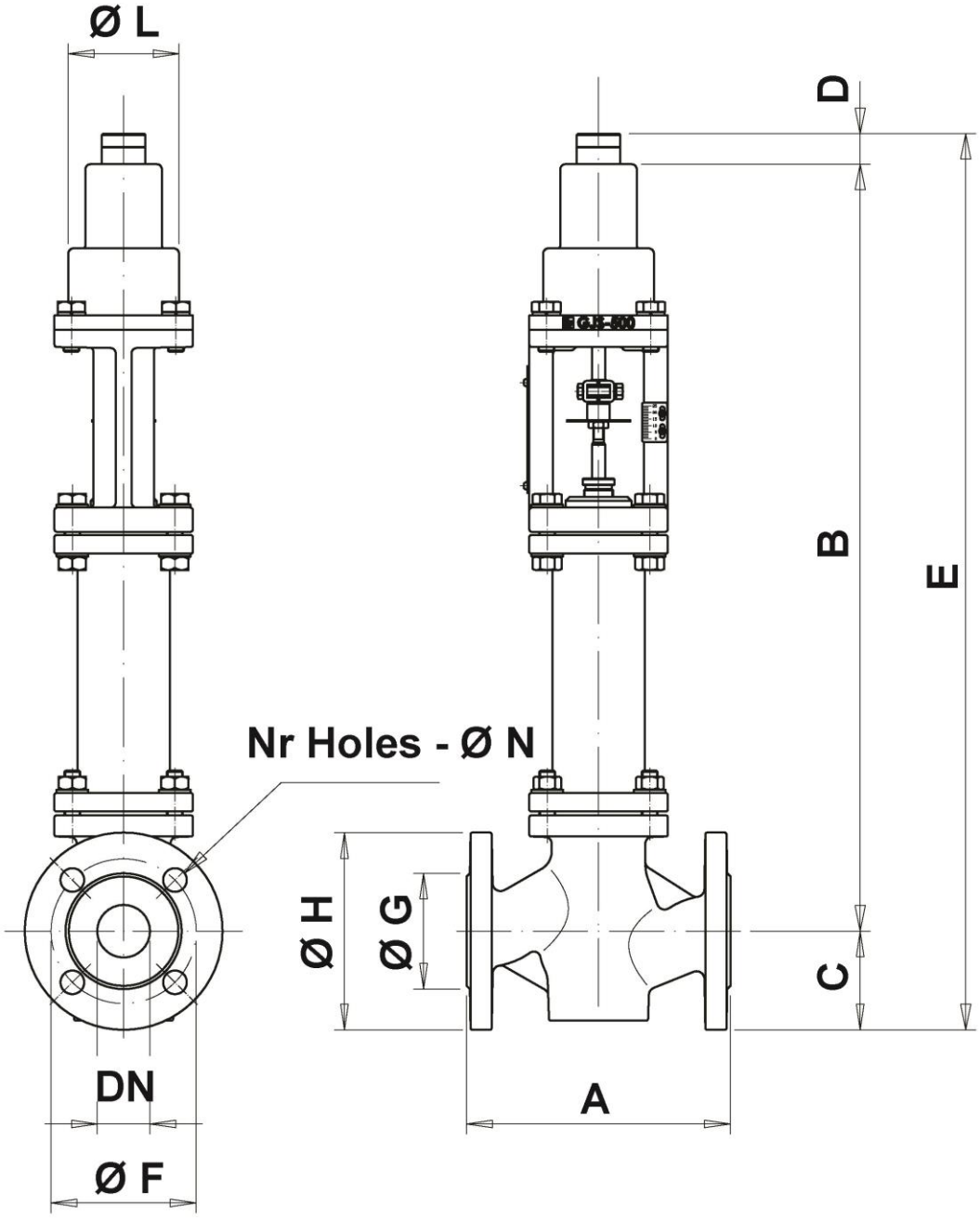


Drawing nr. 030014 Rev:01

ND	A	B	C	D	E	Ø F	Ø G	Ø H	Ø L	Ø N	holes nr.
15	130	525,5	84	36,5	646	65	45	95	70	14	4
20	150	525,5	87,5	36,5	649,5	75	58	105	70	14	4
25	160	525,5	92,5	36,5	654,5	85	68	115	70	14	4
32	180	583	100,5	36,5	720	100	78	140	80	18	4
40	200	583	110,5	36,5	730	110	88	150	80	18	4
50	230	583	116,5	36,5	736	125	102	165	80	18	4
65	290	697	145	60,5	902,5	145	122	185	125	18	4
80	310	697	154,5	60,5	912	160	138	200	125	18	8

Dimensions are in millimeters

3.8.7. 2 -way GRS NO Cast Iron Valves ND 15 to 80 D.V with bellows group: 33

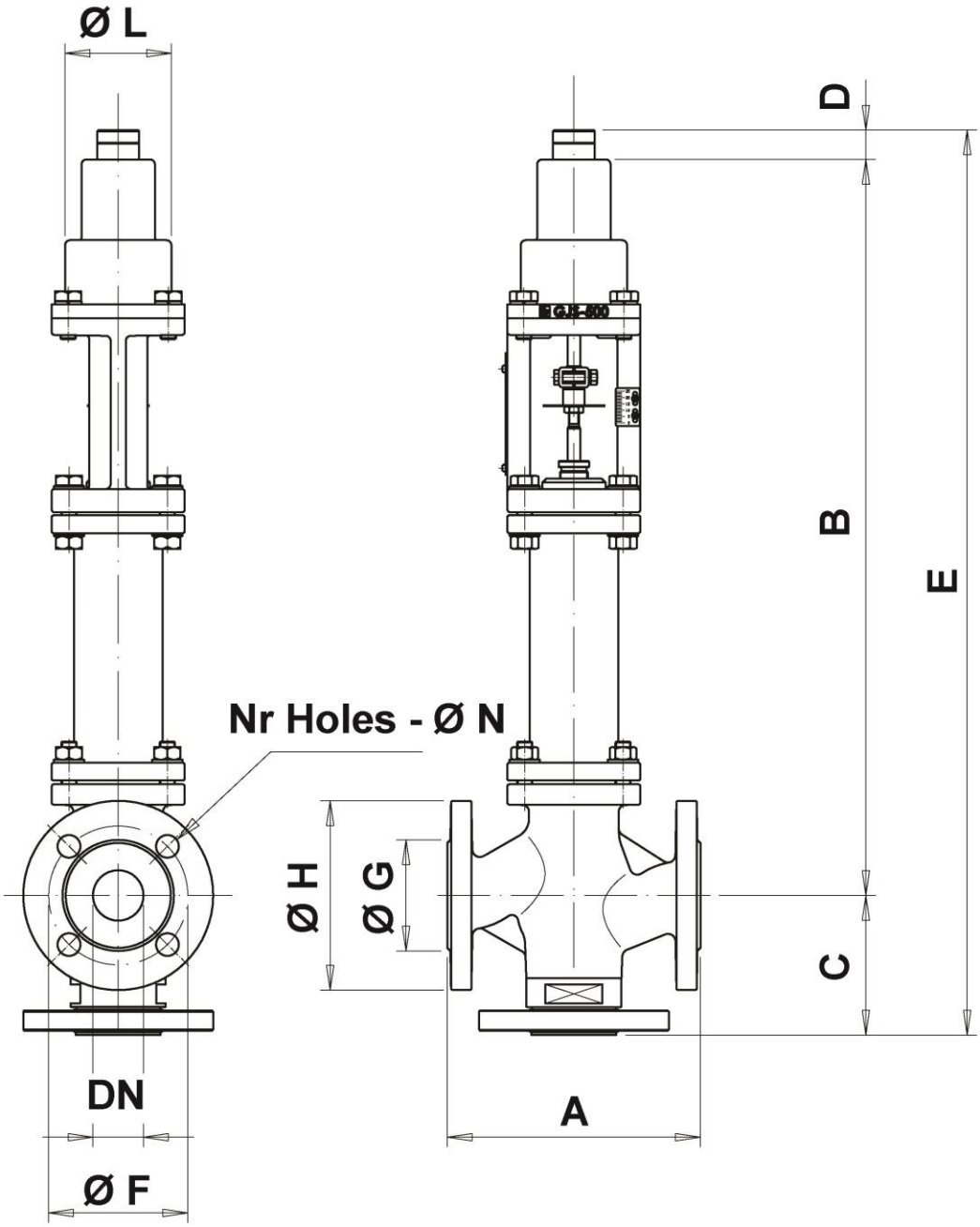


Drawing nr. 030015 Rev:01

ND	A	B	C	D	E	Ø F	Ø G	Ø H	Ø L	Ø N	holes nr.
15	130	525,5	48	23	596,5	65	45	95	70	14	4
20	150	525,5	53	23	601,5	75	58	105	70	14	4
25	160	525,5	58	23	606,5	85	68	115	70	14	4
32	180	583	70	23	676	100	78	140	80	18	4
40	200	583	75	23	681	110	88	150	80	18	4
50	230	583	82,5	23	688,5	125	102	165	80	18	4
65	290	749	125	28	902	145	122	185	125	18	4
80	310	749	136,5	28	913,5	160	138	200	125	18	8

Dimensions are in millimeters

3.8.8. 3 -way GRS NO Cast Iron Valves ND 15 to 80 D.V. with bellows group: 34



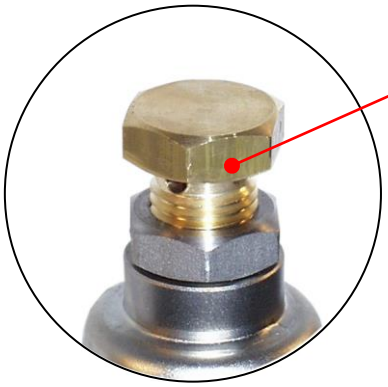
Drawing nr. 030018 Rev:01

ND	A	B	C	D	E	Ø F	Ø G	Ø H	Ø L	Ø N	holes nr.
15	130	525,5	84	23	632,5	65	45	95	70	14	4
20	150	525,5	87,5	23	636	75	58	105	70	14	4
25	160	525,5	92,5	23	641	85	68	115	70	14	4
32	180	583	100,5	23	706,5	100	78	140	80	18	4
40	200	583	110,5	23	716,5	110	88	150	80	18	4
50	230	583	116,5	23	722,5	125	102	165	80	18	4
65	290	749	145	28	922	145	122	185	125	18	4
80	310	749	154,5	28	931,5	160	138	200	125	18	8

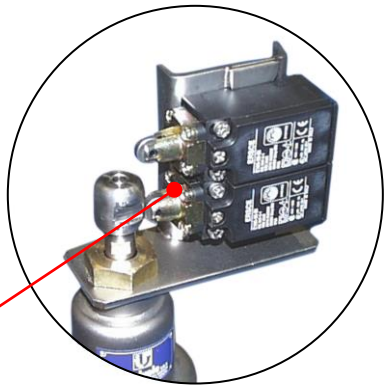
Dimensions are in millimeters

4. Fittings

GRS valves may be fitted with various fittings, to meet the different customer's requirements.

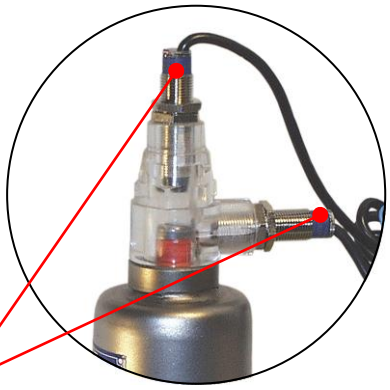


STROKE LIMITING DEVICE
The stroke limiting device permits to limit the valve stroke to the required value.



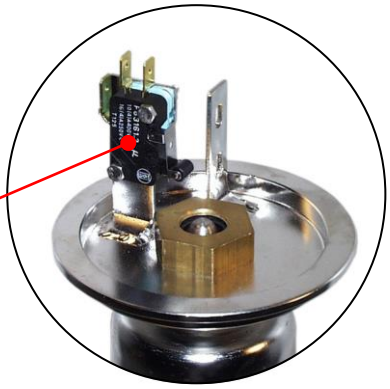
ELECTRIC LIMIT SWITCH (G 809)
It is operated from the movement of the shutter stem and detects the valve on/off condition.

MAGNETIC SENSOR (G 809)
This sensors permits to detect the valve opening: it is activated by a magnet translating together with the shutter.



INDUCTIVE SENSOR (G 809)
This sensor permits to detect the valve on/off condition.

SENSOR BOX (G 809)
The sensor box is fitted on the upper part of the servo control: inside it electric or pneumatic limit stops can be fitted.



5. Storage, Assembly, Check and Maintenance

5.1. Transport, Storage and Handling

GRS 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 (handwheels, solenoid valves, pneumatic limit switches or proximity sensors).

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

Valves shall be stored in areas which are not exposed to the sunshine, so as to prevent 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.

5.2. Assembly Instructions

5.2.1. 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 any case the valve must not be disassembled or modified, under pain of revocation of each type of guarantee.

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

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

The compressed air shall be instrument air, with a pressure ranging between 2 and 6 bar, depending upon the duty values of the servocontrol, in no way higher than 6 bar, with supply pipes made of nylon $ø_{int.}$ = 4 mm The air connections on the valve shall be made of 1/8” threaded coupling.

5.2.2. 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 servocontrol facing 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.

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 tightens 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.

5.3. 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 shutter at the operating pressure, (check that it is always lower than the maximum allowable pressure indicated on the data plate).

Blow air into the servocontrol equal to the control signal as indicated on the data plate (the valve should start to open, this data can be read on the data 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 shutter at the operating pressure, (check that it is always lower than the maximum allowable pressure indicated on the data plate).
2) Blow air into the servocontrol equal to the control signal as indicated on the data plate (the valve should start to close; this data can be read on the data plate).
3) Repeat this operation 5 times.
4) Check, with air off, that there are no valve leakages.
5) Check, with air on, that there are no air leakages from the servo control.

5.4. 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.

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.

5.4.1. N. C. VALVES

In case of anomalous operation or valve leakages, the valve operation shall be immediately stopped and the following checks shall be carried out:

disconnect the air circuit; disconnect the air supplying pipe (with air off), to make sure that no air is present inside the piping.

Caution: during troubleshooting, the valve shall not be removed, nor placed elsewhere. No components of the valve shall be disassembled or unloosened.

Check with a pressure gauge that the fluid pressure at the valve inlet (upstream) is not higher than the maximum allowable pressure or, in case of $\Delta p < PS$, the Δp is not exceeded.

Verify from the stroke indicator disk that the valve has carried out a complete stroke and that it is now in the off position. If the stroke is not complete, foreign matters might have entered the part between shutter and seat.

Should anomalies still be present after this check, verify the valve inner parts, disassembling the valve as indicated under the" Instructions for disassembly, gasket replacement and re-assembly of NC valves" included in this manual.

Should leakages still persist, contact our technical department.

5.4.2. N. O. VALVES

In case of anomalous operation or a leakage through the valve, the operation shall be immediately interrupted and the following checks shall be carried out: blow air (at a pressure value equal to the one indicated for a proper operation) into the servo control so as to make the valve close.

Caution: during troubleshooting, the valve shall not be removed, nor placed elsewhere. No components of the valve shall be disassembled or unloosened.

Check with a pressure gauge that the fluid pressure at the valve inlet (upstream) is not higher than the maximum allowable pressure or, in case of $\Delta p < PS$, the Δp is not exceeded.

Verify from the stroke indicator disk that the valve has carried out a complete stroke and that it is now in the off position. If the stroke is not complete, foreign matters might have entered the part between shutter and seat.Should anomalies still be present after this check, valve inner parts are to be verified, disassembling the valve as indicated under the “Instructions for disassembly, gasket replacement and re-assembly of N. C. valves” of this manual.

Should leakages still persist, contact our technical department.

5.5. Scheduled Maintenance

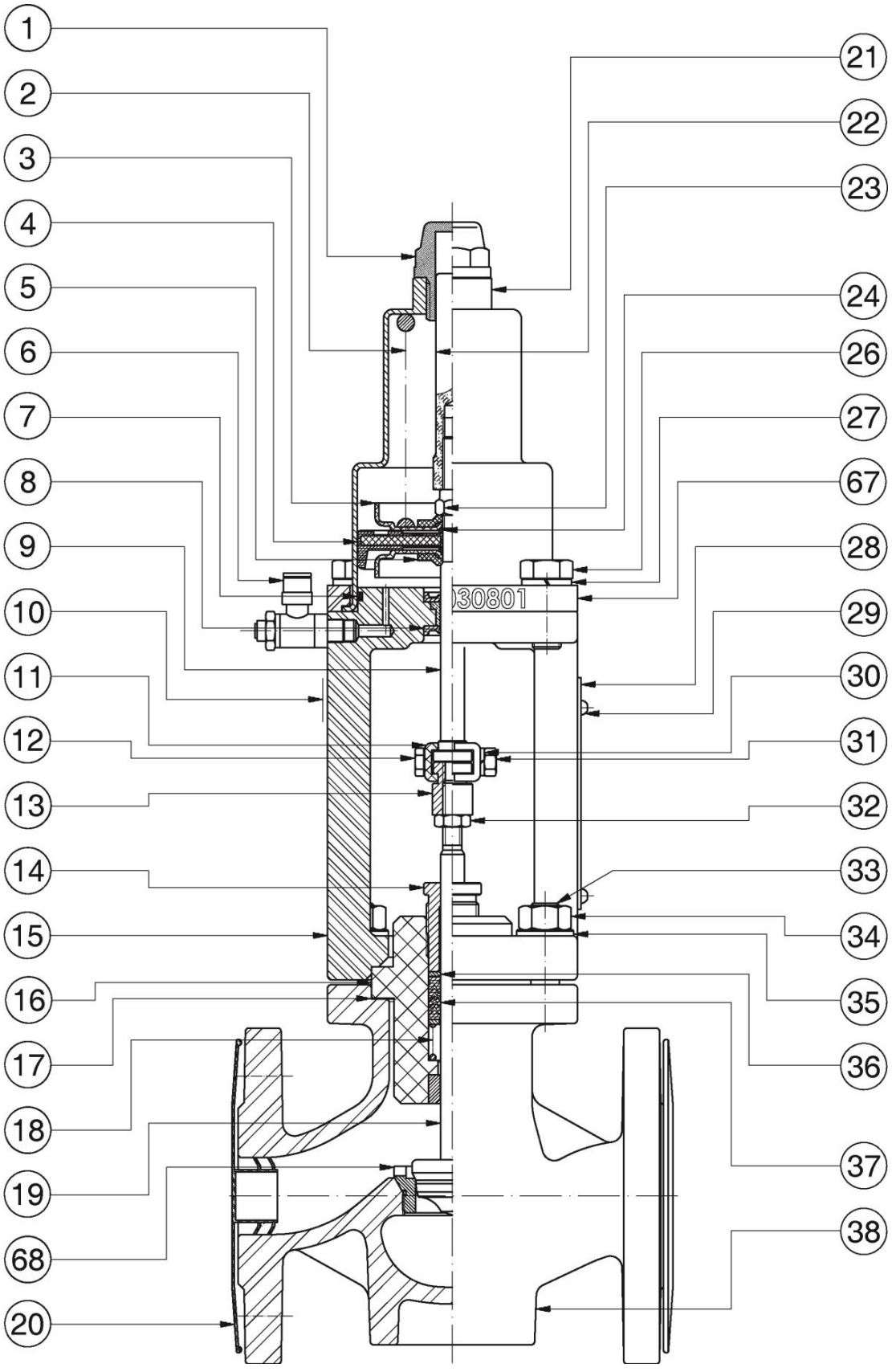
Scheduled maintenance operations shall be carried out apart from the ones due to possible failures, which always need an immediate intervention.

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. Should leakage persist despite the tightening, the packing gland shall be completely replaced.Instructions for Disassembly, Replacement of gaskets, Re-assembly of 2-way GRS NC Cast Iron Valves, ND 15 to 50.

5.5.1. Section Plane – 2-way GRS NC Cast Iron D.V. Valves ND 15 to 50



Drawing nr. 030019 Rev.:01

Refer to annexed Dwg. 030019 for the disassembly and assembly operations of valves.
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, and take the relevant safety measures.
Whenever operations are to be carried out on valves, remove the fluid completely. The valve body shall be completely empty.
NOTE: Read the procedures thoroughly before starting any operation.

5.5.2. Disassembly.

1) Unloosen screws (26), remove washers (27). **Cautions! A compressed spring is placed inside the cylinder.** Proper tools shall then be used to prevent the spring housing piston (21) from leaving the valve mounting (15), once springs (26) have been unloosen.
2) Remove the fixing plate (67).
3) Remove the spring housing piston (21).
4) Unscrew the transparent cap (1).
5) Remove the O-Ring (7).
6) Remove the spring (2).
7) Block the servocontrol stem between soft jaws (9).Unloosen the stroke indicator (22) and the self-locking nut (23).
8) Withdraw the first piston bearing washer (5), withdraw the first piston support (3), placed on the upper part.
9) Remove the first O-Ring (24), remove the piston with TDUOP gasket (4), withdraw the second O-Ring (24).
10) Withdraw the second piston support (3), withdraw the second piston bearing washer (5).
11) Unloosen screws (12) from nuts (31), remove washers (30) and separate the connection blocks (11).
12) Unloosen nuts (34) and remove washers (35), withdraw then the valve mounting (15).
13) Withdraw the servocontrol stem (9) and the BA gaskets (8) out of the valve mounting (15).
14) Withdraw the intermediate body (16) out of the valve body (38), together with the shutter (19) and the other seal components.
15) Withdraw the adjusting nut (13) and relevant lock nut (32) , marking their position in order to get the same calibration of the valve during the assembly operations.
16) Withdraw the shutter (19) out of the intermediate body (16).
17) Unloosen the packing gland screw (14) and withdraw the first spacer ring washer (36) out of the intermediate body, the packing gland (37), the second spacer ring washer (36) and the packing gland spring (18). **Caution! The packing gland screw (14) keeps the packing gland spring (18) compressed. Pay attention that the inner components of the intermediate body do not come off once the packing gland screw (14) is no longer compressed.**
18) Remove the body gasket (17) from the valve body (38).
19) Now the valve has been completely disassembled, so that the required components can be replaced.

5.5.3. Assembly.

1) Lubricate the inner part of the intermediate body (16) with silicone grease and insert inside it the packing gland spring (18), the first spacer ring washer (36), the packing gland (37), the second spacer ring washer (36).
2) Screw down the packing gland screw (14) 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 placed on the spring do not come off during the assembly.**
3) Lubricate the shutter stem (19) with silicone grease and insert it into the intermediate body (16) previously prepared.
4) Place the body gasket (17) into the valve seat (38). Then, place the intermediate body with the shutter inserted into the valve body.
5) Place the BA gaskets (8) into the valve mounting (15).
6) Lubricate the servocontrol stem (9) with silicone grease and insert it into the valve mounting (15).
7) Insert the valve mounting (15) on the stud bolts (33) of the valve body (38), insert washers (35) and torque tighten the nuts (34), as indicated in table 4.
8) Screw down the nut (32) and the preloading adjusting nut (13) placing them in the same position they had before disassembly the valve, in order to get the right calibration of the valve.
9) Bring the stem of the servocontrol (9) against the preloading adjusting nut (13) and connect them with the connection blocks (11).
10) Insert screws (12) into the connection blocks (11), insert then the spring washers (30) and torque tighten the nuts (31), as indicated under Table 4.
11) Insert the OR gasket (7) on the valve mounting.
12) Insert the first piston support washer (5), the first piston support (3), the first OR (24). on the stem of the servocontrol.
13) Insert on the stem the piston with TDUOP gasket (4), being careful to place it with lip down, the second OR (24), the second piston support (3) and the second piston support washer (5). Screw down all the components with the self-locking nut (23) without torque tightening .
14) Screw down the stroke indicator (22).
15) Insert the spring (2) on the piston.
16) Insert the spring housing piston (21) on the valve mounting (15) paying attention at lubricating the lips of the TDUOP gasket with silicone grease.
17) Insert on the spring housing piston (21) the fixing plate (67).
18) Using proper tools, draw the spring housing piston (21) up to the valve mounting (15), place the washers (27) and torque tighten the screws (26), as indicated under Table 4. **Caution! A compressed spring is placed inside the cylinder**.
19) Screw down the transparent cap (1) and the flow rate control (6)

5.6. Instructions for Disassembly, Replacement of Gaskets and Re-assembly of 2-way GRS NC Cast Iron D.V. Valves, ND 65 to 80.

Refer to Dwg. nr. 030032 for the disassembly and assembly operations of valves. 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, and take the relevant safety measures.

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

NOTE: Read the procedures thoroughly before starting any operation.

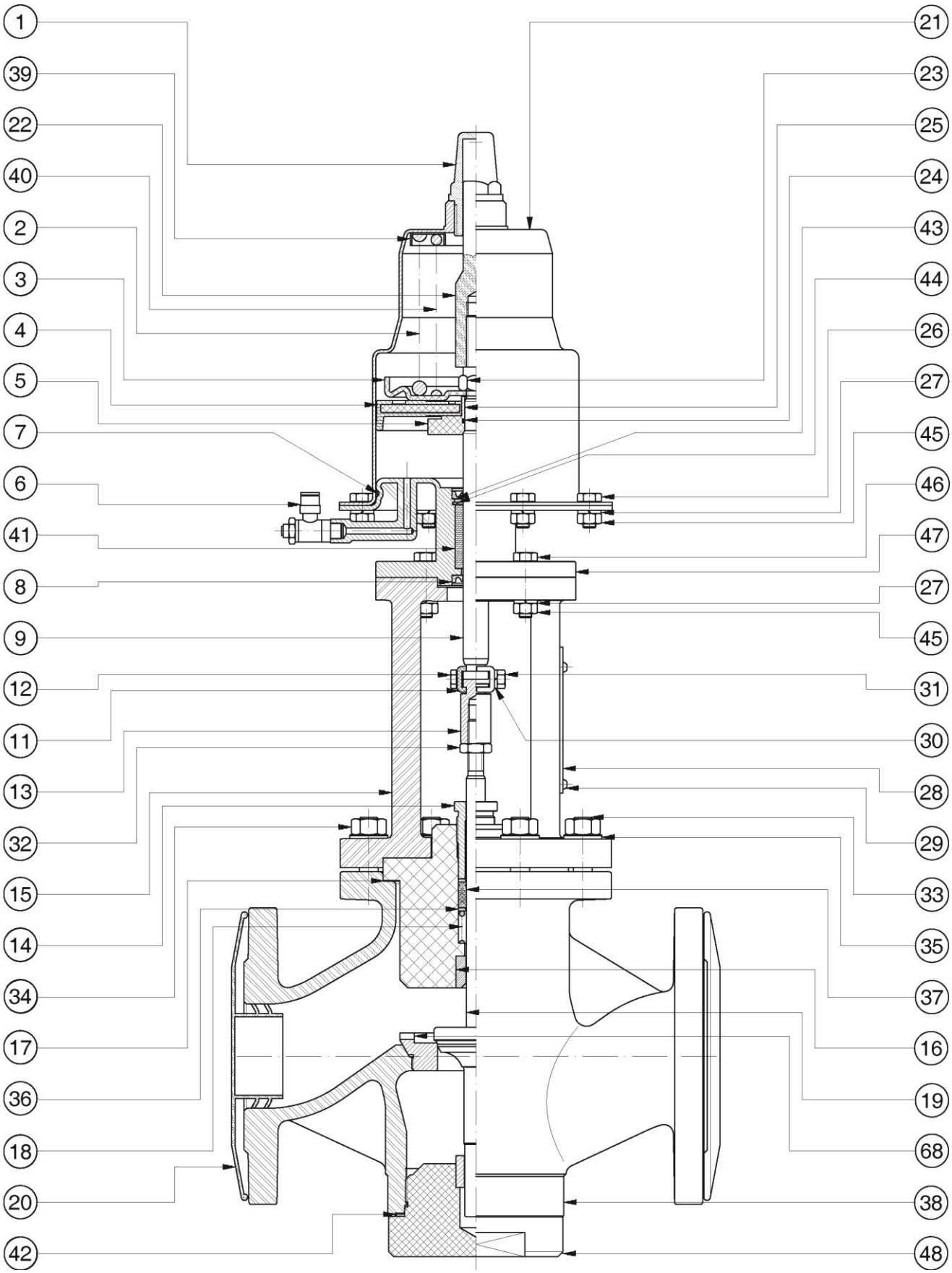
5.6.1. Disassembly.

1) Unloosen screws (26), remove washers (27) and the nuts (45). **Caution! Compressed springs are placed inside the cylinder.** Proper tools shall then be used to prevent the spring housing piston (21) from leaving the intermediate body (47), once all the screws (26) have been unloosen.
2) Remove the spring housing piston (21).
3) Unscrew the transparent cap (1).
4) Remove the O-Ring (7).
5) Remove the spring guide (39), the spring (2) and the spring (40).
6) Block the stem of the servocontrol (9) between soft jaws. Screw out the stroke indicator (22) and the self-locking nut (23).
7) Withdraw the piston lock support (3), remove the piston with TDUOP gasket (4), extract the spacer ring (25) out of it.
8) Withdraw the piston support washer (5) and withdraw the OR gasket (24).
9) Unloosen screws (12) from nuts (31), remove washers (30) and separate the connection blocks (11).
10) Unloosen screws (46), remove washers (27) and the nuts (45), then separate the intermediate body (47) from the valve mounting (15).
11) Withdraw the servocontrol stem (9), the BA gaskets (8), the spacer ring washer (43), the snap ring (44) and the spacer ring bush (41) from the intermediate body (47).
12) Unloosen nuts (34) e remove washers (35), withdraw then the valve mounting (15).
13) Withdraw the intermediate body (16) out of the valve body (38), together with the shutter (19) and the other seal components.
14) Withdraw the adjusting nut (13) and relevant lock nut (32) , marking their position in order to get the same calibration of the valve during the assembly operations.
15) Withdraw the shutter (19) out of the intermediate body (16).
16) Unloosen the packing gland screw (14) and withdraw the first spacer ring washer (36) out of the intermediate body, the packing gland (37), the second spacer ring washer (36) and the packing gland spring (18). **Caution! The packing gland screw (14) keeps the packing gland spring (18) compressed. Pay attention that the inner components of the intermediate body do not come off once the packing gland screw (14) is no longer compressed.**
17) Remove the body gasket (17) from the valve body (38).
18) Unloosen the bottom (48) and withdraw the bottom gasket (42) from the valve body (22).
19) Now the valve has been completely disassembled, so that the required components can be replaced.

5.6.2. Assembly.

1) Place the bottom gasket (42), and torque tighten the bottom (48), as indicated under Table 4.
2) Lubricate the inner part of the intermediate body (16) with silicone grease and insert inside it the packing gland spring (18), the first spacer ring washer (36), the packing gland (37), the second spacer ring washer (36).
3) Screw down the packing gland screw (14) 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 placed on the spring do not come off during the assembly.** Insert screws (12) into the connection blocks (11), insert the spring washers (30) and torque tighten the nuts (31), as indicated under Table 4.
4) Insert the OR gasket (7) on the intermediate body (47).
5) Insert the OR gasket (24) on the piston support washer (5).
6) Insert the piston support washer (5), the spacer ring (25), the piston with TDUOP gasket (49), being careful to place it with lip down, the piston support (3) on the stem of the servocontrol (9). Screw down all the components with the self-locking nut (23) without torque tightening .
7) Screw down the stroke indicator (22). Insert spring (49) and (2) and place the spring guide (39) on them.
8) Insert on the intermediate body (47) the spring housing piston (21) paying attention at lubricating the lips of the TDUOP gasket with silicone grease.
9) Using proper tools draw the spring housing piston (21) up to the intermediate body (47), insert screws (26) insert washers (27) on them and torque tighten the nuts (45), as indicated under Table 4.). **Caution! Compressed springs are placed inside the cylinder**.
10) Screw down the transparent cap (1) and the flow rate control (6)
11) Lubricate the shutter stem (19) with silicone grease and insert it into the intermediate body (16) previously prepared.
12) Place the body gasket (17) into the valve seat (38). Then, place the intermediate body with the shutter inserted into the valve body.
13) Insert the valve mounting (15) on the stud bolts (33) of the valve body (38), insert washers (35) and torque tighten the nuts (34), as indicated in table 4.
14) Screw down the nut (32) and the preloading adjusting nut (13) placing them in the same position they had before disassembly the valve, in order to get the right calibration of the valve.
15) Insert into the intermediate body(47) the spacer ring bush (41), the snap ring (44), the spacer ring washer (43), the two BA gaskets (8) and the stem of the servocontrol (9).
16) Place the intermediate body (47) on the valve mounting (15).
17) Insert screws (46), insert washers (27) and torque tighten the nuts (45), as indicated under Table 4.
18) Bring the stem of the servocontrol (9) against the preloading adjusting nut (13) and connect them with the connection blocks (11).

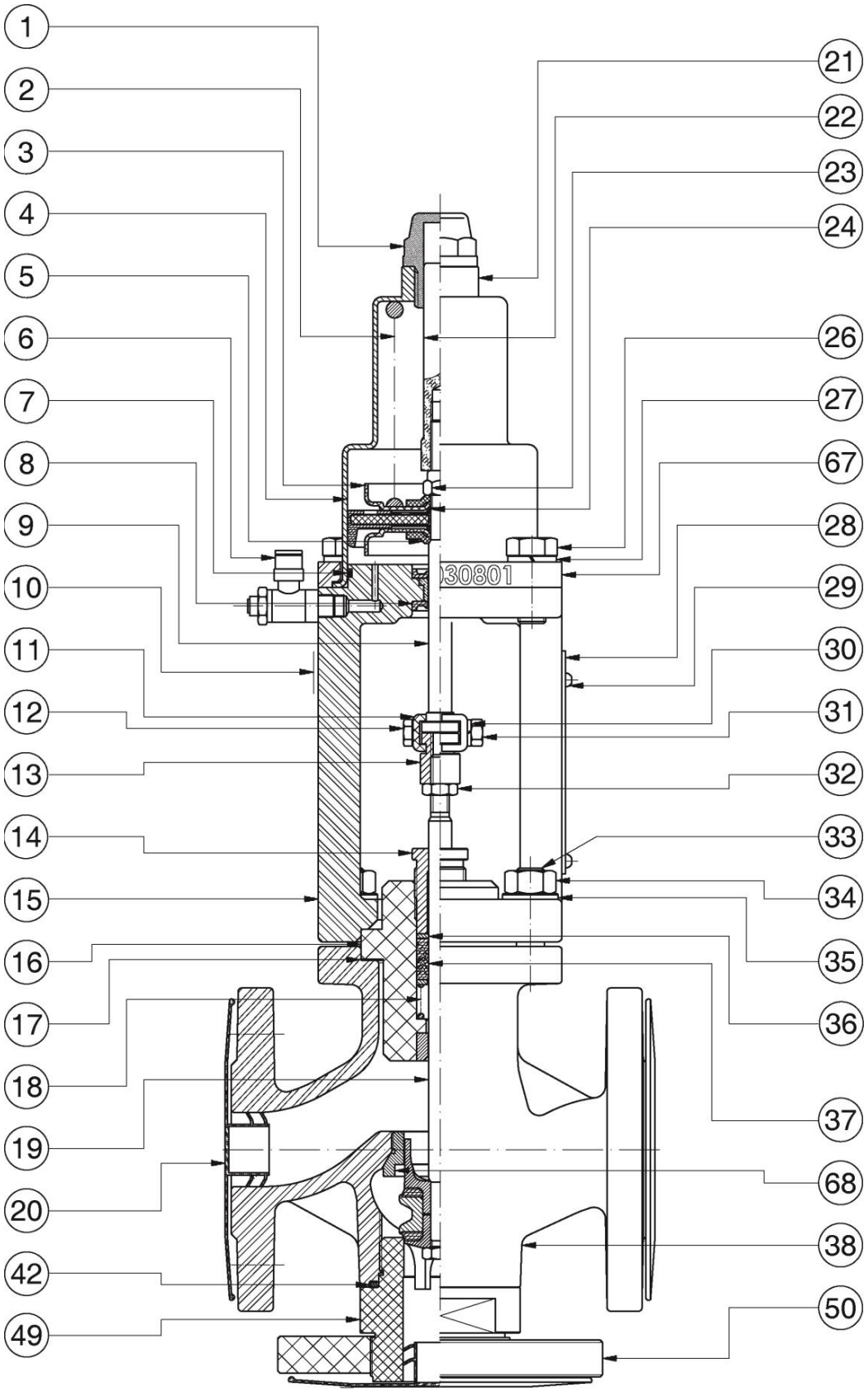
5.6.3. Section Plane – 2-way GRS NC Cast Iron D.V. Valves ND 65 to 80.



Drawing nr. 030032 Rev.:01

5.7. Instructions for Disassembly, Replacement of Gaskets and Re-assembly of 3-way GRS NC Cast Iron Valves - ND 15 to 50.

5.7.1. Section Plane – 3-way GRS NC Cast Iron D.V. Valves - ND 15 to 50



Drawing nr. 030037 Rev.:01

Refer to annexed Dwg. nr. 030037 for the disassembly and assembly operations of valves.
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, and take the relevant safety measures.
Whenever operations are to be carried out on valves, remove the fluid completely. The valve body shall be completely empty.
NOTE: Read the procedures thoroughly before starting any operation.

5.7.2. Disassembly.

1) Unloosen screws (26), remove washers (27). **Caution! A compressed spring is placed inside the cylinder.** Proper tools shall then be used to prevent the spring housing piston (21) from leaving the valve mounting (15), once all the screws (26) have been unloosen.
2) Remove the fixing plate (67).
3) Remove the spring housing piston (21).
4) Unscrew the transparent cap (1).
5) Remove the O-Ring (7).
6) Remove spring (2).
7) Block the stem of the servocontrol (9) between soft jaws. Screw out the stroke indicator (22) and the self-locking nut (23).
8) Withdraw the first piston bearing washer (5), withdraw the first piston support (3), placed on the upper part.
9) Remove the first O-Ring (24), remove the piston with TDUOP gasket (4), withdraw the second O-Ring (24).
10) Withdraw the second piston support (3), withdraw the second piston bearing washer (5).
11) Unloosen screws (12) from nuts (31), remove washers (30) and separate the connection blocks (11).
12) Unloosen nuts (34) e remove washers (35), withdraw then the valve mounting (15).
13) Extract the stem of the servocontrol (9) and the BA gaskets (8) from the valve mounting (15).
14) Withdraw the adjusting nut (13) and relevant lock nut (32) , marking their position in order to get the same calibration of the valve during the assembly operations.
15) Unloosen the 3-way flange (50) and the 3-way bottom (49) then remove the bottom gasket (42). **Caution! Before unloosening the 3-way bottom, pull up the shutter and hold its position.**
16) Withdraw the shutter (19) from the valve bottom.
17) Withdraw the intermediate body (16) with all the seal components from the valve body (38).
18) Unloosen the packing gland screw (14) and withdraw the first spacer ring washer (36) out of the intermediate body, the packing gland (37), the second spacer ring washer (36) and the packing gland spring (18). **Caution! The packing gland screw (14) keeps the packing gland spring (18) compressed. Pay attention that the inner components of the intermediate body do not come off once the packing gland screw (14) is no longer compressed.**
19) Remove the body gasket (17) from the valve body (38).
20) Now the valve has been completely disassembled, so that the required components can be replaced.

5.7.3. Assembly.

1) Lubricate the inner part of the intermediate body (16) with silicone grease and insert inside it the packing gland spring (18), the first spacer ring washer (36), the packing gland (37), the second spacer ring washer (36).
2) Screw down the packing gland screw (14) 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 placed on the spring do not come off during the assembly.**
3) Place the body gasket (17) into the valve seat (38).
4) Place the BA gaskets (8) into the valve mounting (15).
5) Lubricate the servocontrol stem (9) with silicone grease and insert it into the valve mounting (15).
6) Insert the valve mounting (15) on the stud bolts (33) of the valve body (38), insert washers (35) and torque tighten the nuts (34), as indicated in Table 4. Then place the intermediate body (16) previously assembled.
7) Lubricate the shutter stem (19) with silicone grease and insert it into the intermediate body (16) from the bottom of the valve body (38). Hold it up during this phase in order to prevent the sealing surface of the shutter from being marked while screwing down the bottom.
8) Place the bottom gasket (42) on the 3-way bottom (49) and torque tighten it; as indicated under Table 4, screw down the 3-way flange (50) to the valve body (38).
9) Screw down the nut (32) and the preloading adjusting nut (13) placing them in the same position they had before disassembly the valve, in order to get the right calibration of the valve.
10) Bring the stem of the servocontrol (9) against the preloading adjusting nut (13) and connect them with the connection blocks (11).
11) Insert screws (12) into the connection blocks (11), insert then the spring washers (30) and torque tighten the nuts (31), as indicated under Table 4.
12) Insert the OR gasket (7) on the valve mounting. Insert the first piston support washer (5), the first piston support (3), the first OR (24) on the stem of the servocontrol.
13) Insert on the stem the piston with TDUOP gasket (4), being careful to place it with lip down, the second OR (24), the second piston support (3) and the second piston support washer (5). Screw down all the components with the self-locking nut (23) without torque tightening .
14) Screw down the stroke indicator (22).
15) Insert the spring (2) on the piston.
16) Insert the spring housing piston (21) on the valve mounting (15) paying attention at lubricating the lips of the TDUOP gasket with silicone grease.
17) Insert on the spring housing piston (21) the fixing plate (67).
18) Using proper tools, draw the spring housing piston (21) up to the valve mounting (15), place the washers (27) and torque tighten the screws (26), as indicated under Table 4. **Caution! A compressed spring is placed inside the cylinder**.
19) Screw down the transparent cap (1) and the flow rate control (6).

5.8. Instructions for Disassembly, Replacement of Gaskets, Re-assembly of 3-way GRS NC Cast Iron Valves - ND 65 to 80.

Refer to annexed Dwg. nr. 030038 for the disassembly and assembly operations of valves.
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, and take the relevant safety measures.
Whenever operations are to be carried out on valves, remove the fluid completely. The valve body shall be completely empty.
NOTE: Read the procedures thoroughly before starting any operation.

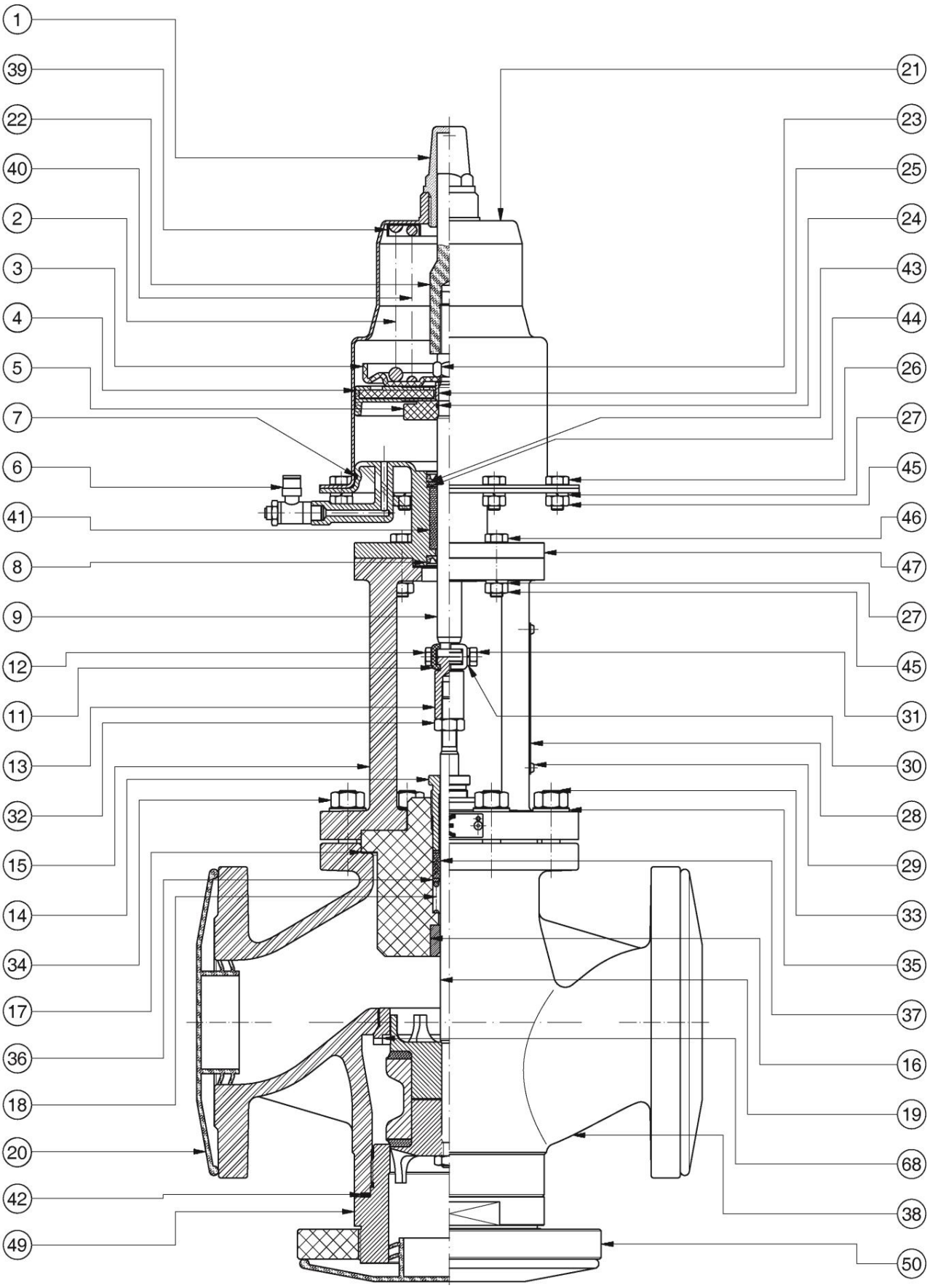
5.8.1. Disassembly.

1) Unloosen screws (26), remove washers (27) and the nuts (45). **Caution! Compressed springs are placed inside the cylinder.** Proper tools shall then be used to prevent the spring housing piston (21) from leaving the intermediate body (47), once all the screws (26) have been unloosen.
2) Remove the spring housing piston (21).
3) Unscrew the transparent cap (1).
4) Remove the O-Ring (7).
5) Remove the spring guide (39), the spring (2) and the spring (40).
6) Block the stem of the servocontrol (9) between soft jaws. Screw out the stroke indicator (22) and the self-locking nut (23).
7) Withdraw the piston lock support (3), Remove the piston with TDUOP gasket (4) extract the spacer ring (25) out of it.
8) Withdraw the piston support washer (5) and withdraw the OR gasket (24).
9) Unloosen screws (12) from nuts (31), remove washers (30) and separate the connection blocks (11).
10) Unloosen screws (46), remove washers (27) and the nuts (45), then separate the intermediate body (47) from the valve mounting (15).
11) Withdraw the servocontrol stem (9), the BA gaskets (8), the spacer ring washer (43), the snap ring (44) and the spacer ring bush (41) from the intermediate body (47).
12) Unloosen nuts (34) e remove washers (35), withdraw then the valve mounting (15).
13) Withdraw the adjusting nut (13) and relevant lock nut (32) , marking their position in order to get the same calibration of the valve during the assembly operations.
14) Unloosen the 3-way flange (50) and the 3-way bottom (49), then remove the bottom gasket (42). **Caution! Before unloosening the 3-way bottom, pull up the shutter and hold its position.**
15) Withdraw the shutter (19) from the valve bottom.
16) Withdraw the intermediate body (16) with all the seal components from the valve body (38).
17) Unloosen the packing gland screw (14) and withdraw the first spacer ring washer (36) out of the intermediate body, the packing gland (37), the second spacer ring washer (36) and the packing gland spring (18). **Caution! The packing gland screw (14) keeps the packing gland spring (18) compressed. Pay attention that the inner components of the intermediate body do not come off once the packing gland screw (14) is no longer compressed.**
18) Remove the body gasket (17) from the valve body (38).
19) Now the valve has been completely disassembled, so that the required components can be replaced.

5.8.2. Assembly.

1) Lubricate the inner part of the intermediate body (16) with silicone grease and insert inside it the packing gland spring (18), the first spacer ring washer (36), the packing gland (37), the second spacer ring washer (36).
2) Screw down the packing gland screw (14) 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 placed on the spring do not come off during the assembly.**
3) Place the body gasket (17) into the valve seat (38). Then place the intermediate body (16) previously assembled.
4) Insert the valve mounting (15) on the stud bolts (33) of the valve body (38), insert washers (35) and torque tighten the nuts (34), as indicated in table 4
5) Lubricate the shutter stem (19) with silicone grease and insert it into the intermediate body (16) from the valve bottom(38). Hold it up during this phase in order to prevent the sealing surface of the shutter from being marked while screwing down the bottom.
6) Place the bottom gasket (42), and torque tighten the bottom (48) to the valve body (3), as indicated under Table 4, screw down, then, the 3-way flange.
7) Screw down the nut (32) and the preloading adjusting nut (13) placing them in the same position they had before disassembly the valve, in order to get the right calibration of the valve.
8) Insert into the intermediate body(47) the spacer ring bush (41), the snap ring (44), the spacer ring washer (43), the two BA gaskets (8) and the stem of the servocontrol (9).
9) Place the intermediate body (47) on the valve mounting (15).
10) Insert screws (46), insert washers (27) and torque tighten the nuts (45), as indicated under Table 4.
11) Bring the stem of the servocontrol (9) against the preloading adjusting nut (13) and connect them with the connection blocks (11).
12) Insert screws (12) into the connection blocks (11), insert then the spring washers (30) and torque tighten the nuts (31), as indicated under Table 4.
13) Insert the OR gasket (7) on the intermediate body (47).
14) Insert the OR gasket (24) on the piston support washer (5).
15) Insert the piston support washer (5), the spacer ring (25), the piston with TDUOP gasket (49) being careful to place it with lip down, and the piston support (3) on the stem of the servocontrol (9). Screw down all the components with the self-locking nut (23) without torque tightening .
16) Screw down the stroke indicator (22). Insert spring (40) and (2) and place the spring guide (39) on them.
17) Insert on the intermediate body (47) the spring housing piston (21) paying attention at lubricating the lips of the TDUOP gasket with silicone grease.
18) Using proper tools draw the spring housing piston (21) up to the intermediate body (47), insert screws (26) insert washers (27) on them and torque tighten the nuts (45), as indicated under Table 4.). **Caution! Compressed springs are placed inside the cylinder**.
19) Screw down the transparent cap (1) and the flow rate control (6).

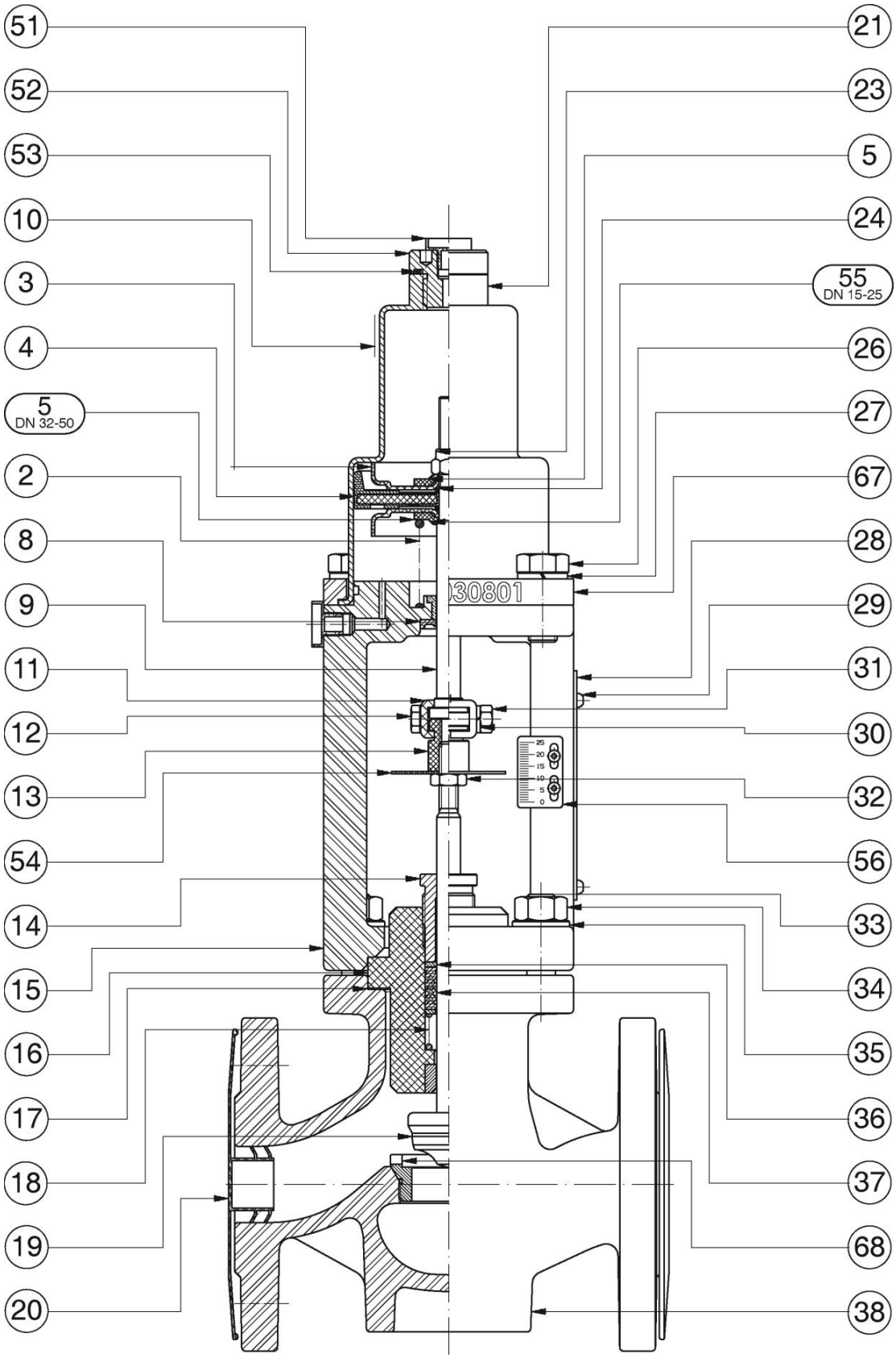
5.8.3. Section Plane – 3-way GRS NC Cast Iron D.V. Valves - ND 65 to 80



Drawing nr. 030038 Rev.:01

5.9. Instructions for Disassembly, Replacement of Gaskets, Re-assembly of 2-way GRS NO Cast Iron Valves - ND 15 to 50.

5.9.1. Section Plane – 2-way GRS No Cast Iron Valves ND 15 to 50



Drawing nr. 030041 Rev.:01

Refer to annexed Dwg. nr. 030041 for the disassembly and assembly operations of valves.
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, and take the relevant safety measures.
Whenever operations are to be carried out on valves, remove the fluid completely. The valve body shall be completely empty.
NOTE: Read the procedures thoroughly before starting any operation.

5.9.2. Disassembly.

1) Unloosen the air inlet connection (52) and remove the OR gasket (53).
2) Unloosen screws (26), remove washers (27). **Caution! A compressed spring is placed inside the cylinder.** Proper tools shall then be used to prevent the spring housing piston (21) from leaving the valve mounting (15), once all the screws (26) have been unloosen.
3) Remove the fixing plate (67).
4) Remove the spring housing piston (21).
5) Block the stem of the servocontrol (9) between soft jaws. Unloosen the self-locking nut (23).
6) Withdraw the first piston bearing washer (5), withdraw the first piston support (3), placed on the upper part.
7) Remove the first O-Ring (24), remove the piston with TDUOP gasket (4), withdraw the second O-Ring (24).
8) Withdraw the second piston support (3), withdraw the second piston bearing washer (5) [for ND 32-50] and (55) [for ND 15-25].
9) Remove spring (2).
10) Unloosen screws (12) from nuts (31), remove washers (30) and separate the connection blocks (11).
11) Unloosen nuts (34) and remove washers (35), withdraw then the valve mounting (15).
12) Withdraw the stem of the servocontrol (9) and the BA gasket (8) from the valve mounting (15).
13) Withdraw the intermediate body (16) out of the valve body (38), together with the shutter (19) and the other seal components.
14) Withdraw the adjusting nut (13) , marking their position in order to get the same calibration of the valve during the assembly operations, remove the stroke indicator disk (54) and unloosen the nut (32).
15) Withdraw the shutter (19) out of the intermediate body (16).
16) Unloosen the packing gland screw (14) and withdraw the first spacer ring washer (36) out of the intermediate body, the packing gland (37), the second spacer ring washer (36) and the packing gland spring (18). **Caution! The packing gland screw (14) keeps the packing gland spring (18) compressed. Pay attention that the inner components of the intermediate body do not come off once the packing gland screw (14) is no longer compressed.**
17) Remove the body gasket (17) from the valve body (38).
18) Now the valve has been completely disassembled, so that the required components can be replaced.

5.9.3. Assembly.

1) Lubricate the inner part of the intermediate body (16) with silicone grease and insert inside it the packing gland spring (18), the first spacer ring washer (36), the packing gland (37), the second spacer ring washer (36),
2) Screw down the packing gland screw (14) 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 placed on the spring do not come off during the assembly.**
3) Lubricate the shutter stem (19) with silicone grease and insert it into the intermediate body (16) previously prepared.
4) Place the body gasket (17) into the valve seat (38). Then, place the intermediate body with the shutter inserted into the valve body.
5) Insert the BA gasket (8) into the valve mounting (15).
6) Lubricate the servocontrol stem (9) with silicone grease and insert it into the valve mounting (15).
7) Insert the valve mounting (15) on the stud bolts (33) of the valve body (38), insert washers (35) and torque tighten the nuts (34), as indicated in table 4.
8) Screw down the nut (32), insert the stroke indicator disk (54) and screw down the pre-loading adjusting nut (13), placing it in the same position held before the disassembly of the valve, in order to have the same calibration.
9) Bring the stem of the servocontrol (9) against the preloading adjusting nut (13) and connect them with the connection blocks (11).
10) Insert screws (12) into the connection blocks (11), insert then the spring washers (30) and torque tighten the nuts (31), as indicated under Table 4.
11) Insert the spring (2) on the stem of the servocontrol.
12) Insert on the stem of the servocontrol the first piston support washer (5) [for ND 32-50] and (55) [for ND 15-25], the first piston support (3), the first OR (24).
13) Insert on the stem the piston with TDUOP gasket (4), being careful to place it with lip up, the second OR (24), the second piston support (3) and the second piston support washer (5). Screw down all the components with the self-locking nut (23) without torque tightening .
14) Insert the spring housing piston (21) on the valve mounting (15) paying attention at lubricating the lips of the TDUOP gasket with silicone grease.
15) Insert on the spring housing piston (21) the fixing plate (67).
16) Using proper tools, draw the spring housing piston (21) up to the valve mounting (15), place the washers (27) and torque tighten the screws (26), as indicated under Table 4. **Caution! A compressed spring is placed inside the cylinder**.
17) Place the OR gasket (53) into the air inlet connection (52).
18) Torque tighten the air inlet connection (52) on the spring housing piston (21), as indicated under Table 4.

5.10. Instructions for Disassembly, Replacement of Gaskets and Re-assembly of 2- way GRS NO Cast Iron Valves - ND 65 to 80.

Refer to annexed Dwg. nr. 030057 for the assembly and disassembly operations of the valves.
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, and take the relevant safety measures.
Whenever operations ae to be carried out on valves, remove the fluid completely. The valve body shall be completely empty.
NOTE: Read the procedures thoroughly before starting any operation.

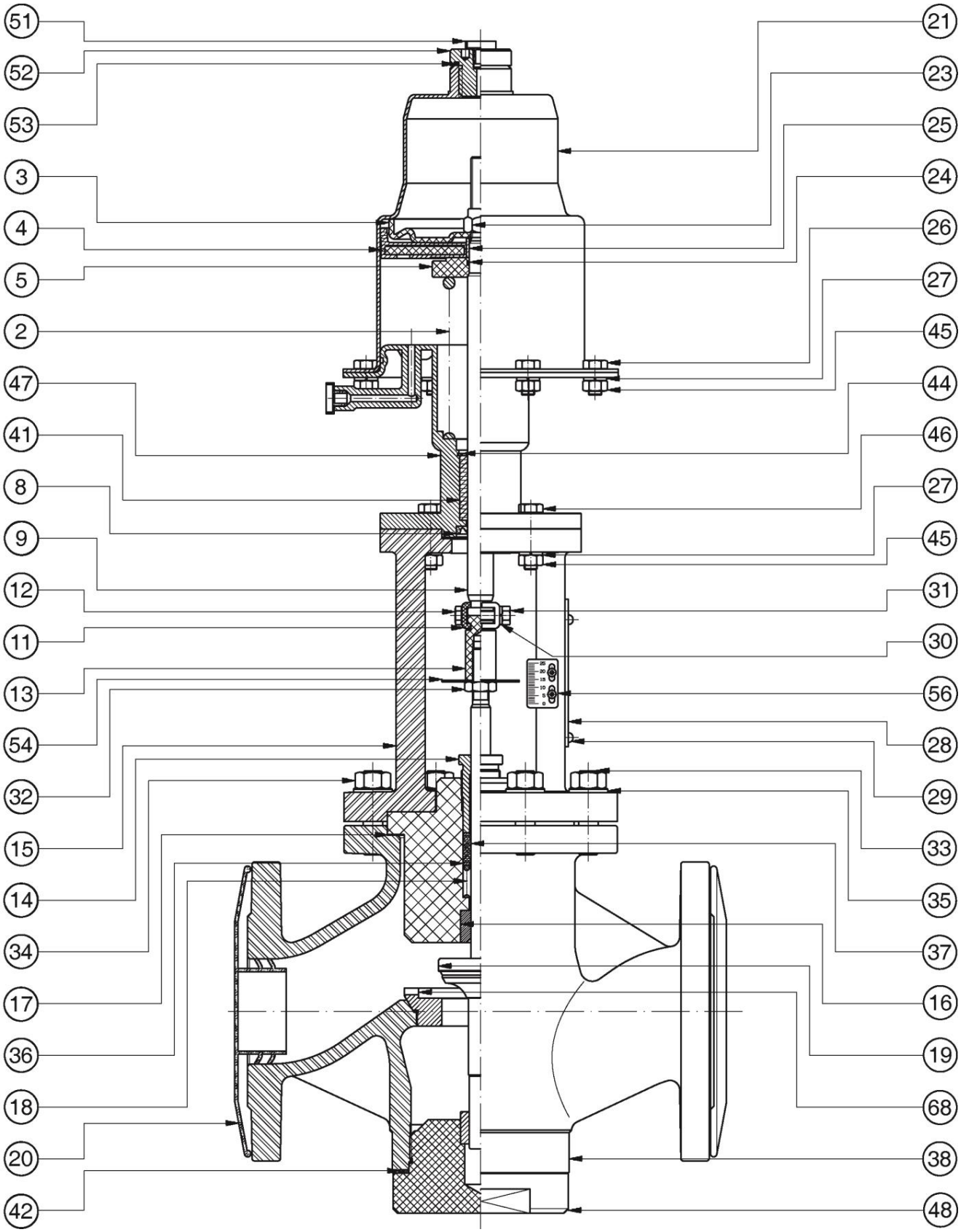
5.10.1. Disassembly.

1) Unloosen the air inlet connection (52) and remove the OR gasket (53).
2) Unloosen screws (26), remove washers (27) and nuts (45). **Caution! A compressed spring is placed inside the cylinder.** Proper tools shall then be used to prevent the spring housing piston (21) from leaving the valve mounting (15), once all the screws (26) have been unloosen.
3) Remove the spring housing piston (21).
4) Block the stem of the servocontrol (9) between soft jaws. unloosen the self-locking nut (23).
5) Withdraw the piston support (3), remove the piston with TDUOP gasket (4), extract the spacer ring (25) out of it.
6) Withdraw the piston support washer (5) and withdraw the OR gasket (24).
7) Remove spring (2).
8) Unloosen screws (12) from nuts (31), remove washers (30) and separate the connection blocks (11).
9) Unloosen screws (46), remove washers (27) and the nuts (45), then separate the intermediate body (47) from the valve mounting (15).
10) Withdraw the stem of the servocontrol (9), the BA gasket (8), the snap ring (44) and the spacer ring bush (41) from the intermediate body (47).
11) Unloosen nuts (34) e remove washers (35), withdraw then the valve mounting (15).
12) Withdraw the intermediate body (16) out of the valve body (38), together with the shutter (19) and the other seal components.
13) Withdraw the adjusting nut (13) , marking their position in order to get the same calibration of the valve during the assembly operations, remove the stroke indicator disk (54) and unloosen the nut (32).
14) Withdraw the shutter (19) out of the intermediate body (16).
15) Unloosen the packing gland screw (14) and withdraw the first spacer ring washer (36) out of the intermediate body, the packing gland (37), the second spacer ring washer (36) and the packing gland spring (18). **Caution! The packing gland screw (14) keeps the packing gland spring (18) compressed. Pay attention that the inner components of the intermediate body do not come off once the packing gland screw (14) is no longer compressed.**
16) Remove the body gasket (17) from the valve body (38).
17) Unloosen the bottom (48) and withdraw the bottom gasket (42) from the valve body (38).
18) Now the valve has been completely disassembled, so that the required components can be replaced.

5.10.2. Assembly.

1) Place the bottom gasket (42), and torque tighten the bottom (48), as indicated under Table 4.
2) Lubricate the inner part of the intermediate body (16) with silicone grease and insert inside it the packing gland spring (18), the first spacer ring washer (36), the packing gland (37), the second spacer ring washer (36),
3) Screw down the packing gland screw (14) 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 placed on the spring do not come off during the assembly.**
4) Lubricate the shutter stem (19) with silicone grease and insert it into the intermediate body (16) previously prepared.
5) Place the body gasket (17) into the valve seat (38). Then, place the intermediate body with the shutter inserted into the valve body.
6) Insert the valve mounting (15) on the stud bolts (33) of the valve body (38), insert washers (35) and torque tighten the nuts (34), as indicated in table 4.
7) Screw down the nut (32), insert the stroke indicator disk (54) and screw down the preloading adjusting nut (13) placing it in the same position it had before disassembly the valve, in order to get the right calibration of the valve.
8) Insert into the intermediate body(47) the spacer ring bush (41), the snap ring, the BA gasket (8) and the stem of the servocontrol (9).
9) Place the intermediate body (47) on the valve mounting (15).
10) Insert screws (46), insert washers (27) and torque tighten the nuts (45), as indicated under Table 4.
11) Bring the stem of the servocontrol (9) against the preloading adjusting nut (13) and connect them with the connection blocks (11).
12) Insert screws (12) into the connection blocks (11), insert then the spring washers (30) and torque tighten the nuts (31), as indicated under Table 4.
13) Insert the spring (2) on the stem of the servocontrol.
14) Insert the spring (2) on the stem of the servocontrol (9).
15) Insert the OR gasket (24) into the piston support washer (5) .
16) Insert on the stem of the servocontrol (9), the piston support washer (5), the spacer ring (25), the piston with TDUOP gasket (49), being careful to place it with lip up, and the piston support (3). Screw down all the components with the self-locking nut (23) without torque tightening .
17) Insert on the intermediate body (47) the spring housing piston (21) paying attention at lubricating the lips of the TDUOP gasket with silicone grease.
18) Using proper tools draw the spring housing piston (21) up to the intermediate body (47). Insert screws (26) insert washers (27) on them and torque tighten the nuts (45), as indicated under Table 4.). **Caution! A compressed spring is placed inside the cylinder**.
19) Place the OR gasket (53) into the air inlet connection (52).
20) Torque tighten the air inlet connection (52) on the spring housing piston (21), as indicated under Table 4.

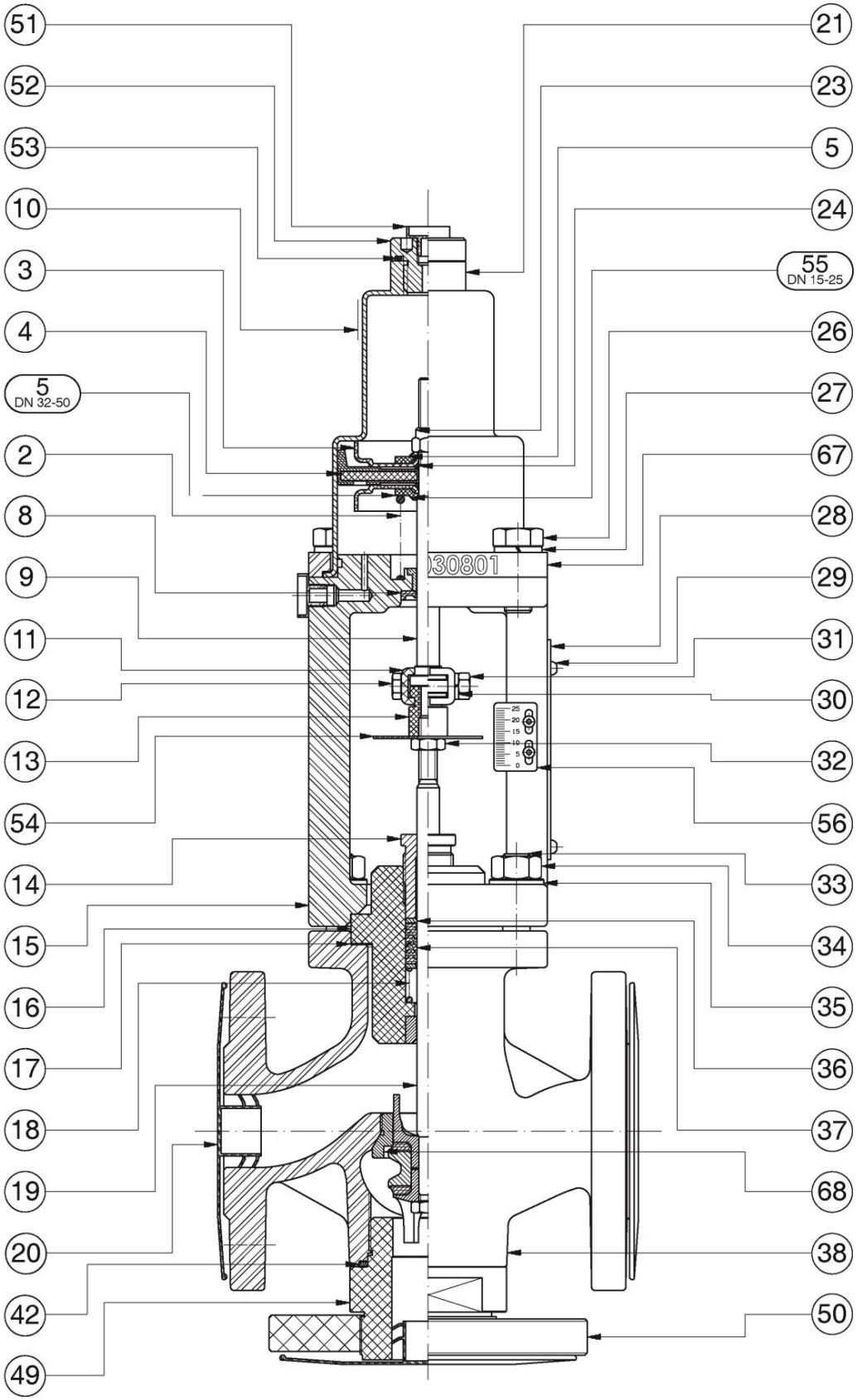
5.10.3. Section Plane – 2-way GRS NO Cast Iron Valves - ND 65 to 80



Drawing nr. 030057 Rev.:01

5.11. Instructions for Disassembly, Replacement of Gaskets and Re-assembly of 3-way GRS NO Cast Iron Valves - ND 15 to 50.

5.11.1. Section Plane – 3-way GRS NO Cast Iron Valves ND 15 to 50



Drawing nr. 030058 Rev.:01

nRefer to annexed Dwg. nr. 030058 for the disassembly and assembly operations of valves.
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, and take the relevant safety measures.
Whenever operations are to be carried out on valves, remove the fluid completely. The valve body shall be completely empty.
NOTE: Read the procedures thoroughly before starting any operation.

5.11.2. Disassembly.

1) Unloosen the air inlet connection (52) and remove the OR gasket (53).
2) Unloosen screws (26), remove washers (27). **Caution! A compressed spring is placed inside the cylinder.** Proper tools shall then be used to prevent the spring housing piston (21) from leaving the valve mounting (15), once all the screws (26) have been unloosen.
3) Remove the fixing plate (67)
4) Remove the spring housing piston (21).
5) Block the stem of the servocontrol (9) between soft jaws. unloosen the self-locking nut (23).
6) Withdraw the first piston bearing washer (5), withdraw the first piston support (3), placed on the upper part.
7) Remove the first O-Ring (24), remove the piston with TDUOP gasket (4), withdraw the second O-Ring (24).
8) Withdraw the second piston support (3), withdraw the second piston bearing washer (5) [for ND 32-50] and (55) [for ND 15-25].
9) Remove spring (2).
10) Unloosen screws (12) from nuts (31), remove washers (30) and separate the connection blocks (11).
11) Unloosen nuts (34) and remove washers (35), withdraw then the valve mounting (15).
12) Withdraw the stem of the servocontrol (9) and the BA gasket (8) from the valve mounting (15).
13) Withdraw the adjusting nut (13), marking their position in order to get the same calibration of the valve during the assembly operations, remove the stroke indicator disk (54) e unloosen the nut (32).
14) Unloosen the 3-way flange (50) and the 3-way bottom (49), then remove the bottom gasket (42). **Caution! Before unloosening the 3-way bottom, pull up the shutter and hold its position.**
15) Withdraw the shutter (19) from the valve bottom.
16) Withdraw the intermediate body (16) with all the seal components from the valve body (38).
17) Unloosen the packing gland screw (14) and withdraw the first spacer ring washer (36) out of the intermediate body, the packing gland (37), the second spacer ring washer (36) and the packing gland spring (18).**Caution! The packing gland screw (14) keeps the packing gland spring (18) compressed. Pay attention that the inner components of the intermediate body do not come off once the packing gland screw (14) is no longer compressed.**
18) Remove the body gasket (17) from the valve body (38).
19) Now the valve has been completely disassembled, so that the required components can be replaced.

5.11.3. Assembly.

1) Lubricate the inner part of the intermediate body (16) with silicone grease and insert inside it the packing gland spring (18), the first spacer ring washer (36), the packing gland (37), the second spacer ring washer (36).
2) Screw down the packing gland screw (14) 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 placed on the spring do not come off during the assembly.**
3) Place the body gasket (17) into the valve seat (38). Then place the intermediate body (16) previously assembled.
4) Insert the BA gasket (8) into the valve mounting (15).
5) Lubricate the servocontrol stem (9) with silicone grease and insert it into the valve mounting (15).
6) Insert the valve mounting (15) on the stud bolts (33) of the valve body (38), insert washers (35) and torque tighten the nuts (34), as indicated in table 4.
7) Lubricate the shutter stem (19) with silicone grease and insert it into the intermediate body (16) from the bottom of the valve body (38). Hold it up during this phase in order to prevent the sealing surface of the shutter from being marked while screwing down the bottom.
8) Place the bottom gasket (42) on the 3-way bottom (49) and torque tighten it, as indicated under Table 4, screw down the 3-way flange (50) to the valve body (38).
9) Screw down the nut (32) insert the stroke indicator disk (54) and screw down the preloading adjusting nut (13) placing it in the same position it had before disassembly the valve, in order to get the right calibration of the valve.
10) Bring the stem of the servocontrol (9) against the preloading adjusting nut (13) and connect them with the connection blocks (11).
11) Insert screws (12) into the connection blocks (11), insert then the spring washers (30) and torque tighten the nuts (31), as indicated under Table 4.
12) Insert the spring (2) on the stem of the servocontrol.
13) Insert on the stem of the servocontrol the first piston support washer (5) [for ND 32-50] and (55) [for ND 15-25], the first piston support (3), the first OR (24).
14) Insert on the stem the piston with TDUOP gasket (4), being careful to place it with lip up, the second OR (24), the second piston support (3) and the second piston support washer (5). Screw down all the components with the self-locking nut (23) without torque tightening .
15) Insert the spring housing piston (21) on the valve mounting (15) paying attention at lubricating the lips of the TDUOP gasket with silicone grease.
16) Insert on the spring housing piston (21) the fixing plate (67).
17) Using proper tools, draw the spring housing piston (21) up to the valve mounting (15), place the washers (27) and torque tighten the screws (26), as indicated under Table 4. **Caution! A compressed spring is placed inside the cylinder**.
18) Place the OR gasket (53) into the air inlet connection (52).
19) Torque tighten the air inlet connection (52) on the spring housing piston (21) , as indicated under Table 4.

5.12. Instructions for Disassembly, Replacement of Gaskets and Re-assembly of 3-way GRS NO Cast Iron Valves - ND 65 to 80.

Refer to annexed Dwg. nr. 030062 for the assembly and disassembly operations of the valves.
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, and take the relevant safety measures.
Whenever operations are to be carried out on valves, remove the fluid completely. The valve body shall be completely empty.
NOTE: Read the procedures thoroughly before starting any operation.

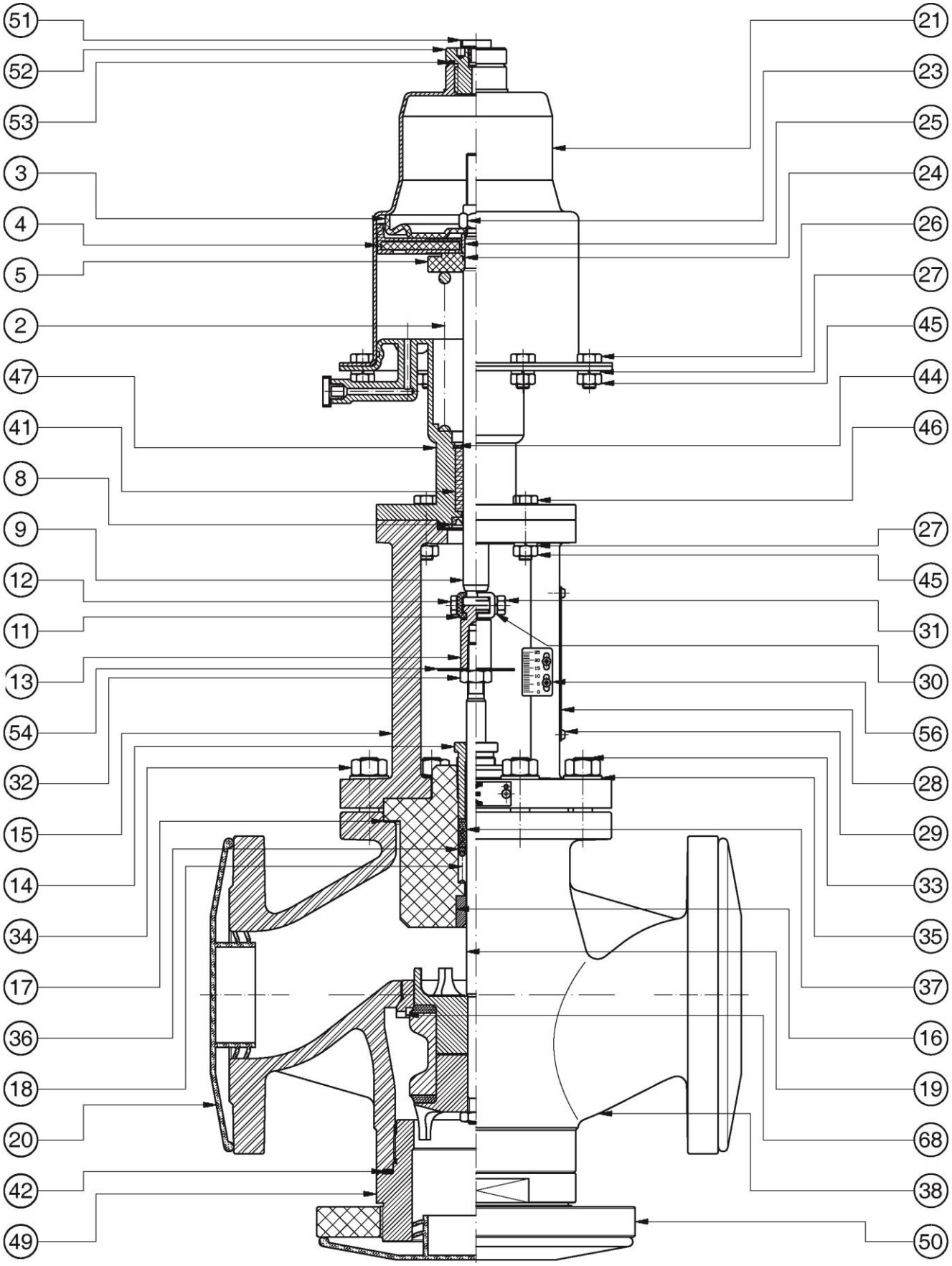
5.12.1. Disassembly.

1) Unloosen the air inlet connection (52) and remove the OR gasket (53).
2) Unloosen screws (26), remove washers (27) and nuts (45). **Caution! A compressed spring is placed inside the cylinder.** Proper tools shall then be used to prevent the spring housing piston (21) from leaving the valve mounting (15), once all the screws (26) have been unloosen.
3) Remove the spring housing piston (21).
4) Block the stem of the servocontrol (9) between soft jaws. unloosen the self-locking nut (23).
5) Withdraw the piston support (3), remove the piston with TDUOP gasket (4), extract the spacer ring (25) out of it.
6) Withdraw the piston support washer (5) and withdraw the OR gasket (24).
7) Remove spring (2).
8) Unloosen screws (12) from nuts (31), remove washers (30) and separate the connection blocks (11).
9) Unloosen screws (46), remove washers (27) and the nuts (45), then separate the intermediate body (47) from the valve mounting (15).
10) Withdraw the stem of the servocontrol (9), the BA gasket (8), the snap ring (44) and the spacer ring bush (41) from the intermediate body (47).
11) Unloosen nuts (34) e remove washers (35), withdraw then the valve mounting (15).
12) Withdraw the adjusting nut (13) , marking their position in order to get the same calibration of the valve during the assembly operations, remove the stroke indicator disk (54) e unloosen the nut (32).
13) Unloosen the 3-way flange (50) and the 3-way bottom (49), then remove the bottom gasket (42). **Caution! Before unloosening the 3-way bottom, pull up the shutter and hold its position.**
14) Withdraw the shutter (19) from the valve bottom.
15) Withdraw the intermediate body (16) with all the seal components from the valve body (38).
16) Unloosen the packing gland screw (14) and withdraw the first spacer ring washer (36) out of the intermediate body, the packing gland (37), the second spacer ring washer (36) and the packing gland spring (18). **Caution! The packing gland screw (14) keeps the packing gland spring (18) compressed. Pay attention that the inner components of the intermediate body do not come off once the packing gland screw (14) is no longer compressed.**
17) Remove the body gasket (17) from the valve body (38).
18) Unloosen the bottom (48) and withdraw the bottom gasket (42) from the valve body (38).
19) Now the valve has been completely disassembled, so that the required components can be replaced.

5.12.2. Assembly.

1) Lubricate the inner part of the intermediate body (16) with silicone grease and insert inside it the packing gland spring (18), the first spacer ring washer (36), the packing gland (37), the second spacer ring washer (36).
2) Screw down the packing gland screw (14) 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 placed on the spring do not come off during the assembly.**
3) Place the body gasket (17) into the valve seat (38). Then place the intermediate body (16) previously assembled.
4) Insert the valve mounting (15) on the stud bolts (33) of the valve body (38), insert washers (35) and torque tighten the nuts (34), as indicated in table 4.
5) Lubricate the shutter stem (19) with silicone grease and insert it into the intermediate body (16) from the bottom of the valve body (38). Hold it up during this phase in order to prevent the sealing surface of the shutter from being marked while screwing down the bottom.
6) Place the bottom gasket (42) on the 3-way bottom (49) and torque tighten it, as indicated under Table 4, screw down the 3-way flange (50) to the valve body (38).
7) Screw down the nut (32) insert the stroke indicator disk (54) and screw down the preloading adjusting nut (13) placing it in the same position it had before disassembly the valve, in order to get the right calibration of the valve.
8) Insert into the intermediate body(47) the spacer ring bush (41), the snap ring, the BA gasket (8) and the stem of the servocontrol (9).
9) Place the intermediate body (47) on the valve mounting (15).
10) Insert screws (46), insert washers (27) and torque tighten the nuts (45), as indicated under Table 4.
11) Bring the stem of the servocontrol (9) against the preloading adjusting nut (13) and connect them with the connection blocks (11).
12) Insert screws (12) into the connection blocks (11), insert then the spring washers (30) and torque tighten the nuts (31), as indicated under Table 4.
13) Insert the spring (2) on the stem of the servocontrol.
14) Insert the spring (2) on the stem of the servocontrol (9).
15) Insert the OR gasket (24) into the piston support washer (5).
16) Insert on the stem of the servocontrol (9), the piston support washer (5), the spacer ring (25), the piston with TDUOP gasket (4), being careful to place it with lip up, and the piston support (3). Screw down all the components with the self-locking nut (23) without torque tightening.
17) Insert on the intermediate body (47) the spring housing piston (21) paying attention at lubricating the lips of the TDUOP gasket with silicone grease.
18) Using proper tools draw the spring housing piston (21) up to the intermediate body (47). Insert screws (26) insert washers (27) on them and torque tighten the nuts (45), as indicated under Table 4.). **Caution! A compressed spring is placed inside the cylinder**.
19) Place the OR gasket (53) into the air inlet connection (52).
20) Torque tighten the air inlet connection (52) on the spring housing piston (21), as indicated under Table 4.

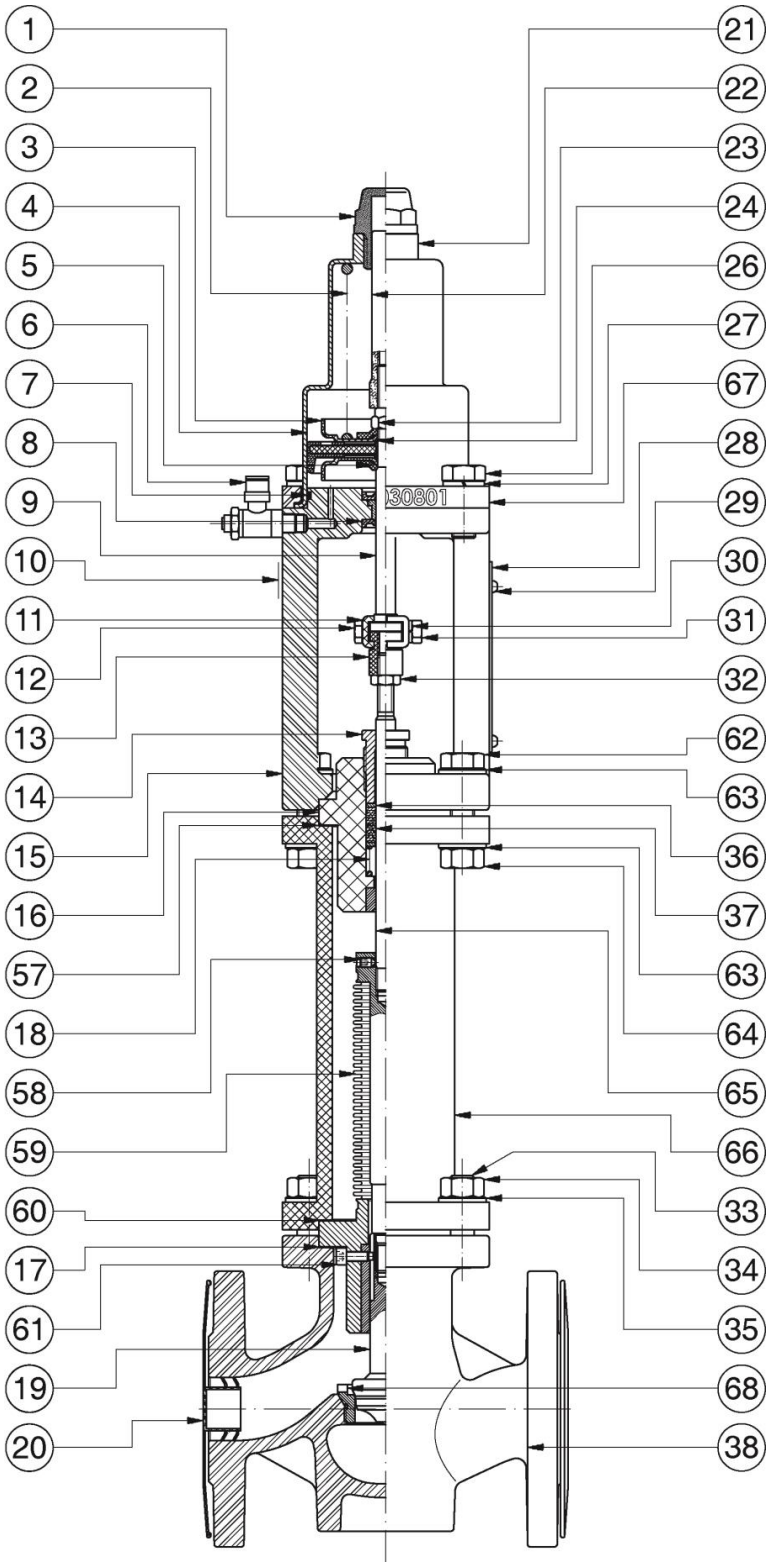
5.12.3. Section Plane – 3-way GRS NO Cast Iron Valves - ND 65 to 80



Drawing nr. 030062 Rev.:01

5.13. Instructions for Disassembly, Replacement of Gaskets and Re-assembly of 2-way GRS NC Cast Iron Valves - ND 15 to 50 with bellows.

5.13.1. Section Plane – 2-way GRS NC Cast Iron D.V. ND 15 to 50 with bellows



Drawing nr. 030063 Rev.:01

Refer to annexed Dwg. nr. 030063 for the disassembly and assembly operations of valves.
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, and take the relevant safety measures.
Whenever operations are to be carried out on valves, remove the fluid completely. The valve body shall be completely empty.
NOTE: Read the procedures thoroughly before starting any operation.

5.13.2. Disassembly.

1) Unloosen screws (26), remove washers (27). **Caution! A compressed spring is placed inside the cylinder.** Proper tools shall then be used to prevent the spring housing piston (21) from leaving the valve mounting (15), once all the screws (26) have been unloosen.
2) Remove the fixing plate (67)
3) Remove the spring housing piston (21).
4) Unscrew the transparent cap (1).
5) Remove the O-Ring (7).
6) Remove spring (2).
7) Block the stem of the servocontrol (9) between soft jaws. Screw out the stroke indicator (22) and the self-locking nut (23).
8) Withdraw the first piston bearing washer (5), withdraw the first piston support (3), placed on the upper part.
9) Remove the first O-Ring (24), remove the piston with TDUOP gasket (4), withdraw the second O-Ring (24).
10) Withdraw the second piston support (3), withdraw the second piston bearing washer (5).
11) Unloosen screws (12) from nuts (31), remove washers (30) and separate the connection blocks (11).
12) Unloosen nuts (64), withdraw washers (63) and remove screws (62) and remaining washers (63) from the valve mounting (15).
13) Remove the valve mounting (15).
14) Extract the stem of the servocontrol (9) and the BA gaskets (8) from the valve mounting (15).
15) Withdraw the adjusting nut (13) and relevant lock nut (32) , marking their position in order to get the same calibration of the valve during the assembly operations.
16) Withdraw the intermediate body (16) from the valve mounting extension (66), remove the gasket from this last (57).
17) Unloosen the packing gland screw (14) and withdraw the first spacer ring washer (36) out of the intermediate body, the packing gland (37), the second spacer ring washer (36) and the packing gland spring (18). **Caution! The packing gland screw (14) keeps the packing gland spring (18) compressed. Pay attention that the inner components of the intermediate body do not come off once the packing gland screw (14) is no longer compressed.**
18) Unloosen nuts (34) and remove washers (35), withdraw then the valve mounting extension (66) and the body gasket (60).
19) Withdraw the intermediate body with bellows (59). Care shall be paid while handling the bellows, as it is a very delicate component when not assembled.
20) Unloosen the grub screw (58), unloosen the shutter stem (65).
21) Unloosen the socket head screw (61), it is then possible to screw out the shutter (19) from the intermediate body with bellows (59). NB: This action is very delicate and shall be carried out very carefully. It is not strictly necessary for the replacement of gaskets.
22) Remove the body gasket (17) from the valve body (38).
23) Now the valve has been completely disassembled, so that the required components can be replaced.

5.13.3. Assembly.

1) Lubricate the inner part of the intermediate body (16) with silicone grease and insert inside it the packing gland spring (18), the first spacer ring washer (36), the packing gland (37), the second spacer ring washer (36).
2) Screw down the packing gland screw (14) 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 placed on the spring do not come off during the assembly.**
3) Screw down the shutter (19) on the intermediate body stem with bellows (59), then, screw down the socket head screw (61) into the intermediate body with bellows (59). This operation shall be carried out very carefully, as the point of the socket head screw (61) shall be perfectly centered into the shutter slot (19). Act on both components in the same time, to get a perfect centering.
4) Screw down the shutter stem (65) into the intermediate body with bellows (59), then torque tighten the grub screw (58), as indicated under Table 4.
5) Place the body gasket (17) into the valve seat (38). Them, place the intermediate body with bellows previously assembled.
6) Place the gasket (60) and insert the mounting extension (66) on the stud bolts (33) of the valve body (38).
7) Insert the washers (35) on the stud bolts (33) and torque tighten the nuts (34), as indicated under Table 4.
8) Place the gasket (57) into the mounting extension.
9) Insert the intermediate body previously assembled (16) into the mounting extension (66) and on the shutter stem (65).
10) Screw down the nut (32) and the preloading adjusting nut (13) placing them in the same position they had before disassembly the valve, in order to get the right calibration of the valve.
11) Place the BA gaskets (8) into the valve mounting (15).
12) Lubricate the servocontrol stem (9) with silicone grease and insert it into the valve mounting (15).
13) Insert the valve mounting (15) on the intermediate body (16)
14) Insert the first washers (63) on the screws (62), then insert screws into the holes of the valve mounting (15).
15) Insert the remaining washers (63) on the screws (62) and torque tighten the nuts (64), as indicated under Table 4.
16) Bring the stem of the servocontrol (9) against the preloading adjusting nut (13) and connect them with the connection blocks (11).
17) Insert screws (12) into the connection blocks (11), insert then the spring washers (30) and torque tighten the nuts (31), as indicated under Table 4.
18) Insert the OR gasket (7) on the valve mounting.
19) Insert the first piston support washer (5), the first piston support (3), the first OR (24) on the stem of the servocontrol.
20) Insert on the stem the piston with TDUOP gasket (4), being careful to place it with lip down, the second OR (24), the second piston support (3) and the second piston support washer (5). Screw down all the components with the self-locking nut (23) without torque tightening .
21) Screw down the stroke indicator (22).
22) Insert the spring (2) on the piston.
23) Insert the spring housing piston (21) on the valve mounting (15) paying attention at lubricating the lips of the TDUOP gasket with silicone grease.
24) Insert on the spring housing piston (21) the fixing plate (67).
25) Using proper tools, draw the spring housing piston (21) up to the valve mounting (15), place the washers (27) and torque tighten the screws (26), as indicated under Table 4. **Caution! A compressed spring is placed inside the cylinder**.
26) Screw down the transparent cap (1) and the flow rate control (6).

5.14. Instructions for Disassembly, Replacement of Gaskets and Re-assembly of 3-way GRS NC Cast Iron Valves - ND 15 to 50 with bellows.

Refer to annexed Dwg. nr. 030099 for the disassembly and assembly operations of valves.
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, and take the relevant safety measures.
Whenever operations are to be carried out on valves, remove the fluid completely. The valve body shall be completely empty.
NOTE: Read the procedures thoroughly before starting any operation.

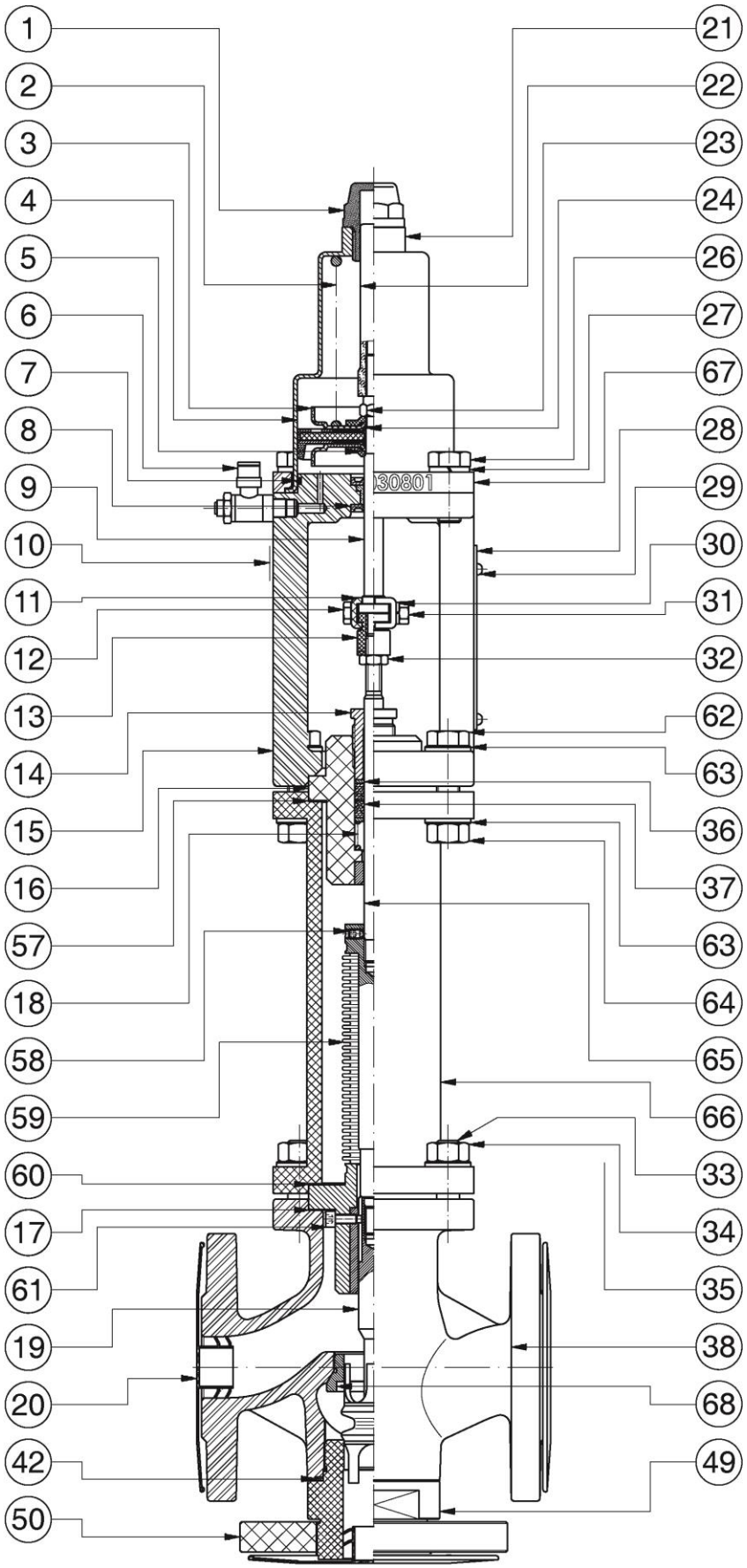
5.14.1. Disassembly.

1) Unloosen screws (26), remove washers (27). **Caution! A compressed spring is placed inside the cylinder.** Proper tools shall then be used to prevent the spring housing piston (21) from leaving the valve mounting (15), once all the screws (26) have been unloosen.
2) Remove the fixing plate (67)
3) Remove the spring housing piston (21).
4) Unscrew the transparent cap (1).
5) Remove the O-Ring (7).
6) Remove spring (2).
7) Block the stem of the servocontrol (9) between soft jaws. Screw out the stroke indicator (22) and the self-locking nut (23).
8) Withdraw the first piston bearing washer (5), withdraw the first piston support (3), placed on the upper part.
9) Remove the first O-Ring (24), remove the piston with TDUOP gasket (4), withdraw the second O-Ring (24).
10) Withdraw the second piston support (3), withdraw the second piston bearing washer (5).
11) Unloosen screws (12) from nuts (31), remove washers (30) and separate the connection blocks (11).
12) Unloosen nuts (64), withdraw washers (63) and remove screws (62) and remaining washers (63) from the valve mounting (15).
13) Remove the valve mounting (15).
14) Withdraw the servocontrol stem (9) and the BA gaskets (8) out of the valve mounting (15).
15) Withdraw the adjusting nut (13) and relevant lock nut (32) , marking their position in order to get the same calibration of the valve during the assembly operations.
16) Withdraw the intermediate body (16) from the valve mounting extension (66), remove the gasket from this last (57).
17) Unloosen the packing gland screw (14) and withdraw the first spacer ring washer (36) out of the intermediate body, the packing gland (37), the second spacer ring washer (36) and the packing gland spring (18). **Caution! The packing gland screw (14) keeps the packing gland spring (18) compressed. Pay attention that the inner components of the intermediate body do not come off once the packing gland screw (14) is no longer compressed.**
18) Unloosen nuts (34) and remove washers (35), withdraw then the valve mounting extension (66) and the body gasket (60). Care shall be paid while handling the bellows, as it is a very delicate component when not assembled.
19) Unloosen the grub screw (58) and the shutter stem (65).
20) Blocking the valve body (38), get hold of the intermediate body with bellows and pull until the socket head screw (61) comes out of the valve body, then screw it out. Caution! This action is very delicate and needs particular care. Once the bellows has been disassembled, it is very delicate.
21) Unloosen the 3-way flange (50), the 3-way bottom (49) and remove the bottom gasket (42).
22) It is then possible to screw out the shutter (19) from the intermediate body with bellows (59) and withdraw it from the valve bottom. NB: This action is very delicate and shall be carried out very carefully.
23) Remove the intermediate body with bellows (59) and the body gasket (17) from the valve body (38).
24) Now the valve has been completely disassembled, so that the required components can be replaced.

5.14.2. Assembly.

1) Lubricate the inner part of the intermediate body (16) with silicone grease and insert inside it the packing gland spring (18), the first spacer ring washer (36), the packing gland (37), the second spacer ring washer (36).
2) Screw down the packing gland screw (14) 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 placed on the spring do not come off during the assembly.**
3) Place the gasket (17) into the valve body (38), then insert the intermediate body with bellows (59) into it.
4) Screw down the shutter (19) from the valve bottom to the intermediate body with bellows (59), until it reaches its seat.
5) Blocking the valve body, pull and withdraw the intermediate body with bellows until the screw hole becomes visible, then screw down the socket head screw (61) into the intermediate body with bellows. This operation shall be carried out very carefully, as the point of the socket head screw (61) shall be perfectly centered into the obturator slot (19). Act on both components in the same time, to get a perfect centering.
6) Place the bottom gasket (42) on the 3-way bottom (49) and torque tighten it; as indicated under Table 4, screw down the 3-way flange (50) to the valve body (38).
7) Screw down the shutter stem (65) into the intermediate body with bellows (59), then torque tighten the grub screw (58), as indicated under Table 4.
8) Place the gasket (60) and insert the mounting extension (66) on the stud bolts (33) of the valve body (38).
9) Insert the washers (35) on the stud bolts (33) and torque tighten the nuts (34), as indicated under Table 4.
10) Insert the gasket (57) into the mounting extension.
11) Insert the intermediate body (16) previously assembled into the mounting extension (66) and on the shutter stem (65).
12) Screw down the nut (32) and the preloading adjusting nut (13) placing them in the same position they had before disassembly the valve, in order to get the right calibration of the valve.
13) Place the BA gaskets (8) into the valve mounting (15).
14) Lubricate the servocontrol stem (9) with silicone grease and insert it into the valve mounting (15).
15) Insert the valve mounting (15) on the intermediate body (16).
16) Insert the first washers (63) on the screws (62), then insert screws into the holes of the valve mounting (15).
17) Insert on the screws (62) the remaining washers (63) and torque tighten the nuts (64), as indicated under Table 4.
18) Bring the stem of the servocontrol (9) against the preloading adjusting nut (13) and connect them with the connection blocks (11).
19) Insert screws (12) into the connection blocks (11), insert then the spring washers (30) and torque tighten the nuts (31), as indicated under Table 4.
20) Insert the OR gasket (7) on the valve mounting.
21) Insert the first piston support washer (5), the first piston support (3), the first OR (24) on the stem of the servocontrol.
22) Insert on the stem the piston with TDUOP gasket (4), being careful to place it with lip down, the second OR (24), the second piston support (3) and the second piston support washer (5). Screw down all the components with the self-locking nut (23) without torque tightening .
23) Screw down the stroke indicator (22).
24) Insert the spring (2) on the piston.
25) Insert the spring housing piston (21) on the valve mounting (15) paying attention at lubricating the lips of the TDUOP gasket with silicone grease.
26) Insert on the spring housing piston (21) the fixing plate (67).
27) Using proper tools, draw the spring housing piston (21) up to the valve mounting (15), place the washers (27) and torque tighten the screws (26), as indicated under Table 4. **Caution! A compressed spring is placed inside the cylinder**.
28) Screw down the transparent cap (1) and the flow rate control (6).

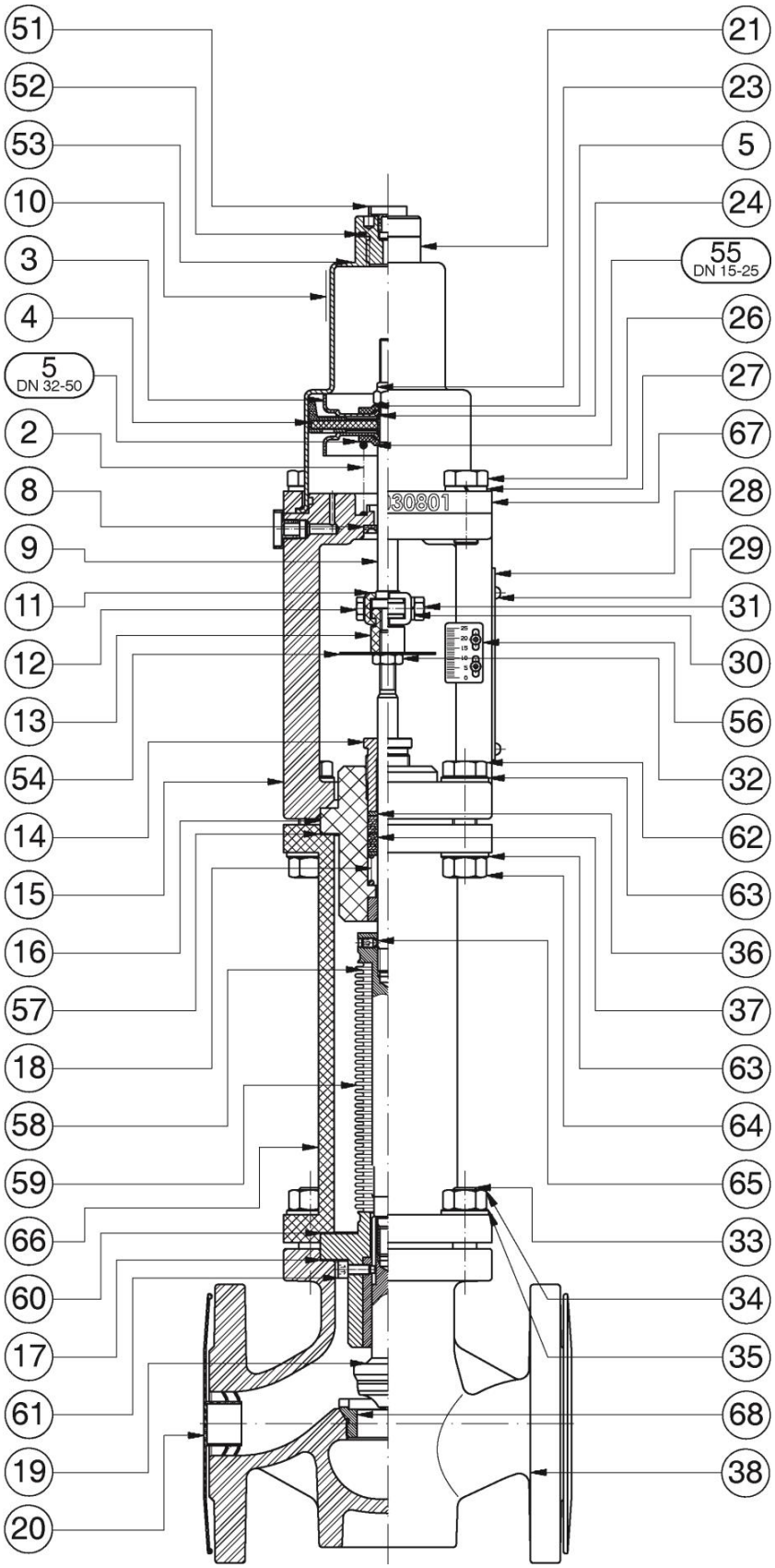
5.14.3. Section Plane – 3-way GRS NC D.V. Valves ND 15 to 50 with Bellows



Drawing nr. 030099 Rev.:01

5.15. Instructions for Disassembly, Replacement of Gaskets and Re-assembly of 2-way GRS NO Cast Iron Valves - ND 15 to 50 .

5.15.1. Section Plane – 2-way GRS NO Cast Iron Valves - ND 15 to 50 with bellows



Drawing nr. 030105 Rev.:01

Refer to annexed Dwg. nr. 030105 for the disassembly and assembly operations of valves.
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, and take the relevant safety measures.
Whenever operations are to be carried out on valves, remove the fluid completely. The valve body shall be completely empty.
NOTE: Read the procedures thoroughly before starting any operation.

5.15.2. Disassembly.

1) Unloosen the air inlet connection (52) and remove the OR gasket (53).
2) Unloosen screws (26), remove washers (27). **Caution! A compressed spring is placed inside the cylinder.** Proper tools shall then be used to prevent the spring housing piston (21) from leaving the valve mounting (15), once all the screws (26) have been unloosen.
3) Remove the fixing plate (67).
4) Remove the spring housing piston (21).
5) Block the stem of the servocontrol (9) between soft jaws. Unloosen the self-locking nut (23).
6) Withdraw the first piston bearing washer (5), withdraw the first piston support (3), placed on the upper part.
7) Remove the first O-Ring (24), remove the piston with TDUOP gasket (4), withdraw the second O-Ring (24).
8) Withdraw the second piston support (3), withdraw the second piston bearing washer (5) [for ND 32-50] and (55) [for ND 15-25].
9) Remove spring (2).
10) Unloosen screws (12) from nuts (31), remove washers (30) and separate the connection blocks (11).
11) Unloosen nuts (64), withdraw washers (63) and remove screws (62) and remaining washers (63) from the valve mounting (15).
12) Remove the valve mounting (15).
13) Withdraw the servocontrol stem (9) and the BA gaskets (8) out of the valve mounting (15).
14) Withdraw the adjusting nut (13) and relevant lock nut (32) , marking their position in order to get the same calibration of the valve during the assembly operations.
15) Withdraw the intermediate body (16) from the valve mounting extension (66), remove the gasket from this last (57).
16) Unloosen the packing gland screw (14) and withdraw the first spacer ring washer (36) out of the intermediate body, the packing gland (37), the second spacer ring washer (36) and the packing gland spring (18). **Caution! The packing gland screw (14) keeps the packing gland spring (18) compressed. Pay attention that the inner components of the intermediate body do not come off once the packing gland screw (14) is no longer compressed.**
17) Unloosen nuts (34) e remove washers (35), withdraw then the valve mounting extension (66) and the body gasket (60).
18) Unloosen the intermediate body with bellows (59). Care shall be paid while handling the bellows, as it is a very delicate component when not assembled.
19) Unloosen the grub screw (58), Unloosen the shutter stem (65).
20) Unloosen the socket head screw (61), it is then possible to screw out the shutter (19) from the intermediate body with bellows(59). NB: This action is very delicate and shall be carried out very carefully. It is not strictly necessary for the replacement of gaskets.
21) Remove the body gasket (17) from the valve body (38).
22) Now the valve has been completely disassembled, so that the required components can be replaced.

5.15.3. Assembly.

1) Lubricate the inner part of the intermediate body (16) with silicone grease and insert inside it the packing gland spring (18), the first spacer ring washer (36), the packing gland (37), the second spacer ring washer (36).
2) Screw down the packing gland screw (14) 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 placed on the spring do not come off during the assembly.**
3) Screw down the shutter (19) on the intermediate body stem with bellows (59), then, screw down the socket head screw (61) into the intermediate body with bellows (59). This operation shall be carried out very carefully, as the point of the socket head screw (61) shall be perfectly centered into the shutter slot (19). Act on both components in the same time, to get a perfect centering.
4) Screw down the shutter stem (65) into the intermediate body with bellows (59), then torque tighten the grub screw (58), as indicated under Table 4.
5) Place the body gasket (17) into the valve seat (38). Then, place the intermediate body with bellows previously assembled.
6) Place the gasket (60) and insert the mounting extension (66) on the stud bolts (33) of the valve body (38).
7) Insert the washers (35) on the stud bolts (33) and torque tighten the nuts (34), as indicated under Table 4.
8) Insert the gasket (57) into the mounting extension.
9) Insert the intermediate body previously assembled (16) into the mounting extension (66) and on the shutter stem (65).
10) Screw down the nut (32) and the preloading adjusting nut (13) placing them in the same position they had before disassembly the valve, in order to get the right calibration of the valve.
11) Place the BA gaskets (8) into the valve mounting (15).
12) Lubricate the servocontrol stem (9) with silicone grease and insert it into the valve mounting (15).
13) Insert the valve mounting (15) on the intermediate body (16)
14) Insert the first washers (63) on the screws (62), then insert screws into the holes of the valve mounting (15).
15) Insert the remaining washers (63) on the screws (62) and torque tighten the nuts (64), as indicated under Table 4.
16) Bring the stem of the servocontrol (9) against the preloading adjusting nut (13) and connect them with the connection blocks (11).
17) Insert screws (12) into the connection blocks (11), insert then the spring washers (30) and torque tighten the nuts (31), as indicated under Table 4.
18) Insert the spring (2) on the stem of the servocontrol.
19) Insert on the stem of the servocontrol the first piston support washer (5) [for ND 32-50] and (55) [for ND 15-25], the first piston support (3), the first OR (24).
20) Insert on the stem the piston with TDUOP gasket (4), being careful to place it with lip up, the second OR (24), the second piston support (3) and the second piston support washer (5). Screw down all the components with the self-locking nut (23) without torque tightening
21) Insert the spring housing piston (21) on the valve mounting (15) paying attention at lubricating the lips of the TDUOP gasket with silicone grease.
22) Insert on the spring housing piston (21) the fixing plate (67).
23) Using proper tools, draw the spring housing piston (21) up to the valve mounting (15), place the washers (27) and torque tighten the screws (26), as indicated under Table 4. **Caution! A compressed spring is placed inside the cylinder**.
24) Insert the OR gasket (53) into the air inlet connection (52).
25) Screw down the air inlet connection (52) on the spring housing piston (21), the transparent cap (1) and the flow rate control (6), as indicated under Table 4.

5.16. Instructions for Disassembly, Replacement of Gaskets and Re-assembly of 3-way GRS NO Cast Iron Valves ND 15 to 50 with bellows.

Refer to annexed Dwg. nr. 030107 for the disassembly and assembly operations of valves.
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, and take the relevant safety measures.
Whenever operations are to be carried out on valves, remove the fluid completely. The valve body shall be completely empty.
NOTE: Read the procedures thoroughly before starting any operation.

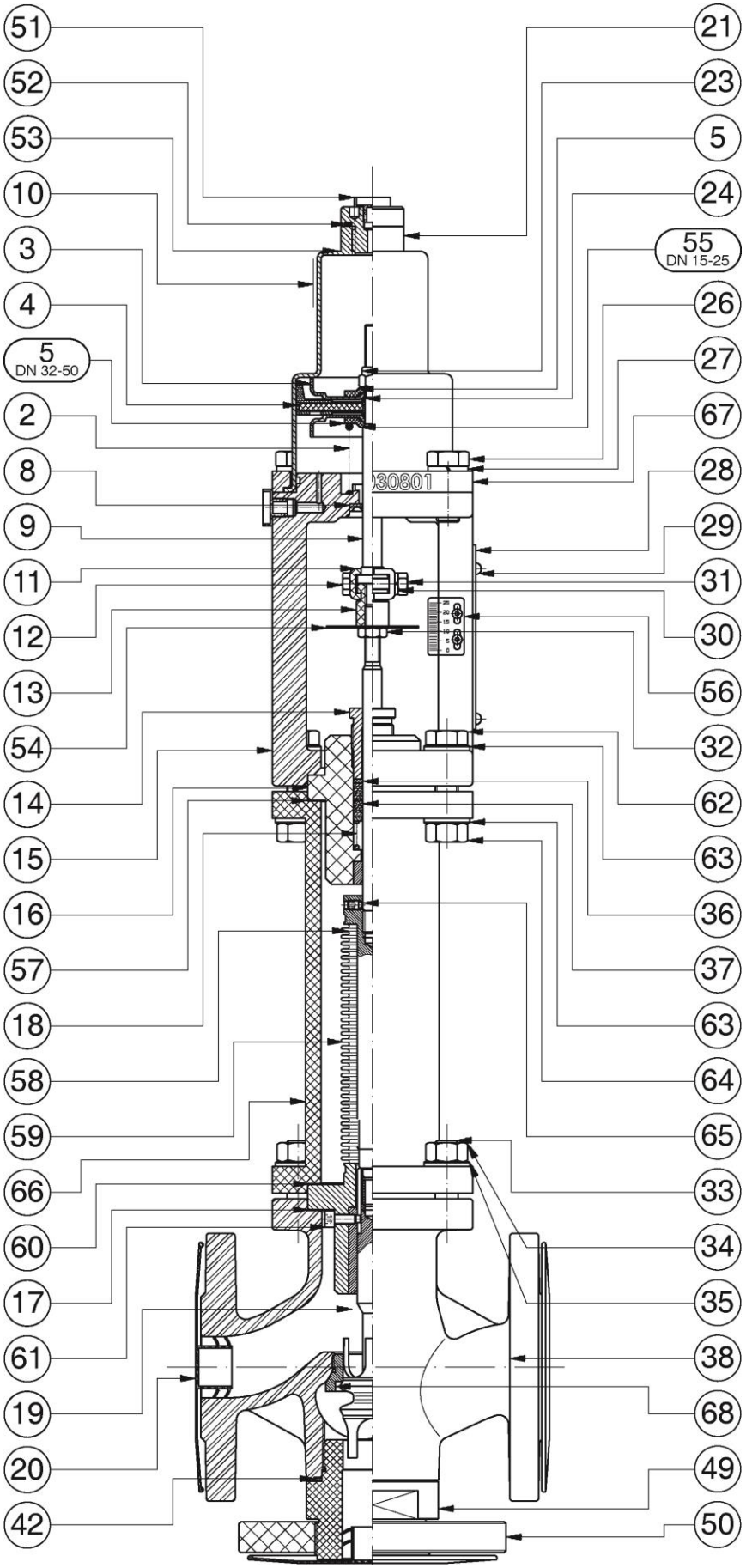
5.16.1. Disassembly.

1) Unloosen the air inlet connection (52) and remove the OR gasket (53).
2) Unloosen screws (26), remove washers (27). **Caution! A compressed spring is placed inside the cylinder.** Proper tools shall then be used to prevent the spring housing piston (21) from leaving the valve mounting (15), once all the screws (26) have been unloosen.
3) Remove the fixing plate (67).
4) Remove the spring housing piston (21).
5) Block the stem of the servocontrol (9) between soft jaws. Unloosen the self-locking nut (23).
6) Withdraw the first piston bearing washer (5), withdraw the first piston support (3), placed on the upper part.
7) Remove the first O-Ring (24), remove the piston with TDUOP gasket (4), withdraw the second O-Ring (24).
8) Withdraw the second piston support (3), withdraw the second piston bearing washer (5) [for ND 32-50] and (55) [for ND 15-25].
9) Remove spring (2).
10) Unloosen screws (12) from nuts (31), remove washers (30) and separate the connection blocks (11).
11) Unloosen nuts (64), withdraw washers (63) and remove screws (62) and remaining washers (63) from the valve mounting (15).
12) Remove the valve mounting (15).
13) Extract the stem of the servocontrol (9) and the BA gaskets (8) from the valve mounting (15).
14) Withdraw the adjusting nut (13) and relevant lock nut (32) , marking their position in order to get the same calibration of the valve during the assembly operations.
15) Withdraw the intermediate body (16) from the valve mounting extension (66), remove the gasket from this last (57).
16) Unloosen the packing gland screw (14) and withdraw the first spacer ring washer (36) out of the intermediate body, the packing gland (37), the second spacer ring washer (36) and the packing gland spring (18). **Caution! The packing gland screw (14) keeps the packing gland spring (18) compressed. Pay attention that the inner components of the intermediate body do not come off once the packing gland screw (14) is no longer compressed.**
17) Unloosen nuts (34) e remove washers (35), withdraw then the valve mounting extension (66) and the body gasket (60). Care shall be paid while handling the bellows, as it is a very delicate component when not assembled.
18) Unloosen the grub screw (58), Unloosen the shutter stem (65).
19) Blocking the valve body (38), get hold of the intermediate body with bellows and pull until the socket head screw (61) comes out of the valve body, then screw it out. Caution! This action is very delicate and needs particular care. Once the bellows has been disassembled, it is very delicate.
20) Unloosen the 3-way flange (50), the 3-way bottom (49) and remove the bottom gasket 42).
21) It is then possible to screw out the shutter (19) from the intermediate body with bellows(59) and withdraw it from the valve bottom. NB: This action is very delicate and shall be carried out very carefully.
22) Remove the intermediate body with bellows (59) and the body gasket (17) from the valve body (38).
23) Now the valve has been completely disassembled, so that the required components can be replaced.

5.16.2. Assembly.

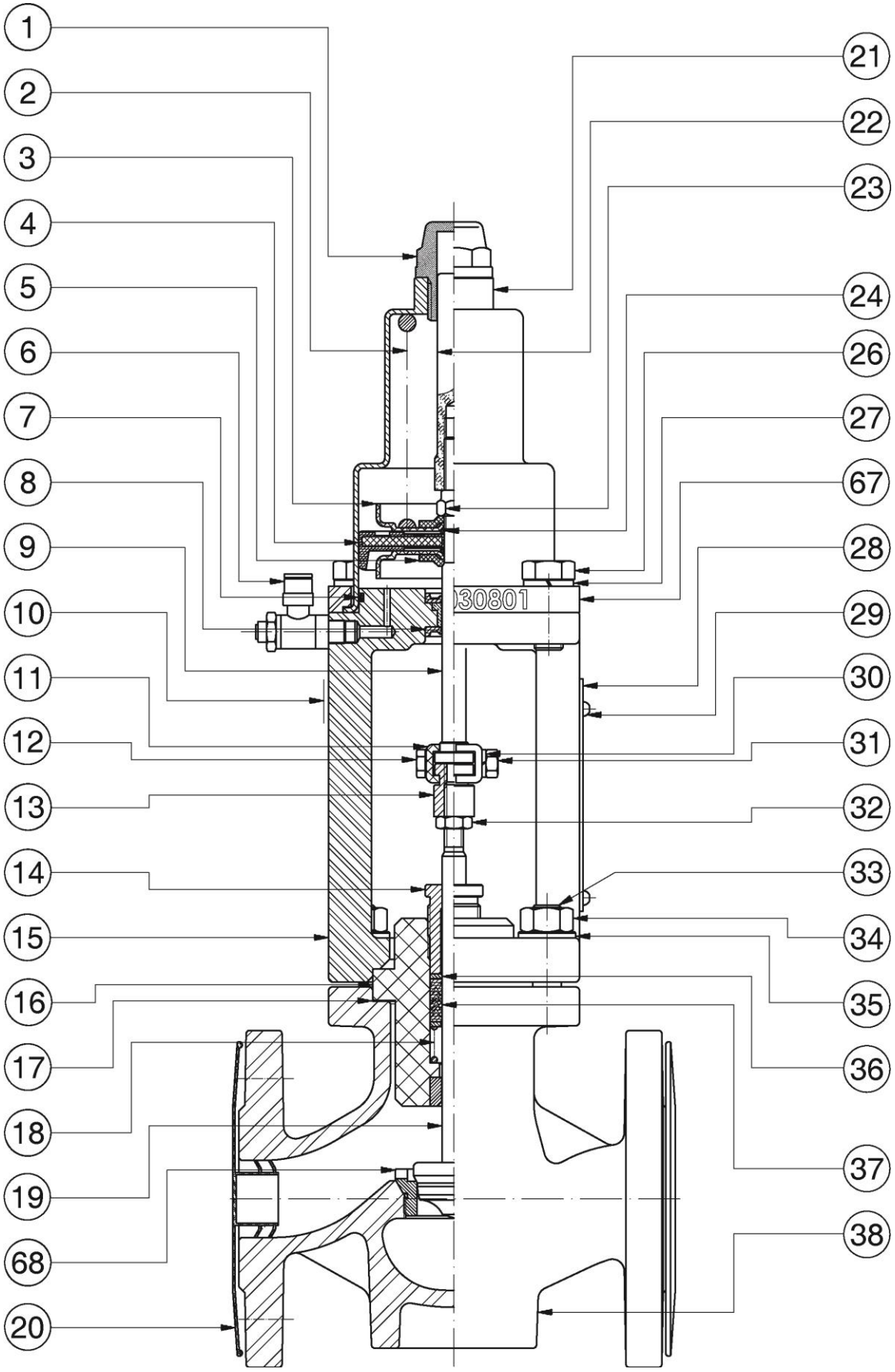
1) Lubricate the inner part of the intermediate body (16) with silicone grease and insert inside it the packing gland spring (18), the first spacer ring washer (36), the packing gland (37), the second spacer ring washer (36).
2) Screw down the packing gland screw (14) until it protrudes ~ 10 mm from the upper side of the intermediate body. **Caution! The packing gland screw keeps the packing gland spring compressed. Pay attention that the components placed on the spring do not come off during the assembly.**
3) Place the gasket (17) into the valve body (38), then insert the intermediate body with bellows (59) into it
4) Screw down the shutter (19) from the valve bottom to the intermediate body with bellows (59), until it reaches its seat.
5) Blocking the valve body, pull and withdraw the intermediate body with bellows until the screw hole becomes visible, then screw down the socket head screw (61) into the intermediate body with bellows. This operation shall be carried out very carefully, as the point of the socket head screw (61) shall be perfectly centered into the obturator slot (19). Act on both components in the same time, to get a perfect centering.
6) Place the bottom gasket (42) on the 3-way bottom (49) and torque tighten it; as indicated under Table 4, screw down the 3-way flange (50) to the valve body (38).
7) Screw down the shutter stem (65) into the intermediate body with bellows (59), then torque tighten the grub screw (58), as indicated under Table 4.
8) Place the gasket (60) and insert the mounting extension (66) on the stud bolts (33) of the valve body (38).
9) Insert the washers (35) on the stud bolts (33) and torque tighten the nuts (34), as indicated under Table 4.
10) Insert the gasket (57) into the mounting extension.
11) Insert the intermediate body (16) previously assembled into the mounting extension (66) and on the shutter stem (65).
12) Screw down the nut (32) and the preloading adjusting nut (13) placing them in the same position they had before disassembly the valve, in order to get the right calibration of the valve.
13) Place the BA gaskets (8) into the valve mounting (15).
14) Lubricate the servocontrol stem (9) with silicone grease and insert it into the valve mounting (15).
15) Insert the valve mounting (15) on the intermediate body (16).
16) Insert the first washers (63) on the screws (62), then insert screws into the holes of the valve mounting (15).
17) Insert on the screws (62) the remaining washers (63) and torque tighten the nuts (64), as indicated under Table 4.
18) Bring the stem of the servocontrol (9) against the preloading adjusting nut (13) and connect them with the connection blocks (11).
19) Insert screws (12) into the connection blocks (11), insert then the spring washers (30) and torque tighten the nuts (31), as indicated under Table 4.
20) Insert the spring (2) on the stem of the servocontrol.
21) Insert on the stem of the servocontrol the first piston support washer (5) [for ND 32-50] and (55) [for ND 15-25], the first piston support (3), the first OR (24).
22) Insert on the stem the piston with TDUOP gasket (4), being careful to place it with lip up, the second OR (24), the second piston support (3) and the second piston support washer (5). Screw down all the components with the self-locking nut (23) without torque tightening.
23) Insert the spring housing piston (21) on the valve mounting (15) paying attention at lubricating the lips of the TDUOP gasket with silicone grease.
24) Insert on the spring housing piston (21) the fixing plate (67).
25) Using proper tools, draw the spring housing piston (21) up to the valve mounting (15), place the washers (27) and torque tighten the screws (26), as indicated under Table 4. **Caution! A compressed spring is placed inside the cylinder**.
26) Place the OR gasket (53) into the air inlet connection (52).
27) Torque tighten the air inlet connections (52) on the spring housing piston (21), as indicated under Table 4.

5.16.3. Section Plane – 3-way GRS NO Cast Iron - ND 15 to 50 with bellows



Drawing nr. 030107 Rev.:01

Section Plane – 2-way GRS NC Cast Iron D.V. - ND 15 to 50



Drawing nr. 030019 Rev.:01

5.17. Components and spare parts of 2-way GRS NC Cast Iron D.V. – ND 15 to 50

N° PART.	Q.ty	DESCRIPTION		MATERIAL	GROUP	ND 15	ND 20	ND 25	ND 32	ND 40	ND 50
1	1	Transparent cap		Plastic	840	ICD091467					
2	1	Spring		Spring steel	552	557			MTD087091		
3	2	Piston support		Fe 360	545	AFD087239			AFD087240		
4	1	TDUOP gasket		NBR+Steel	566	TDUOP7065			TDUOP8073		
5	2	Piston bearing washer		Fe 360	671	RAD087233			RAD087234		
6	1	Flow rate control			613	3883					
7	1	O-Ring gasket		Gaco	548	OR03256GA			OR03300GA		
8	2	BA gasket		VITON	567	BA0V08224			BA0V10244		
9	1	Servocontrol stem		AISI 304	561	ASD092183			ASD092184		
10	1	Arrow label		Polyester	506	EAFRECCIA					
11	2	Connection blocks		Fe 360	593	BVD086251					
12	2	Hexagon head screw		Fe 360	607	VTE0630FE					
13	1	Loading adjusting nut		Fe 360	558	DRD086048					
14	1	Packing gland screw		AISI 420	559	VVD086076			VVD086077		
15	1	Valve mounting		CAST IRON	570	CSD092182			CSD092188		CSD092189
16	1	Intermediate body		ASTM A105	594	CIFD86034			CIFD86035		CIFD86036
17	1	Body gasket		FASIT 400	511	GCD086194			OR003237VI		GCD086196
18	1	Packing gland spring		AISI 316	552	MTD086109			MTD086110		
19	1	Shutter	Plastic seal	AISI 316 TEFLON -	675	OVD088084	OVD088085	OVD088086	OVD088087	OVD088088	OVD088089
			Metallic seal	AISI 316	595	OVD086053	OVD086054	OVD086055	OVD086056	OVD086057	OVD086058
			Stellited seal	AISI 316 STELLITE		OTTR092234	OTTR092239	OTTR092244	OTTR092250	OTTR092255	OTTR092261
20	2	Flange cap		Polyethylene	505	TEP3050015	TEP3050020	TEP3050025	TEP3050032	TEP3050040	TEP3050050
21	1	Spring bearing washer		AISI 304	651	PAMC941010			PAMC950781		
22	1	Stroke indicator		PVC red	840	ICD091255			ICD091256		
23	1	Self-braking nut		Fe 360	576	D06AUTOFE			D08AUTOFE		
24	2	O-Ring gasket		Gaco	548	OR02025GA			OR02031GA		
26	4	Hexagon head screw		AISI 304	500	VTE081604			VTE122004		
27	4	Spring washer		AISI 304	503	RE0800304			RE1200304		
28	1	Rating plate		Polyester	506	ERD086150					
29	2	Tear rivets		Aluminum	589	RIV32510A					
30	2	Spring washers		Fe 360	610	RE06000FE					
31	2	Hexagon nuts		Fe 360	608	D0605588F					
32	1	Hexagon nut		Fe 360	608	D0805588F					
33	4	Stud bolts		Fe 360	555	PVFD86011			PVFD86012		
34	4	Hexagon nut		Fe 360	608	D1005588F			D1205588F		
35	4	Plane washers		Fe 360	609	RP10000FE			RP12000FE		
36	2	Distance ring washer		AISI 316	703	RDD086256			RDD086274		
37	1	Packing gland		TEFLON\ GRAPHITE	587	PT00810TT			PT01020TT		
38	1	Valve body		Cast Iron	597	CG2C030724	CG2C030576	CG2C030561	CG2C030615	CG2C030621	CG2C030718
67	1	Fixing plate		Cast Iron	645	CVGR040082			CVGR040083		
68	1	Valve sat	standard	AISI 316	598	SCOM030710	SCOM030711	SCOM030707	SCOM030712	SCOM030701	SCOM030704
			stellited			SCOS030713	SCOS030716	SCOS030725	SCOS030717	SCOS030703	SCOS030719

GROUP 100

Air side spare parts

Spare part code		2705			2708		
N° Part.	Q.ty	ND 15	ND 20	ND 25	ND 32	ND 40	ND 50
4	1	TDUOP7065			TDUOP8073		
7	1	OR03256GA			OR03300GA		
8	2	BA0V08224			BA0V10244		
24	2	OR02025GA			OR02031GA		

Body side spare parts

Spare part code		2651			7814		2653
N° Part.	Q.ty	ND 15	ND 20	ND 25	ND 32	ND 40	ND 50
17	1	GCD086194			OR003237VI		GCD086196
18	1	MTD086109			MTD086110		
37	1	PT00810TT			PT01020TT		

5.18. Components and spare parts of 2-way GRS NC D.V. ND 65 to 80

N° PART.	Q.ty	DESCRIPTION		MATERIAL	GROUP	ND 65	ND 80
1	1	Transparent cap		Plastic	840	ICD092917	
2	1	Spring		Spring steel	552	MTD089226	
3	2	Piston support		Fe 360	545	AFD089222	
4	1	TDUOP gasket		NBR+Steel	566	TDUOP1254	
5	2	Piston bearing washer		Fe 360	671	RAD089220	
6	1	Flow rate control			613	3883	
7	1	O-Ring gasket		Gaco	548	OR03475GA	
8	2	BA gasket		VITON	567	BA0V16305	
9	1	Servocontrol stem		AISI 304	561	ALSC960287	
11	2	Connection blocks		Fe 360	593	BVD086251	
12	2	Hexagon head screw		Fe 360	607	VTE0630FE	
13	1	Loading adjusting nut		Fe 360	558	DRD086049	
14	1	Packing gland screw		AISI 420	559	VVD086078	
15	1	Valve mounting		CAST IRON	570	CSD086002	
16	1	Intermediate body		ASTM A105	594	CIFD86037	
17	1	Body gasket		FASIT 400	511	GCD086197	
18	1	Packing gland spring		AISI 316	552	MTD086111	
19	1	Shutter	Plastic seal	AISI 316 TEFLON -	675	OVD089287	OVD089288
			Metallic seal	AISI 316	595	OVD086060	OVD086062
			Stellited seal	AISI 316 STELLITE		OTTR092266	OTTR092271
20	2	Flange cap		Polyethylene	505	TEP3050065	TEP3050080
21	1	Spring bearing washer		AISI 304	651	NPMD89224	
22	1	Stroke indicator		PVC red	840	INDCXX0515	
23	1	Self-braking nut		Fe 360	576	D12AUTOFE	
24	2	O-Ring gasket		Gaco	548	OR02056VI	
25	1	Spacer ring		Brass	522	DDD089279	
26	4	Hexagon head screw		AISI 304	500	VTE081604	
27	4	Spring washer		AISI 304	503	RE0800304	
28	1	Rating plate		Polyester	506	ERD086150	
29	2	Tear rivets		Aluminum	589	RIV32510A	
30	2	Spring washers		Fe 360	610	RE06000FE	
31	2	Hexagon nuts		Fe 360	608	D0605588F	
32	1	Hexagon nut		Fe 360	608	D1005588F	
33	4	Stud bolts		Fe 360	555	PVFD86013	
34	4	Hexagon nut		Fe 360	608	D1205588F	
35	4	Plane washers		Fe 360	609	RP12000FE	
36	2	Distance ring washer		AISI 316	703	RDD086297	
37	1	Packing gland		TEFLON\ GRAPHITE	587	PT01222TT	
38	1	Valve body		Cast iron	597	CG2C030826	CG2C030819
39	1	Spring guide		AISI 304	812	NGMD90295	
40	1	Spring		Spring steel	552	MTD089227	
41	1	Spacer ring bush		PTFE	581	BGD091127	
42	1	Bottom gasket		FASIT 400	511	GD0091407	GD0091408
43	1	Distance ring washer		AISI 316	703	RDD088158	
44	1	Snap ring		AISI 304	665	SEEF27304	
45	12	Hexagon nut		AISI 304	501	D08055884	
46	4	Hexagon head screw		AISI 304	500	VTE083504	
47	1	Intermediate body		AISI 304	632	CINT960286	
48	1	Valve Bottom		ASTM A105	756	FFD086130	FFD086132
68	1	Valve seat	standard	AISI 316	598	SCOM030816	SCOM030817
			stellited			SCOS030825	SCOS030821

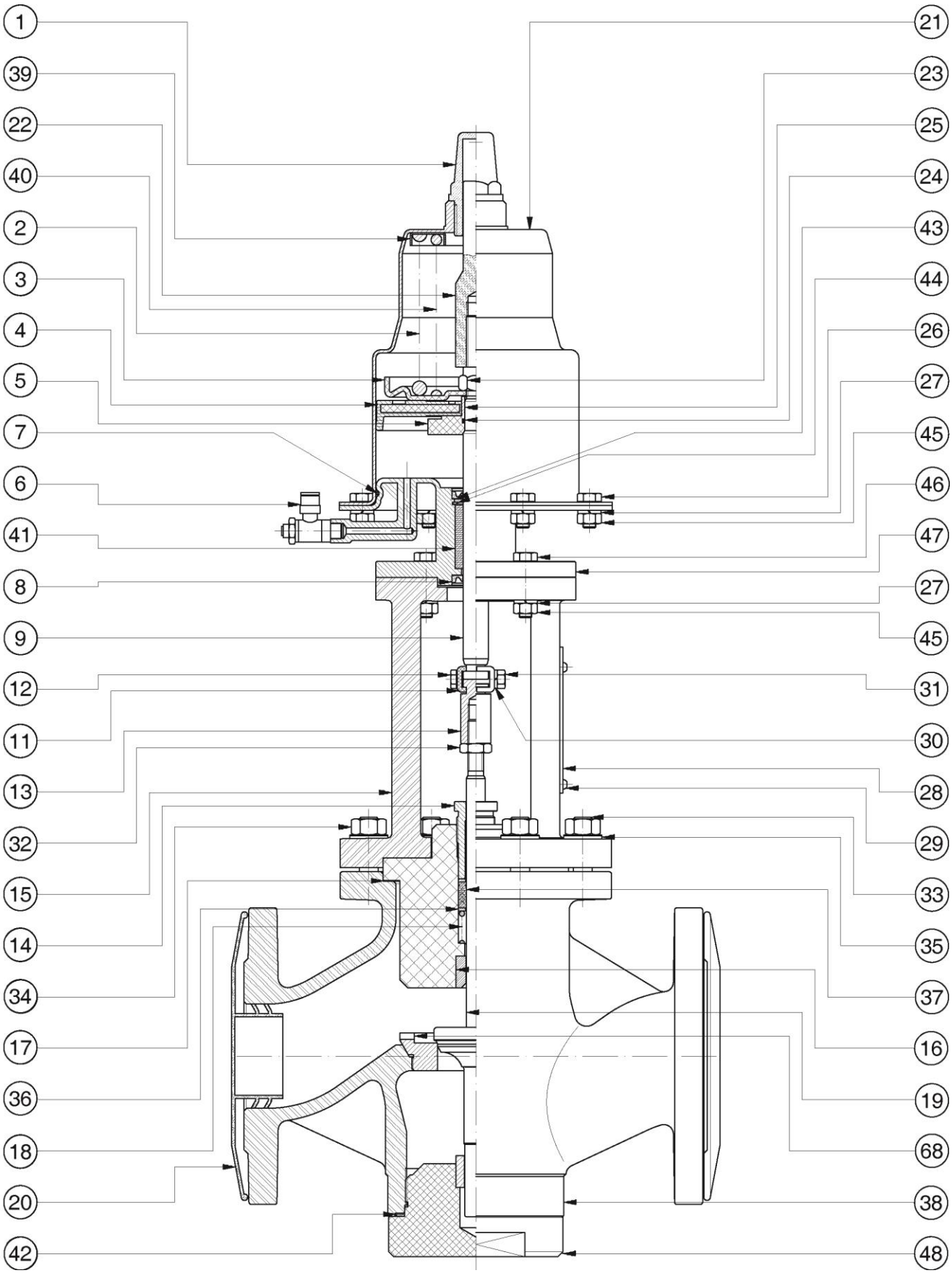
GROUP 100
Air side spare parts

Spare part code		3952	
N° Part.	Q.ty	ND 65	ND 80
4	1	TDUOP1254	
5	1	RAD089220	
7	1	OR03475GA	
8	2	BA0V16305	
24	1	OR02056VI	

Body side spare parts

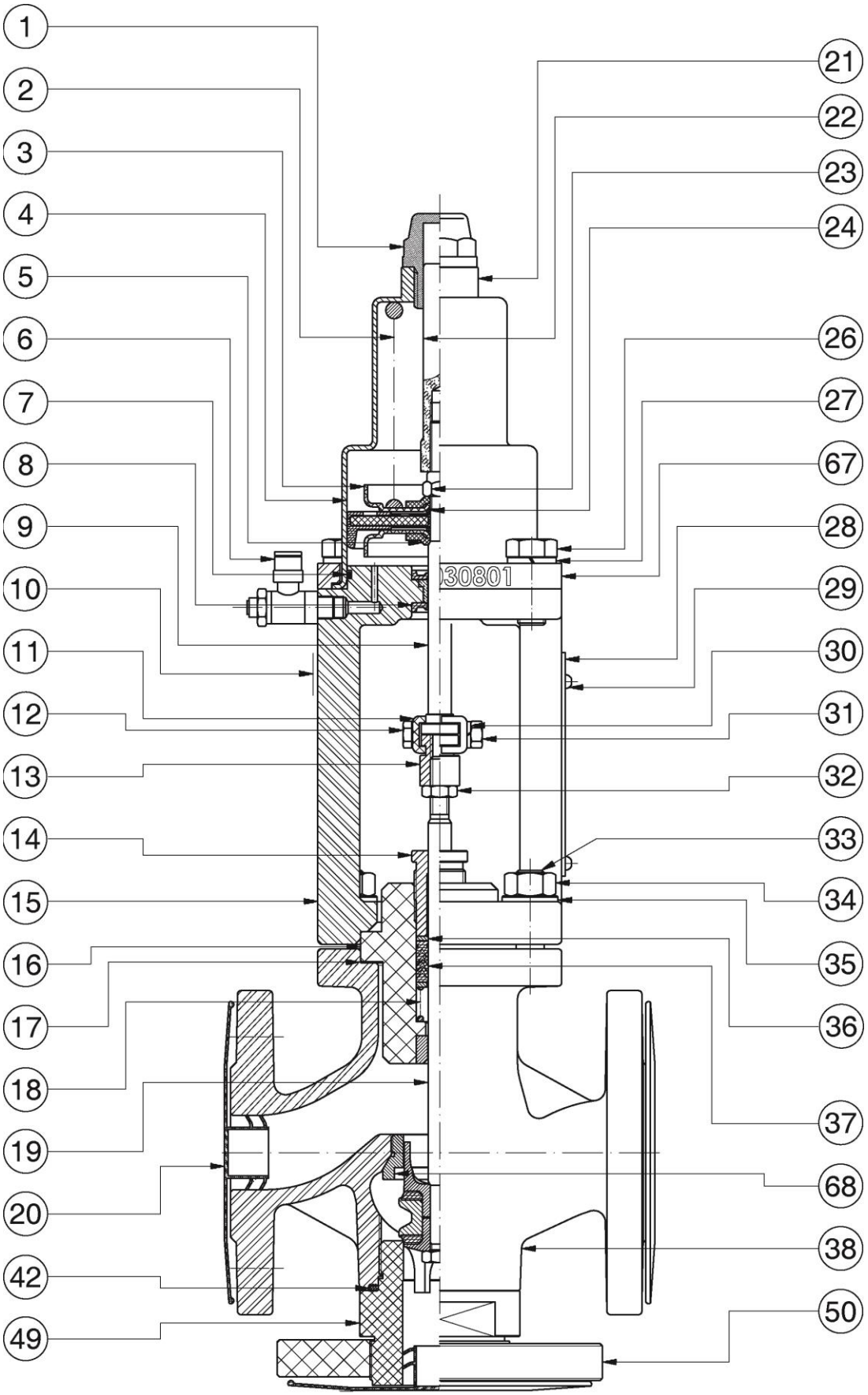
Spare part code		2654	5415
N° Part.	Q.ty	ND 65	ND 80
17	1	GCD086197	
18	1	MTD086111	
37	1	PT01222TT	
42	1	GD0091407	GD0091408

Section Plane – 2-way GRS NO D.V. ND 65 to 80



Drawing nr. 030032 Rev.:01

Section Plane – 3-way GRS NC Cast Iron D.V. ND 15 to 50



Drawing nr. 030037 Rev.:01

5.19. Components and spare parts of 3-way GRS NC D.V. ND 15 to 50

N° PART.	Q.ty	DESCRIPTION		MATERIAL	GROUP	ND 15	ND 20	ND 25	ND 32	ND 40	ND 50
1	1	Transparent cap		Plastic	840	ICD091467					
2	1	Spring		Spring steel	552	557			MTD087091		
3	2	Piston support		Fe 360	545	AFD087239			AFD087240		
4	1	TDUOP gasket		NBR+Steel	566	TDUOP7065			TDUOP8073		
5	2	Piston bearing washer		Fe 360	671	RAD087233			RAD087234		
6	1	Flow rate control			613	3883					
7	1	O-Ring gasket		Gaco	548	OR03256GA			OR03300GA		
8	2	BA gasket		VITON	567	BA0V08224			BA0V10244		
9	1	Servocontrol stem		AISI 304	561	ASD092183			ASD092184		
10	1	Arrow label		Polyester	506	EAFRECCIA					
11	2	Connection blocks		Fe 360	593	BVD086251					
12	2	Hexagon head screw		Fe 360	607	VTE0630FE					
13	1	Loading adjusting nut		Fe 360	558	DRD086048					
14	1	Packing gland screw		AISI 420	559	VVD086076			VVD086077		
15	1	Valve mounting		CAST IRON	570	CSD092182			CSD092188		CSD092189
16	1	Intermediate body		ASTM A105	594	CIFD86034			CIFD86035		CIFD86036
17	1	Body gasket		FASIT 400	511	GCD086194			OR003237VI		GCD086196
18	1	Packing gland spring		AISI 316	552	MTD086109			MTD086110		
19	1	Shutter	Plastic seal	AISI 316 TEFLON -	807	OV3D88215	OV3D88214	OV3D88178	OV3D88179	OV3D88177	OV3D88180
			Metallic seal	AISI 316	654	OV3D86245	OV3D86234	OV3D86231	OV3D86226	OV3D96223	OV3D86220
			Stellited seal	AISI 316 STELLITE					OT3MXX0391	OT3MXX0392	OT3M990662
20	2	Flange cap		Polyethylene	505	TEP3050015	TEP3050020	TEP3050025	TEP3050032	TEP3050040	TEP3050050
21	1	Spring bearing washer		AISI 304	651	PAMC941010			PAMC950781		
22	1	Stroke indicator		PVC red	840	ICD091255			ICD091256		
23	1	Self-braking nut		Fe 360	576	D06AUTOFE			D08AUTOFE		
24	2	O-Ring gasket		Gaco	548	OR02025GA			OR02031GA		
26	4	Hexagon head screw		AISI 304	500	VTE081604			VTE122004		
27	4	Spring washer		AISI 304	503	RE0800304			RE1200304		
28	1	Rating plate		Polyester	506	ERD086150					
29	2	Tear rivets		Aluminum	589	RIV32510A					
30	2	Spring washers		Fe 360	610	RE06000FE					
31	2	Hexagon nuts		Fe 360	608	D0605588F					
32	1	Hexagon nut		Fe 360	608	D0805588F					
33	4	Stud bolts		Fe 360	555	PVFD86011			PVFD86012		
34	4	Hexagon nut		Fe 360	608	D1005588F			D1205588F		
35	4	Plane washers		Fe 360	609	RP10000FE			RP12000FE		
36	2	Distance ring washer		AISI 316	703	RDD086256			RDD086274		
37	1	Packing gland		TEFLON\ GRAPHITE	587	PT00810TT			PT01020TT		
38	1	Valve body		Cast Iron	597	CG3C030573	CG3C030579	CG3C030564	CG3C030618	CG3C030624	CG3C030558
42	1	Bottom gasket		FASIT 400	511	GD0960673	GD0960674	GD0960675	GD0960676	GD0960677	GD0960678
49	1	Three-way bottom		ASTM A105	756	FONDXX0142	FONDXX0143	FONDXX0144	FONDXX0145	FONDXX0146	FONDXX0147
50	1	Three-way flange		Fe 360	578	F3VD86152	F3VD86153	F3VD86154	F3VD86155	F3VD86156	F3VD86157
67	1	Fixing plate		Cast Iron	645	CVGR040082			CVGR040083		
68	1	Valve seat	standard	AISI 316	598	SCOM030710	SCOM030711	SCOM030707	SCOM030712	SCOM030701	SCOM030704
			stellited			SCOS030713	SCOS030716	SCOS030725	SCOS030717	SCOS030703	SCOS030719

GROUP 100

Air side spare parts

Spare part code		2705			2708		
N° Part.	Q.ty	ND 15	ND 20	ND 25	ND 32	ND 40	ND 50
4	1	TDUOP7065			TDUOP8073		
7	1	OR03256GA			OR03300GA		
8	2	BA0V08224			BA0V10244		
24	2	OR02025GA			OR02031GA		

Body side spare parts

Spare part code		5419	5420	5421	7815	7816	5424
N° Part.	Q.ty	ND 15	ND 20	ND 25	ND 32	ND 40	ND 50
17	1	GCD086194			OR003237VI		GCD086196
18	1	MTD086109			MTD086110		
37	1	PT00810TT			PT01020TT		
42	1	GD0960673	GD0960674	GD0960675	GD0960676	GD0960677	GD0960678

5.20. Components and spare parts of 3-way GRS NC D.V. ND 65 to 80

N° PART.	Q.ty	DESCRIPTION		MATERIAL	GROUP	ND 65	ND 80
1	1	Transparent cap		Plastic	840	ICD092917	
2	1	Spring		Spring steel	552	MTD089226	
3	2	Piston support		Fe 360	545	AFD089222	
4	1	TDUOP gasket		NBR+Steel	566	TDUOP1254	
5	2	Piston bearing washer		Fe 360	671	RAD089220	
6	1	Flow rate control			613	3883	
7	1	O-Ring gasket		Gaco	548	OR03475GA	
8	2	BA gasket		VITON	567	BA0V16305	
9	1	Servocontrol stem		AISI 304	561	ALSC960287	
11	2	Connection blocks		Fe 360	593	BVD086251	
12	2	Hexagon head screw		Fe 360	607	VTE0630FE	
13	1	Loading adjusting nut		Fe 360	558	DRD086049	
14	1	Packing gland screw		AISI 420	559	VVD086078	
15	1	Valve mounting		CAST IRON	570	CSD086002	
16	1	Intermediate body		ASTM A105	594	CIFD86037	
17	1	Body gasket		FASIT 400	511	GCD086197	
18	1	Packing gland spring		AISI 316	552	MTD086111	
19	1	Shutter	Plastic seal	AISI 316 TEFLON -	675	OV3D88176	OV3D88175
			Metallic seal	AISI 316	595	OV3D86169	OV3D86168
			Stellited seal	AISI 316 STELLITE		OT3MXX0393	OT3MXX0394
20	3	Flange cap		Polyethylene	505	TEP3050065	TEP3050080
21	1	Spring bearing washer		AISI 304	651	NPMD89224	
22	1	Stroke indicator		PVC red	840	INDCXX0515	
23	1	Self-braking nut		Fe 360	576	D12AUTOFE	
24	2	O-Ring gasket		Gaco	548	OR02056VI	
25	1	Spacer ring		Brass	522	DDD089279	
26	4	Hexagon head screw		AISI 304	500	VTE081604	
27	4	Spring washer		AISI 304	503	RE0800304	
28	1	Rating plate		Polyester	506	ERD086150	
29	2	Tear rivets		Aluminum	589	RIV32510A	
30	2	Spring washers		Fe 360	610	RE06000FE	
31	2	Hexagon nuts		Fe 360	608	D0605588F	
32	1	Hexagon nut		Fe 360	608	D1005588F	
33	4	Stud bolts		Fe 360	555	PVFD86013	
34	4	Hexagon nut		Fe 360	608	D1205588F	
35	4	Plane washers		Fe 360	609	RP12000FE	
36	2	Distance ring washer		AISI 316	703	RDD086297	
37	1	Packing gland		TEFLON\ GRAPHITE	587	PT01222TT	
38	1	Valve body		Cast iron	**(1)**	CG2C030826	CG3C040051
39	1	Spring guide		AISI 304	812	NGMD90295	
40	1	Spring		Spring steel	552	MTD089227	
41	1	Spacer ring bush		PTFE	581	BGD091127	
42	1	Bottom gasket		FASIT 400	511	GD0091407	GD0091408
43	1	Distance ring washer		AISI 316	703	RDD088158	
44	1	Snap ring		AISI 304	665	SEEF27304	
45	12	Hexagon nut		AISI 304	501	D08055884	
46	4	Hexagon head screw		AISI 304	500	VTE083504	
47	1	Intermediate body		AISI 304	632	CINT960286	
49	1	Three-way bottom		ASTM A105	756	FOND040220	FOND040052
50	1	Three-way iron flange		Fe 360	578	F3VD86158	F3VD86159
68	1	Valve seat	standard	AISI 316	598	SCOM030816	SCOM030817
			stellited			SCOS030825	SCOS030821

(1) Group 597 for the ND 65 – Group 655 for the ND 80

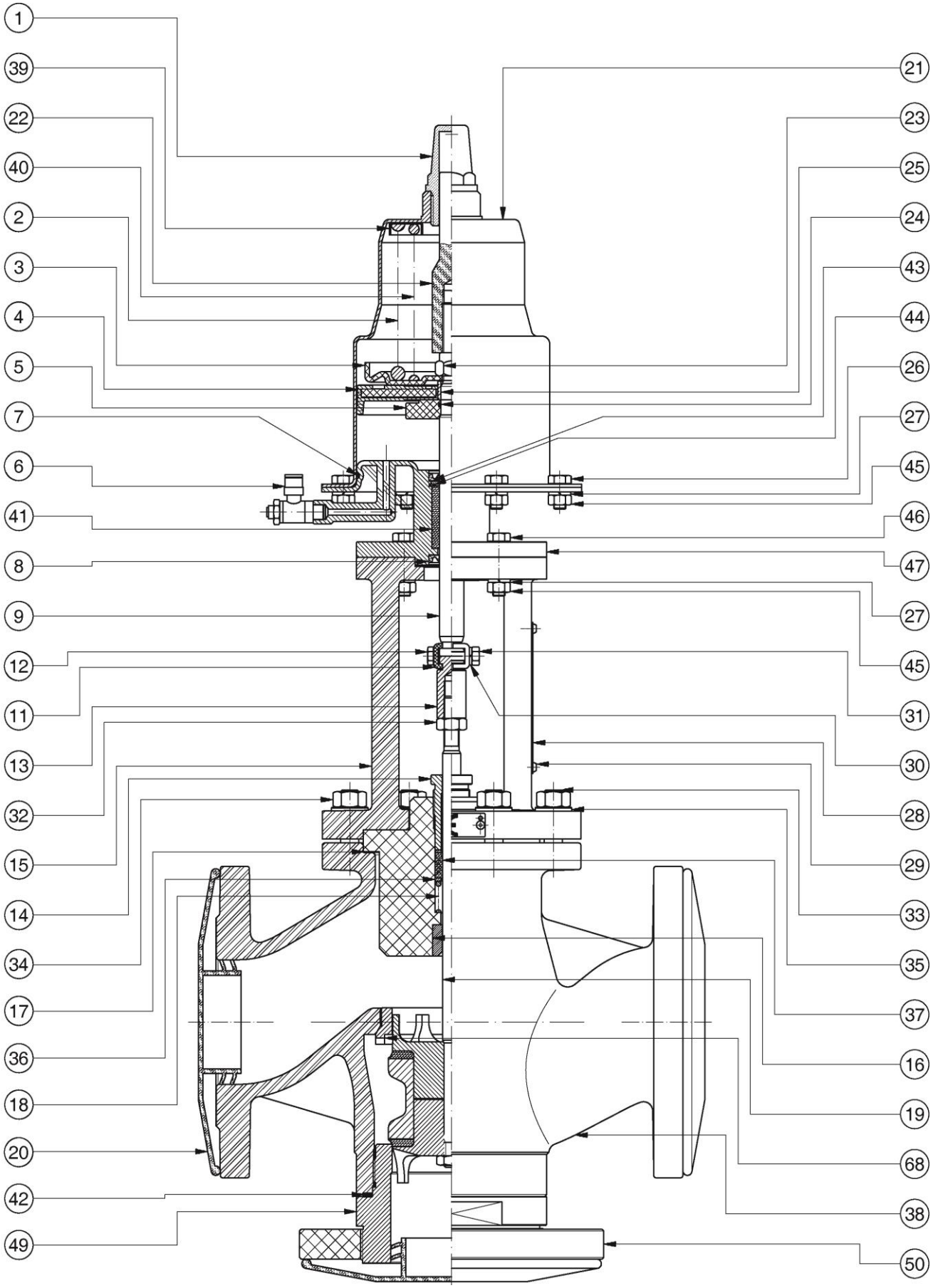
GROUP 100
Air side spare parts

Spare part code		3952	
N° Part.	Q.ty	ND 65	ND 80
4	1	TDUOP1254	
5	1	RAD089220	
7	1	OR03475GA	
8	2	BA0V16305	
24	1	OR02056VI	

Body side spare parts

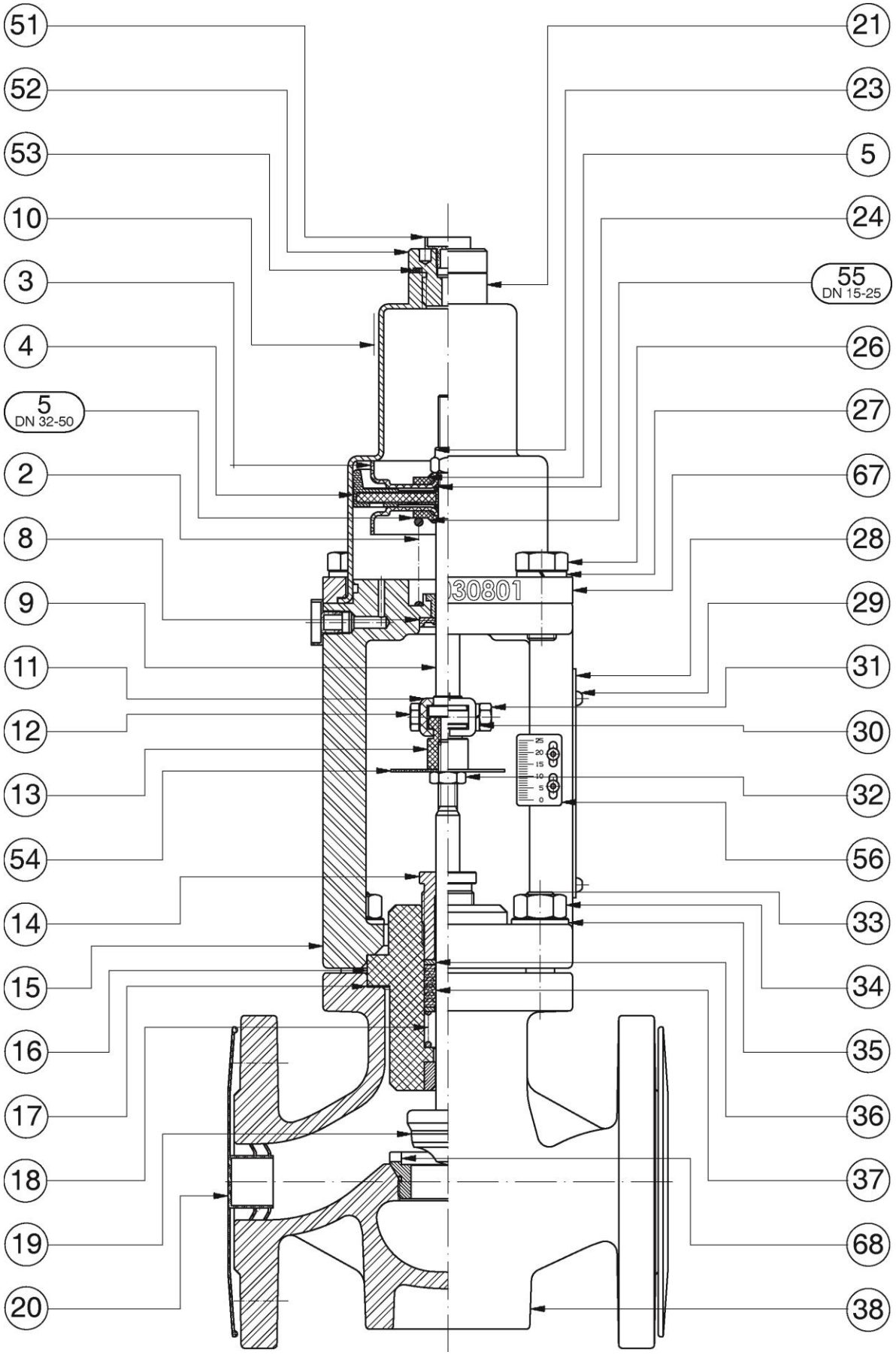
Spare part code		2654	5415
N° Part.	Q.ty	ND 65	ND 80
17	1	GCD086197	
18	1	MTD086111	
37	1	PT01222TT	
42	1	GD0091407	GD0091408

Section Plane – 3-way GRS NC Cast Iron D.V. ND 65 to 80



Drawing nr. 030038 Rev.:01

Section Plane 2-way GRS NO Cast Iron Valves ND 15 to 50



Drawing nr. 030041 Rev.:01

5.21. Components and spare parts of 2-way GRS NO Valves ND 15 to 50

N° PART.	Q.ty	DESCRIPTION		MATERIAL	GROUP	ND 15	ND 20	ND 25	ND 32	ND 40	ND 50
2	1	Spring		Spring steel	552	MTD092510					
3	2	Piston support		Fe 360	545	AFD087239			AFD087240		
4	1	TDUOP gasket		NBR+Steel	566	TDUOP7065			TDUOP8073		
5	2	Piston bearing washer		Fe 360	671	RAD087233			RAD087234		
8	1	BA gasket		VITON	567	BA0V08224			BA0V10244		
9	1	Servocontrol stem		AISI 304	561	ASD092183			ASD092184		
10	1	Arrow label		Polyester	506	EAFRECCIA					
11	2	Connection blocks		Fe 360	593	BVD086251					
12	2	Hexagon head screw		Fe 360	607	VTE0630FE					
13	1	Loading adjusting nut		Fe 360	558	DRD086048					
14	1	Packing gland screw		AISI 420	559	VVD086076			VVD086077		
15	1	Valve mounting		CAST IRON	570	CAST960248			CAST960249		CAST960250
16	1	Intermediate body		ASTM A105	594	CIFD86034			CIFD86035		CIFD86036
17	1	Body gasket		FASIT 400	511	GCD086194			OR003237VI		GCD086196
18	1	Packing gland spring		AISI 316	552	MTD086109			MTD086110		
19	1	Shutter	Plastic seal	AISI 316 TEFLON -	675	OVD088084	OVD088085	OVD088086	OVD088087	OVD088088	OVD088089
			Metallic seal	AISI 316	595	OVD086053	OVD086054	OVD086055	OVD086056	OVD086057	OVD086058
			Stellited seal	AISI 316 STELLITE		OTTR092234	OTTR092239	OTTR092244	OTTR092250	OTTR092255	OTTR092261
20	2	Flange cap		Polyethylene	505	TEP3050015	TEP3050020	TEP3050025	TEP3050032	TEP3050040	TEP3050050
21	1	Spring bearing washer		AISI 304	651	PAMC941010			PAMC950781		
23	1	Self-braking nut		Fe 360	576	D06AUTOFE			D08AUTOFE		
24	2	O-Ring gasket		Gaco	548	OR02025GA			OR02031GA		
26	4	Hexagon head screw		AISI 304	500	VTE081604			VTE122004		
27	4	Spring washer		AISI 304	503	RE0800304			RE1200304		
28	1	Rating plate		Polyester	506	ERD086150					
29	4	Tear rivets		Aluminum	589	RIV32510A					
30	2	Spring washers		Fe 360	610	RE06000FE					
31	2	Hexagon nuts		Fe 360	608	D0605588F					
32	1	Hexagon nut		Fe 360	608	D0805588F					
33	4	Stud bolts		Fe 360	555	PVFD86011			PVFD86012		
34	4	Hexagon nut		Fe 360	608	D1005588F			D1205588F		
35	4	Plane washers		Fe 360	609	RP10000FE			RP12000FE		
36	2	Distance ring washer		AISI 316	703	RDD086256			RDD086274		
37	1	Packing gland		TEFLON\ GRAPHITE	587	PT00810TT			PT01020TT		
38	1	Valve body		Cast Iron	597	CG2C030724	CG2C030576	CG2C030561	CG2C030615	CG2C030621	CG2C030718
51	2	Threaded cap		Polyethylene	505	TEP400G018					
52	1	Air inlet fitting		AISI 304	811	RRDD93955					
53	1	O-Ring gasket		Gaco	548	533					
54	1	Stroke indicator disk		Fe 360	585	DCD086096					
55	1	Piston support washer inversa		Fe 360	671	RAD092502					
56	1	Stroke rating plante		Aluminum	590	ERD086151					
67	1	Fixing plate		Cast Iron	645	CVGR040082			CVGR040083		
68	1	Valve seat	standard	AISI 316	598	SCOM030710	SCOM030711	SCOM030707	SCOM030712	SCOM030701	SCOM030704
			stellited			SCOS030713	SCOS030716	SCOS030725	SCOS030717	SCOS030703	SCOS030719

GROUP 100

Air side spare parts

Spare part code		3953			3954		
N° Part.	Q.ty	ND 15	ND 20	ND 25	ND 32	ND 40	ND 50
4	1	TDUOP7065			TDUOP8073		
8	2	BA0V08224			BA0V10244		
24	2	OR02025GA			OR02031GA		
52	1	533					

Body side spare parts

Spare part code		2651			7814		2653
N° Part.	Q.ty	ND 15	ND 20	ND 25	ND 32	ND 40	ND 50
17	1	GCD086194			OR003237VI		GCD086196
18	1	MTD086109			MTD086110		
37	1	PT00810TT			PT01020TT		

5.22. Components and spare parts of 2-way GRS NO Valves ND 65 to 80

N° PART.	Q.ty	DESCRIPTION		MATERIAL	GROUP	ND 65	ND 80
2	1	Spring		Spring steel	552	MTD087091	
3	2	Piston support		Fe 360	545	AFD089222	
4	1	TDUOP gasket		NBR+Steel	566	TDUOP1254	
5	2	Piston bearing washer		Fe 360	671	RAD089220	
7	1	O-Ring gasket		Gaco	548	OR03475GA	
8	1	BA gasket		VITON	567	BA0V16305	
9	1	Servocontrol stem		AISI 304	561	ALSC960287	
11	2	Connection blocks		Fe 360	593	BVD086251	
12	2	Hexagon head screw		Fe 360	607	VTE0630FE	
13	1	Loading adjusting nut		Fe 360	558	DRD086049	
14	1	Packing gland screw		AISI 420	559	VVD086078	
15	1	Valve mounting		CAST IRON	570	CSD086002	
16	1	Intermediate body		ASTM A105	594	CIFD86037	
17	1	Body gasket		FASIT 400	511	GCD086197	
18	1	Packing gland spring		AISI 316	552	MTD086111	
19	1	Shutter	Plastic seal	AISI 316 TEFLON -	675	OVD089287	OVD089288
			Metallic seal	AISI 316	595	OVD086060	OVD086062
			Stellited seal	AISI 316 STELLITE		OTTR092266	OTTR092271
20	2	Flange cap		Polyethylene	505	TEP3050065	TEP3050080
21	1	Spring bearing washer		AISI 304	651	NPMD89224	
23	1	Self-braking nut		Fe 360	576	D12AUTOFE	
24	2	O-Ring gasket		Gaco	548	OR02056VI	
25	1	Spacer ring		Brass	522	DDD089279	
26	4	Hexagon head screw		AISI 304	500	VTE081604	
27	4	Spring washer		AISI 304	503	RE0800304	
28	1	Rating plate		Polyester	506	ERD086150	
29	4	Tear rivets		Aluminum	589	RIV32510A	
30	2	Spring washers		Fe 360	610	RE06000FE	
31	2	Hexagon nuts		Fe 360	608	D0605588F	
32	1	Hexagon nut		Fe 360	608	D1005588F	
33	4	Stud bolts		Fe 360	555	PVFD86013	
34	4	Hexagon nut		Fe 360	608	D1205588F	
35	4	Plane washers		Fe 360	609	RP12000FE	
36	2	Distance ring washer		AISI 316	703	RDD086297	
37	1	Packing gland		TEFLON\ GRAPHITE	587	PT01222TT	
38	1	Valve body		Cast iron	597	CG2C030826	CG2C030819
39	1	Spring guide		AISI 304	812	NGMD90295	
41	1	Spacer ring bush		PTFE	581	BGD091127	
42	1	Bottom gasket		FASIT 400	511	GD0091407	GD0091408
43	1	Distance ring washer		AISI 316	703	RDD088158	
44	1	Snap ring		AISI 304	665	SEEF27304	
45	12	Hexagon nut		AISI 304	501	D08055884	
46	4	Hexagon head screw		AISI 304	500	VTE083504	
47	1	Intermediate body		AISI 304	632	CINT960286	
48	1	Valve bottom		ASTM A105	756	FFD086130	FFD086132
51	2	Threaded cap		Polyethylene	505	TEP400G018	
52	1	Air inlet fitting		AISI 304	811	RRDD91609	
53	1	O-Ring gasket		VITON	548	OR03112VI	
54	1	Stroke indicator disk		Fe 360	585	DCD086097	
56	1	Stroke rating plate		Aluminum	590	ERD086151	
68	1	Valve seat	standard	AISI 316	598	SCOM030816	SCOM030817
			stellited			SCOS030825	SCOS030821

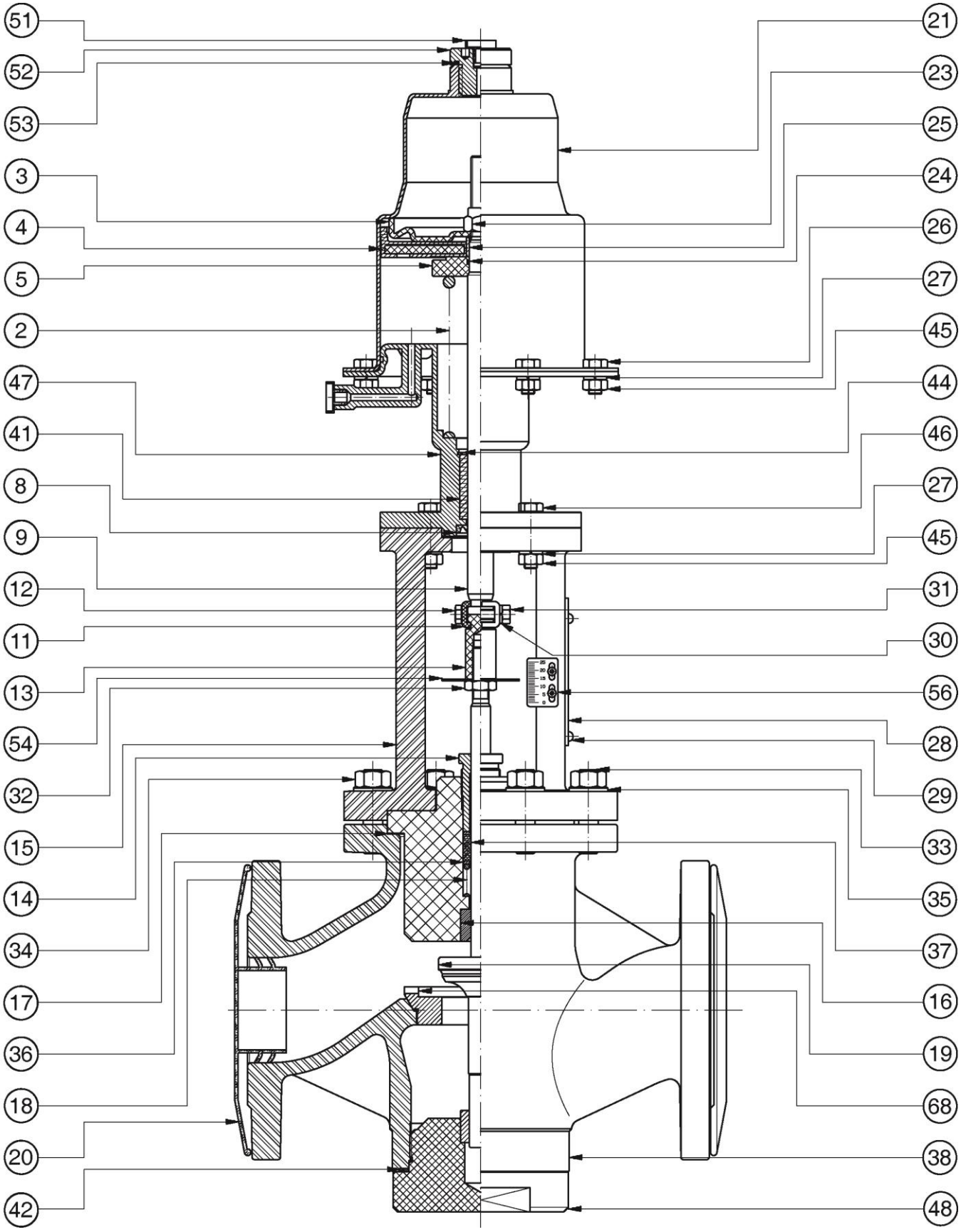
GROUP 100
Air side spare parts

Spare part code		7593	
N° Part.	Q.ty	ND 65	ND 80
4	1	TDUOP1254	
5	1	RAD089220	
8	1	BA0V16305	
24	1	OR02056VI	
53	1	OR03112VI	

Body side spare parts

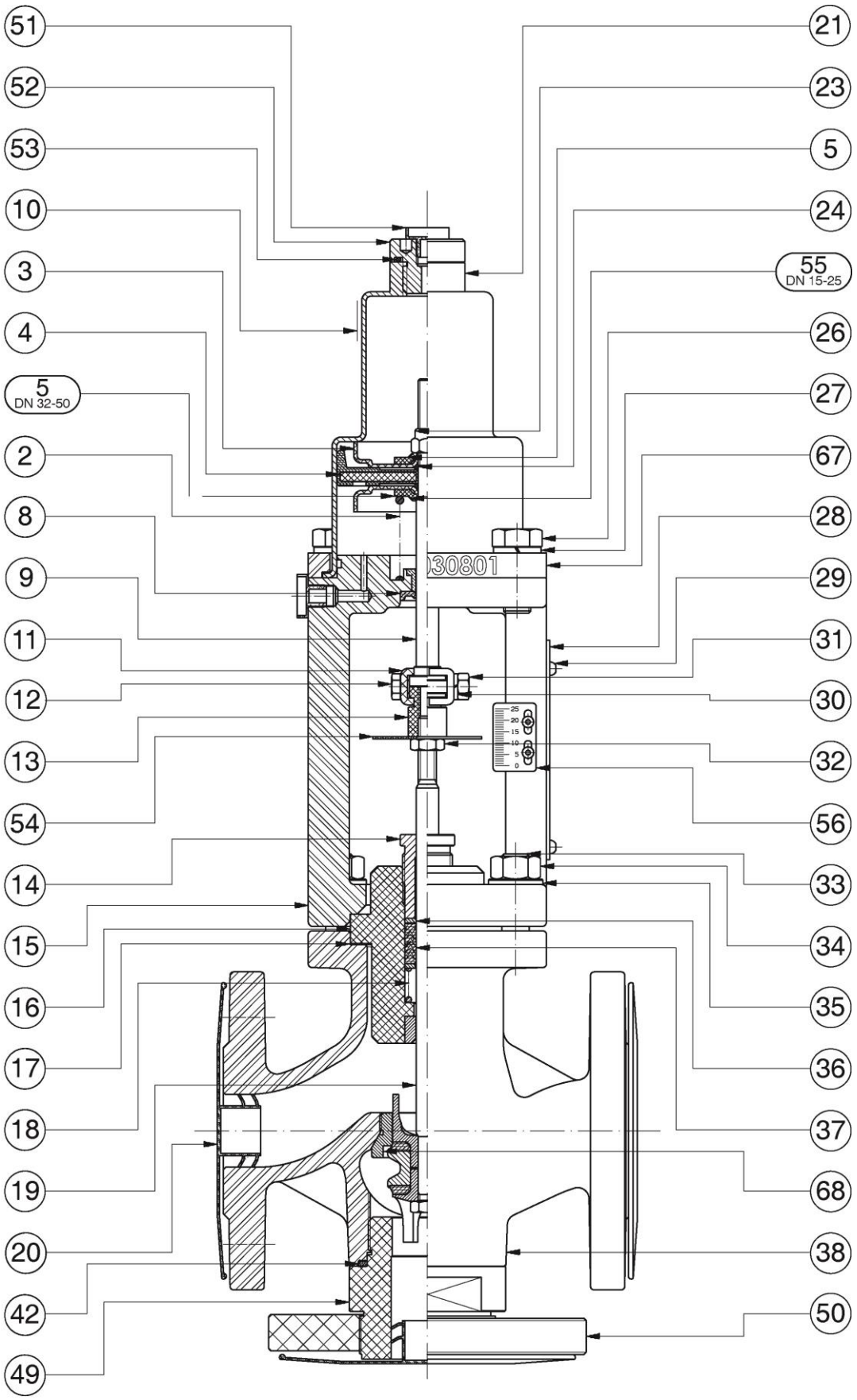
Spare part code		2654	5415
N° Part.	Q.ty	ND 65	ND 80
17	1	GCD086197	
18	1	MTD086111	
37	1	PT01222TT	
42	1	GD0091407	GD0091408

Section Plane – 2-way GRS NO Cast Iron Valves ND 65 to 80.



Drawing nr. 030057 Rev.:01

Section Plane – 3-way GRS NO Cast Iron Valves ND 15 to 50.



Drawing nr. 030058 Rev.:01

5.23. Components and spare parts of 3-way GRS NO Valves ND 15 to 50

N° PAR.	Q.ty	DESCRIPTION		MATERIAL	GROUP	ND 15	ND 20	ND 25	ND 32	ND 40	ND 50
2	1	Spring		Spring steel	552	MTD092510					
3	2	Piston support		Fe 360	545	AFD087239			AFD087240		
4	1	TDUOP gasket		NBR+Steel	566	TDUOP7065			TDUOP8073		
5	2	Piston bearing washer		Fe 360	671	RAD087233			RAD087234		
8	1	BA gasket		VITON	567	BA0V08224			BA0V10244		
9	1	Servocontrol stem		AISI 304	561	ASD092183			ASD092184		
10	1	Arrow label		Polyester	506	EAFRECCIA					
11	2	Connection blocks		Fe 360	593	BVD086251					
12	2	Hexagon head screw		Fe 360	607	VTE0630FE					
13	1	Loading adjusting nut		Fe 360	558	DRD086048					
14	1	Packing gland screw		AISI 420	559	VVD086076			VVD086077		
15	1	Valve mounting		CAST IRON	570	CAST960248			CAST960249		CAST960250
16	1	Intermediate body		ASTM A105	594	CIFD86034			CIFD86035		CIFD86036
17	1	Body gasket		FASIT 400	511	GCD086194			OR003237VI		GCD086196
18	1	Packing gland spring		AISI 316	552	MTD086109			MTD086110		
19	1	Shutter	Plastic seal	AISI 316 TEFLON -	807	OV3D88215	OV3D88214	OV3D88178	OV3D88179	OV3D88177	OV3D88180
			Metallic seal	AISI 316	654	OV3D86245	OV3D86234	OV3D86231	OV3D86226	OV3D96223	OV3D86220
			Stellited seal	AISI 316 STELLITE					OT3MXX0391	OT3MXX0392	OT3M990662
20	2	Flange cap		Polyethylene	505	TEP3050015	TEP3050020	TEP3050025	TEP3050032	TEP3050040	TEP3050050
21	1	Spring bearing washer		AISI 304	651	PAMC941010			PAMC950781		
23	1	Self-braking nut		Fe 360	576	D06AUTOFE			D08AUTOFE		
24	2	O-Ring gasket		Gaco	548	OR02025GA			OR02031GA		
26	4	Hexagon head screw		AISI 304	500	VTE081604			VTE122004		
27	4	Spring washer		AISI 304	503	RE0800304			RE1200304		
28	1	Rating plate		Polyester	506	ERD086150					
29	4	Tear rivets		Aluminum	589	RIV32510A					
30	2	Spring washers		Fe 360	610	RE06000FE					
31	2	Hexagon nuts		Fe 360	608	D0605588F					
32	1	Hexagon nut		Fe 360	608	D0805588F					
33	4	Stud bolts		Fe 360	555	PVFD86011			PVFD86012		
34	4	Hexagon nut		Fe 360	608	D1005588F			D1205588F		
35	4	Plane washers		Fe 360	609	RP10000FE			RP12000FE		
36	2	Distance ring washer		AISI 316	703	RDD086256			RDD086274		
37	1	Packing gland		TEFLON\ GRAPHITE	587	PT00810TT			PT01020TT		
38	1	Valve body		Cast Iron	597	CG3C030573	CG3C030579	CG3C030564	CG3C030618	CG3C030624	CG3C030558
42	1	Bottom gasket		FASIT 400	511	GD0960673	GD0960674	GD0960675	GD0960676	GD0960677	GD0960678
49	1	Three-way bottom		ASTM A105	756	FONDXX0142	FONDXX0143	FONDXX0144	FONDXX0145	FONDXX0146	FONDXX0147
50	1	Three-way flange		Fe 360	578	F3VD86152	F3VD86153	F3VD86154	F3VD86155	F3VD86156	F3VD86157
51	2	Threaded cap		Polyethylene	505	TEP400G018					
52	1	Air inlet fitting		AISI 304	811	RRDD93955					
53	1	O-Ring gasket		Gaco	548	533					
54	1	Stroke indicator disk		Fe 360	585	DCD086096					
55	1	Piston support inverted washer		Fe 360	671	RAD092502					
56	1	Stroke rating plate		Aluminum	590	ERD086151					
67	1	Fixing plate		Cast Iron	645	CVGR040082			CVGR040083		
68	1	Valve seat	standard	AISI 316	598	SCOM030710	SCOM030711	SCOM030707	SCOM030712	SCOM030701	SCOM030704
			stellited			SCOS030713	SCOS030716	SCOS030725	SCOS030717	SCOS030703	SCOS030719

GROUP 100

Air side spare parts

Spare part code		3953			3954		
N° Part.	Q.ty	ND 15	ND 20	ND 25	ND 32	ND 40	ND 50
4	1	TDUOP7065			TDUOP8073		
8	2	BA0V08224			BA0V10244		
24	2	OR02025GA			OR02031GA		
52	1	533					

Body side spare parts

Spare part code		5419	5420	5421	7815	7816	5424
N° Part.	Q.ty	ND 15	ND 20	ND 25	ND 32	ND 40	ND 50
17	1	GCD086194			OR003237VI		GCD086196
18	1	MTD086109			MTD086110		
37	1	PT00810TT			PT01020TT		
42	1	GD0960673	GD0960674	GD0960675	GD0960676	GD0960677	GD0960678

5.24. Components and spare parts of 3-way GRS NO Valves ND 65 to 80

N° PART.	Q.ty	DESCRIPTION		MATERIAL	GROUP	ND 65	ND 80
2	1	Spring		Spring steel	552	MTD089071	
3	2	Piston support		Fe 360	545	AFD089222	
4	1	TDUOP gasket		NBR+Acc.	566	TDUOP1254	
5	2	Piston bearing washer		Fe 360	671	RAD089220	
7	1	O-Ring gasket		Gaco	548	OR03475GA	
8	1	BA gasket		VITON	567	BA0V16305	
9	1	Servocontrol stem		AISI 304	561	ALSC960287	
11	2	Connection blocks		Fe 360	593	BVD086251	
12	2	Hexagon head screw		Fe 360	607	VTE0630FE	
13	1	Loading adjusting nut		Fe 360	558	DRD086049	
14	1	Packing gland screw		AISI 420	559	VVD086078	
15	1	Valve mounting		CAST IRON	570	CSD086002	
16	1	Intermediate body		ASTM A105	594	CIFD86037	
17	1	Body gasket		FASIT 400	511	GCD086197	
18	1	Packing gland spring		AISI 316	552	MTD086111	
19	1	Shutter	Plastic seal	AISI 316 TEFLON -	675	OV3D88176	OV3D88175
			Metallic seal	AISI 316	595	OV3D86169	OV3D86168
			Stellited seal	AISI 316 STELLITE		OT3MXX0393	OT3MXX0394
20	3	Flange cap		Polyethylene	505	TEP3050065	TEP3050080
21	1	Spring bearing washer		AISI 304	651	NPMD89224	
23	1	Self-braking nut		Fe 360	576	D12AUTOFE	
24	2	O-Ring gasket		Gaco	548	OR02056VI	
25	1	Spacer ring		Brass	522	DDD089279	
26	4	Hexagon head screw		AISI 304	500	VTE081604	
27	4	Spring washer		AISI 304	503	RE0800304	
28	1	Rating plate		Polyester	506	ERD086150	
29	4	Tear rivets		Aluminum	589	RIV32510A	
30	2	Spring washers		Fe 360	610	RE06000FE	
31	2	Hexagon nuts		Fe 360	608	D0605588F	
32	1	Hexagon nut		Fe 360	608	D1005588F	
33	4	Stud bolts		Fe 360	555	PVFD86013	
34	4	Hexagon nut		Fe 360	608	D1205588F	
35	4	Plane washers		Fe 360	609	RP12000FE	
36	2	Distance ring washer		AISI 316	703	RDD086297	
37	1	Packing gland		TEFLON\ GRAPHITE	587	PT01222TT	
38	1	Valve body		Cast iron	**(1)**	CG2C030826	CG3C040051
39	1	Spring guide		AISI 304	812	NGMD90295	
41	1	Spacer ring bush		PTFE	581	BGD091127	
42	1	Bottom gasket		FASIT 400	511	GD0091407	GD0091408
43	1	Distance ring washer		AISI 316	703	RDD088158	
44	1	Snap ring		AISI 304	665	SEEF27304	
45	12	Hexagon nut		AISI 304	501	D08055884	
46	4	Hexagon head screw		AISI 304	500	VTE083504	
47	1	Intermediate body		AISI 304	632	CINT960286	
49	1	Three-way bottom		ASTM A105	756	FOND040220	FOND040052
50	1	Three-way iron flange		Fe 360	578	F3VD86158	F3VD86159
51	2	Threaded cap		Polyethylene	505	TEP400G018	
52	1	Air inlet fitting		AISI 304	811	RRDD91609	
53	1	O-Ring gasket		VITON	548	OR03112VI	
54	1	Stroke indicator disk		Fe 360	585	DCD086097	
56	1	Stroke rating plate		Aluminum	590	ERD086151	
68	1	Valve seat	standard	AISI 316	598	SCOM030816	SCOM030817
			stellited			SCOS030825	SCOS030821

(1) Group 597 for the ND 65 – Group 655 for the ND 80

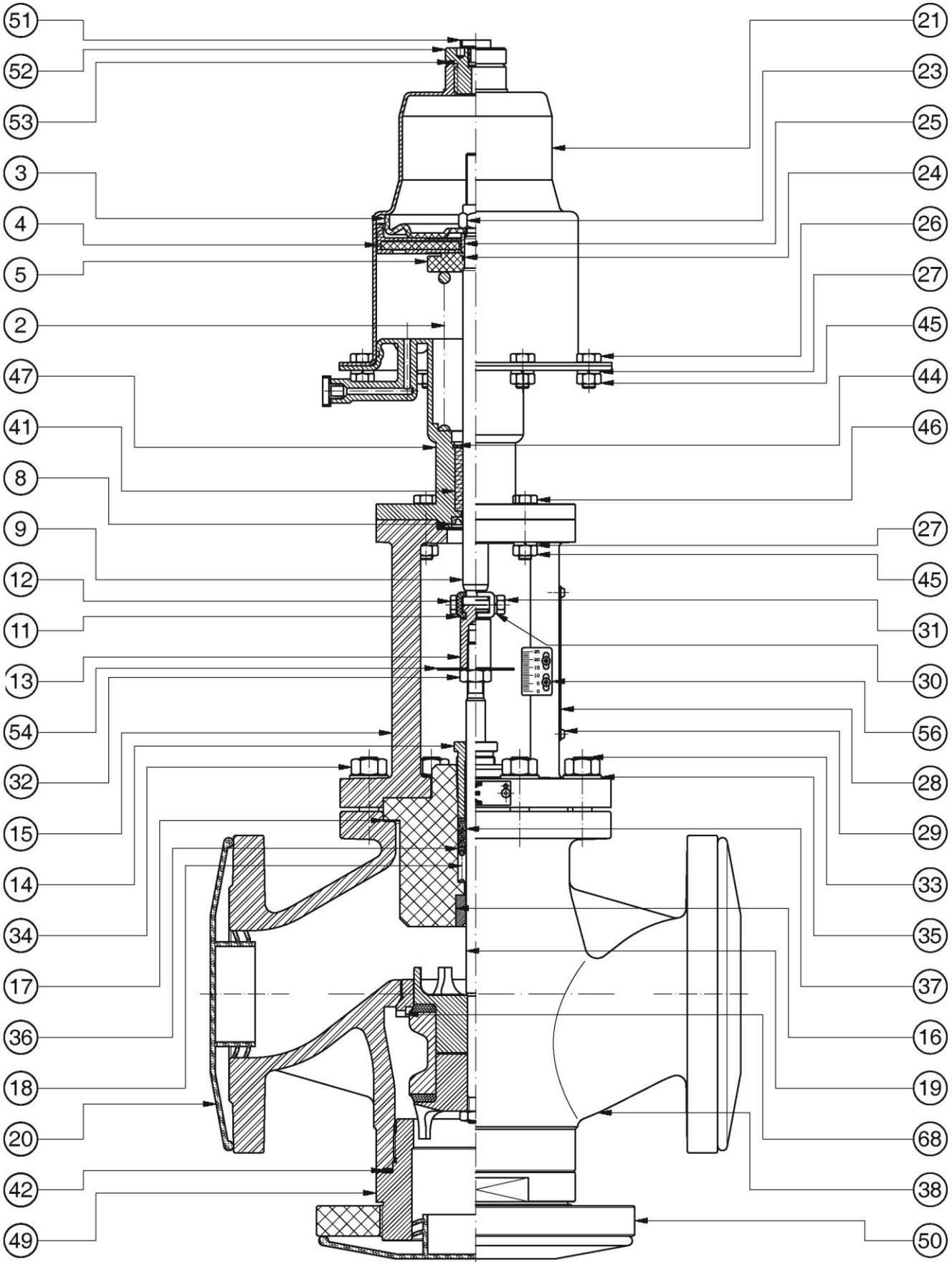
GROUP 100
Air side spare parts

Spare part code		7593	
N° Part.	Q.ty	ND 65	ND 80
4	1	TDUOP1254	
5	1	RAD089220	
8	1	BA0V16305	
24	1	OR02056VI	
53	1	OR03112VI	

Body side spare parts

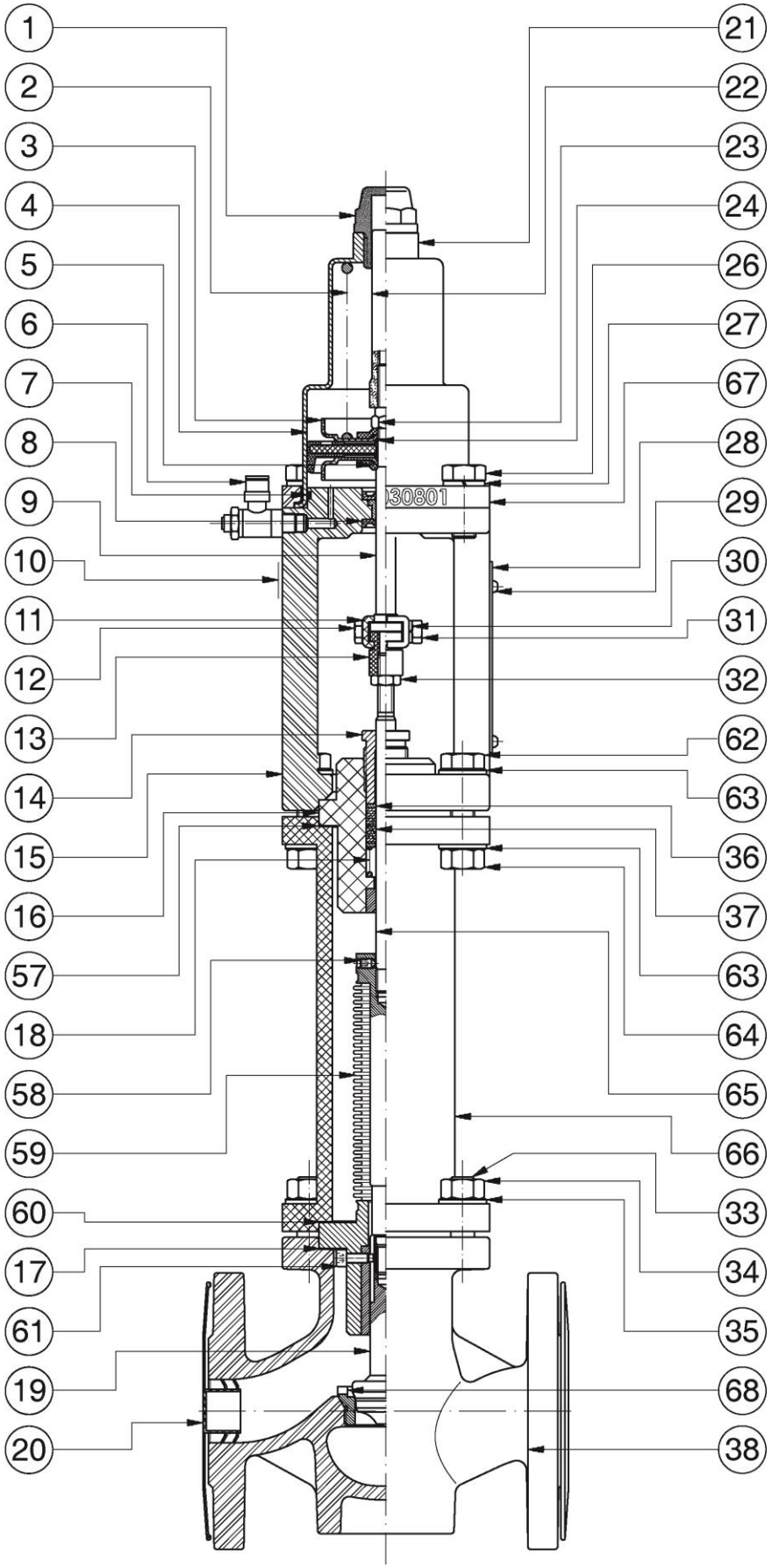
Spare part code		2654	5415
N° Part.	Q.ty	ND 65	ND 80
17	1	GCD086197	
18	1	MTD086111	
37	1	PT01222TT	
42	1	GD0091407	GD0091408

Section Plane – 3-way GRS NO Cast Iron Valves ND 65 to 80.



Drawing nr. 030062 Rev.:01

Section Plane – 2-way GRS NC Cast Iron D.V. ND 15 to 50 with bellows



Drawing nr. 030063 Rev.:01

5.25. Components and spare parts – 2- way GRS NC D.V. ND 15 to 50 with bellows

N° PART.	Q.ty	DESCRIPTION		MATERIAL	GROUP	ND 15	ND 20	ND 25	ND 32	ND 40	ND 50
1	1	Transparent cap		Plastic	840	ICD091467					
2	1	Spring		Spring steel	552	557			MTD087091		
3	2	Piston support		Fe 360	545	AFD087239			AFD087240		
4	1	TDUOP gasket		NBR+Acc.	566	TDUOP7065			TDUOP8073		
5	2	Piston bearing washer		Fe 360	671	RAD087233			RAD087234		
6	1	Flow rate control			613	3883					
7	1	O-Ring gasket		Gaco	548	OR03256GA			OR03300GA		
8	2	BA gasket		VITON	567	BA0V08224			BA0V10244		
9	1	Servocontrol stem		AISI 304	561	ASD092183			ASD092184		
10	1	Arrow label		Polyester	506	EAFRECCIA					
11	2	Connection blocks		Fe 360	593	BVD086251					
12	2	Hexagon head screw		Fe 360	607	VTE0630FE					
13	1	Loading adjusting nut		Fe 360	558	DRD086048					
14	1	Packing gland screw		AISI 420	559	VVD086076			VVD086077		
15	1	Valve mounting		CAST IRON	570	CSD092182			CSD092188		CSD092189
16	1	Intermediate body		ASTM A105	594	CIFD86034			CIFD86035		CIFD86036
17	1	Body gasket		FASIT 400	511	GCD086194			GCD086195		GCD086196
18	1	Packing gland spring		AISI 316	552	MTD086109			MTD086110		
19	1	Shutter	Plastic seal	AISI 316 TEFLON -	675	OVD088084	OVD088085	OVD088086	OVD088087	OVD088088	OVD088089
			Metallic seal	AISI 316	595	OVD086053	OVD086054	OVD086055	OVD086056	OVD086057	OVD086058
			Stellited seal	AISI 316 STELLITE		OTTR092234	OTTR092239	OTTR092244	OTTR092250	OTTR092255	OTTR092261
20	2	Flange cap		Polyethylene	505	TEP3050015	TEP3050020	TEP3050025	TEP3050032	TEP3050040	TEP3050050
21	1	Spring bearing washer		AISI 304	651	PAMC941010			PAMC950781		
22	1	Stroke indicator		PVC red	840	ICD091255			ICD091256		
23	1	Self-braking nut		Fe 360	576	D06AUTOFE			D08AUTOFE		
24	2	O-Ring gasket		Gaco	548	OR02025GA			OR02031GA		
26	4	Hexagon head screw		AISI 304	500	VTE081604			VTE122004		
27	4	Spring washer		AISI 304	503	RE0800304			RE1200304		
28	1	Rating plate		Polyester	506	ERD086150					
29	2	Tear rivets		Aluminum	589	RIV32510A					
30	2	Spring washers		Fe 360	610	RE06000FE					
31	2	Hexagon nuts		Fe 360	608	D0605588F					
32	1	Hexagon nut		Fe 360	608	D0805588F					
33	4	Stud bolts		Fe 360	555	PVFD86011			PVFD86012		
34	4	Hexagon nut		Fe 360	608	D1005588F			D1205588F		
35	4	Plane washers		Fe 360	609	RP10000FE			RP12000FE		
36	2	Distance ring washer		AISI 316	703	RDD086256			RDD086274		
37	1	Packing gland		TEFLON GRAPHITE	587	PT00810TT			PT01020TT		
38	1	Valve body		Cast Iron	597	CG2C030724	CG2C030576	CG2C030561	CG2C030615	CG2C030621	CG2C030718
57	1	Body gasket		FASIT 400	511	GCD086194			OR003237VI		
58	1	Grub screw		AISI 304	542	VST050804					
59	1	Intermediate with bellows		AISI 316	855	INSF089002			INSF089003		INSF089004
60	1	Body gasket		FASIT 400	511	GCD086194			GCD086195		
61	1	Socket head screw worked for bellows		AISI 316	855	ZSVD88126			ZSVD88127		
62	4	Hexagon head screw		Fe 360	607	VTE10045PF			VTE12050PF		
63	8	Plane washers		Fe 360	609	RP10000FE			RP12000FE		
64	4	Hexagon nuts		Fe 360	608	D1005588F			D1205588F		
65	1	Bellows upper stem		AISI 304	676	STOT091362			STOT091363		
66	1	Mounting extension		Fe 360	857	PRCA091365			PRCA091366		
67	1	Fixing plate		Cast Iron	645	CVGR040082			CVGR040083		
68	1	Valve seat	standard	AISI 316	598	SCOM030710	SCOM030711	SCOM030707	SCOM030712	SCOM030701	SCOM030704
			stellited			SCOS030713	SCOS030716	SCOS030725	SCOS030717	SCOS030703	SCOS030719

GROUP 100

Air side spare parts

Spare part code		2705			2708		
N° Part.	Q.ty	ND 15	ND 20	ND 25	ND 32	ND 40	ND 50
4	1	TDUOP7065			TDUOP8073		
7	1	OR03256GA			OR03300GA		
8	2	BA0V08224			BA0V10244		
24	2	OR02025GA			OR02031GA		

Body side spare parts

Spare part code		5426			5427		5428
N° Part.	Q.ty	ND 15	ND 20	ND 25	ND 32	ND 40	ND 50
17	1	GCD086194			GCD086195		GCD086196
18	1	MTD086109			MTD086110		
37	1	PT00810TT			PT01020TT		
57	1	GCD086194			OR003237VI		
60	1	GCD086194			GCD086195		

5.26. Components and spare parts 3-way GRS NC D.V. ND 15 to 50 with bellows

N° PAR.	Q.ty	DESCRIPTION		MATERIAL	GROUP	ND 15	ND 20	ND 25	ND 32	ND 40	ND 50
1	1	Transparent cap		Plastic	840	ICD091467					
2	1	Spring		Spring steel	552	557			MTD087091		
3	2	Piston support		Fe 360	545	AFD087239			AFD087240		
4	1	TDUOP gasket		NBR+Steel.	566	TDUOP7065			TDUOP8073		
5	2	Piston bearing washer		Fe 360	671	RAD087233			RAD087234		
6	1	Flow rate control			613	3883					
7	1	O-Ring gasket		Gaco	548	OR03256GA			OR03300GA		
8	2	BA gasket		VITON	567	BA0V08224			BA0V10244		
9	1	Servocontrol stem		AISI 304	561	ASD092183			ASD092184		
10	1	Arrow label		Polyester	506	EAFRECCIA					
11	2	Connection blocks		Fe 360	593	BVD086251					
12	2	Hexagon head screw		Fe 360	607	VTE0630FE					
13	1	Loading adjusting nut		Fe 360	558	DRD086048					
14	1	Packing gland screw		AISI 420	559	VVD086076			VVD086077		
15	1	Valve mounting		CAST IRON	570	CSD092182			CSD092188		CSD092189
16	1	Intermediate body		ASTM A105	594	CIFD86034			CIFD86035		CIFD86036
17	1	Body gasket		FASIT 400	511	GCD086194			GCD086195		GCD086196
18	1	Packing gland spring		AISI 316	552	MTD086109			MTD086110		
19	1	Shutter	Plastic seal	AISI 316 TEFLON -	807	OV3D88215	OV3D88214	OV3D88178	OV3D88179	OV3D88177	OV3D88180
			Metallic seal	AISI 316	654	OV3D86245	OV3D86234	OV3D86231	OV3D86226	OV3D96223	OV3D86220
			Stellited seal	AISI 316 STELLITE					OT3MXX0391	OT3MXX0392	OT3M990662
20	2	Flange cap		Polyethylene	505	TEP3050015	TEP3050020	TEP3050025	TEP3050032	TEP3050040	TEP3050050
21	1	Spring bearing washer		AISI 304	651	PAMC941010			PAMC950781		
22	1	Stroke indicator		PVC red	840	ICD091255			ICD091256		
23	1	Self-braking nut		Fe 360	576	D06AUTOFE			D08AUTOFE		
24	2	O-Ring gasket		Gaco	548	OR02025GA			OR02031GA		
26	4	Hexagon head screw		AISI 304	500	VTE081604			VTE122004		
27	4	Spring washer		AISI 304	503	RE0800304			RE1200304		
28	1	Rating plate		Polyester	506	ERD086150					
29	2	Tear rivets		Aluminum	589	RIV32510A					
30	2	Spring washers		Fe 360	610	RE06000FE					
31	2	Hexagon nuts		Fe 360	608	D0605588F					
32	1	Hexagon nut		Fe 360	608	D0805588F					
33	4	Stud bolts		Fe 360	555	PVFD86011			PVFD86012		
34	4	Hexagon nut		Fe 360	608	D1005588F			D1205588F		
35	4	Plane washers		Fe 360	609	RP10000FE			RP12000FE		
36	2	Distance ring washer		AISI 316	703	RDD086256			RDD086274		
37	1	Packing gland		TEFLON GRAPHITE	587	PT00810TT			PT01020TT		
38	1	Valve body		Cast Iron	597	CG3C030573	CG3C030579	CG3C030564	CG3C030618	CG3C030624	CG3C030558
42	1	Bottom gasket		FASIT 400	511	GD0960673	GD0960674	GD0960675	GD0960676	GD0960677	GD0960678
49	1	Three-way bottom		ASTM A105	756	FONDXX0142	FONDXX0143	FONDXX0144	FONDXX0145	FONDXX0146	FONDXX0147
50	1	Three-way flange		Fe 360	578	F3VD86152	F3VD86153	F3VD86154	F3VD86155	F3VD86156	F3VD86157
57	1	Body gasket		FASIT 400	511	GCD086194			OR003237VI		
58	1	Grub screw		AISI 304	542	VST050804					
59	1	Intermediate with bellows		AISI 316	855	INSF089002			INSF089003		INSF089004
60	1	Body gasket		FASIT 400	511	GCD086194			GCD086195		
61	1	Socket head screw worked for bellows		AISI 316	855	ZSVD88126			ZSVD88127		
62	4	Hexagon head screw		Fe 360	607	VTE10045PF			VTE12050PF		
63	8	Plane washers		Fe 360	609	RP10000FE			RP12000FE		
64	4	Hexagon nuts		Fe 360	608	D1005588F			D1205588F		
65	1	Bellows upper stem		AISI 304	676	STOT091362			STOT091363		
66	1	Mounting extension		Fe 360	857	PRCA091365			PRCA091366		
67	1	Fixing plate		Cast Iron	645	CVGR040082			CVGR040083		
68	1	Valve seat	standard	AISI 316	598	SCOM030710	SCOM030711	SCOM030707	SCOM030712	SCOM030701	SCOM030704
			stellited			SCOS030713	SCOS030716	SCOS030725	SCOS030717	SCOS030703	SCOS030719

GROUP 100

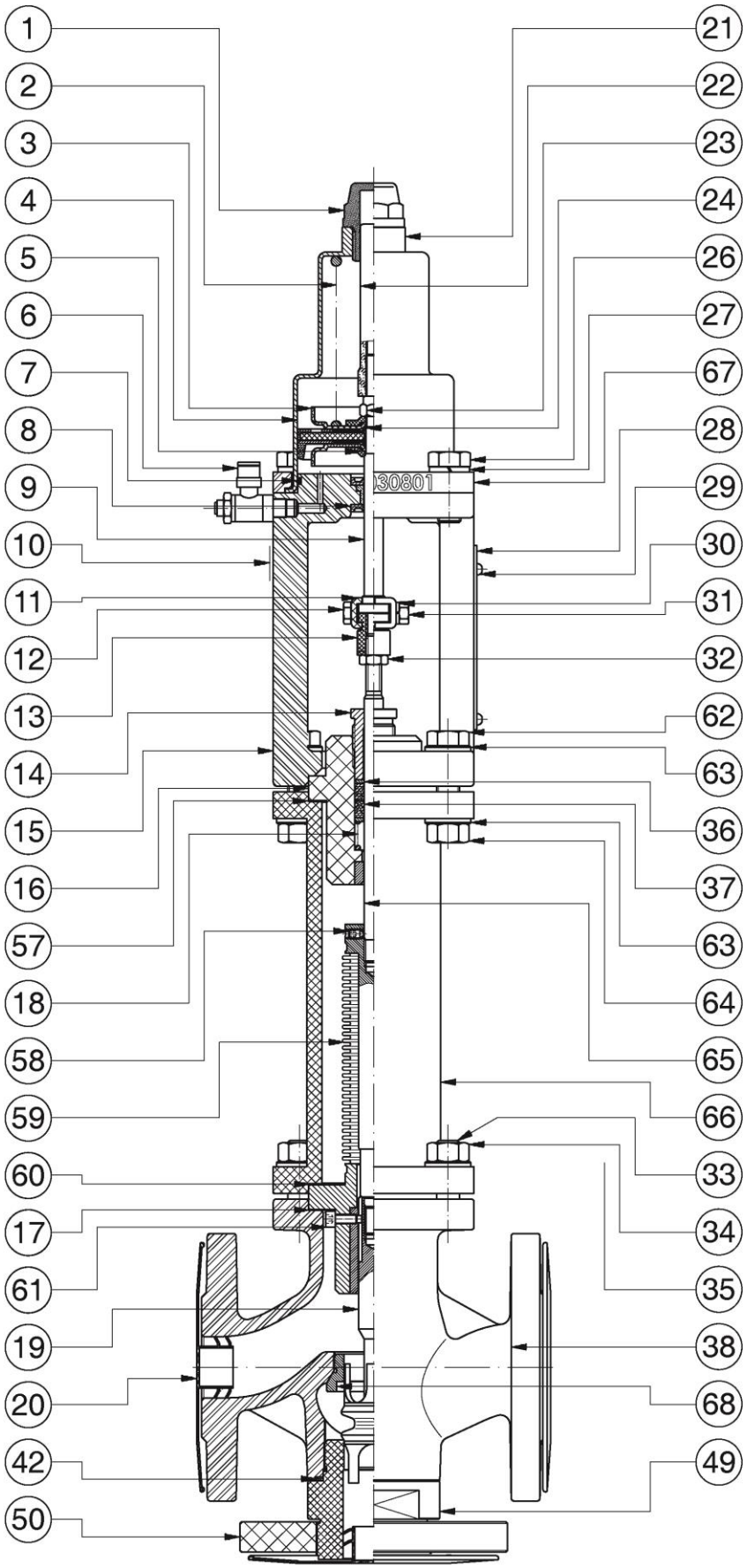
Air side spare parts

Spare part code		2705			2708		
N° Part.	Q.ty	ND 15	ND 20	ND 25	ND 32	ND 40	ND 50
4	1	TDUOP7065			TDUOP8073		
7	1	OR03256GA			OR03300GA		
8	2	BA0V08224			BA0V10244		
24	2	OR02025GA			OR02031GA		

Body side spare parts

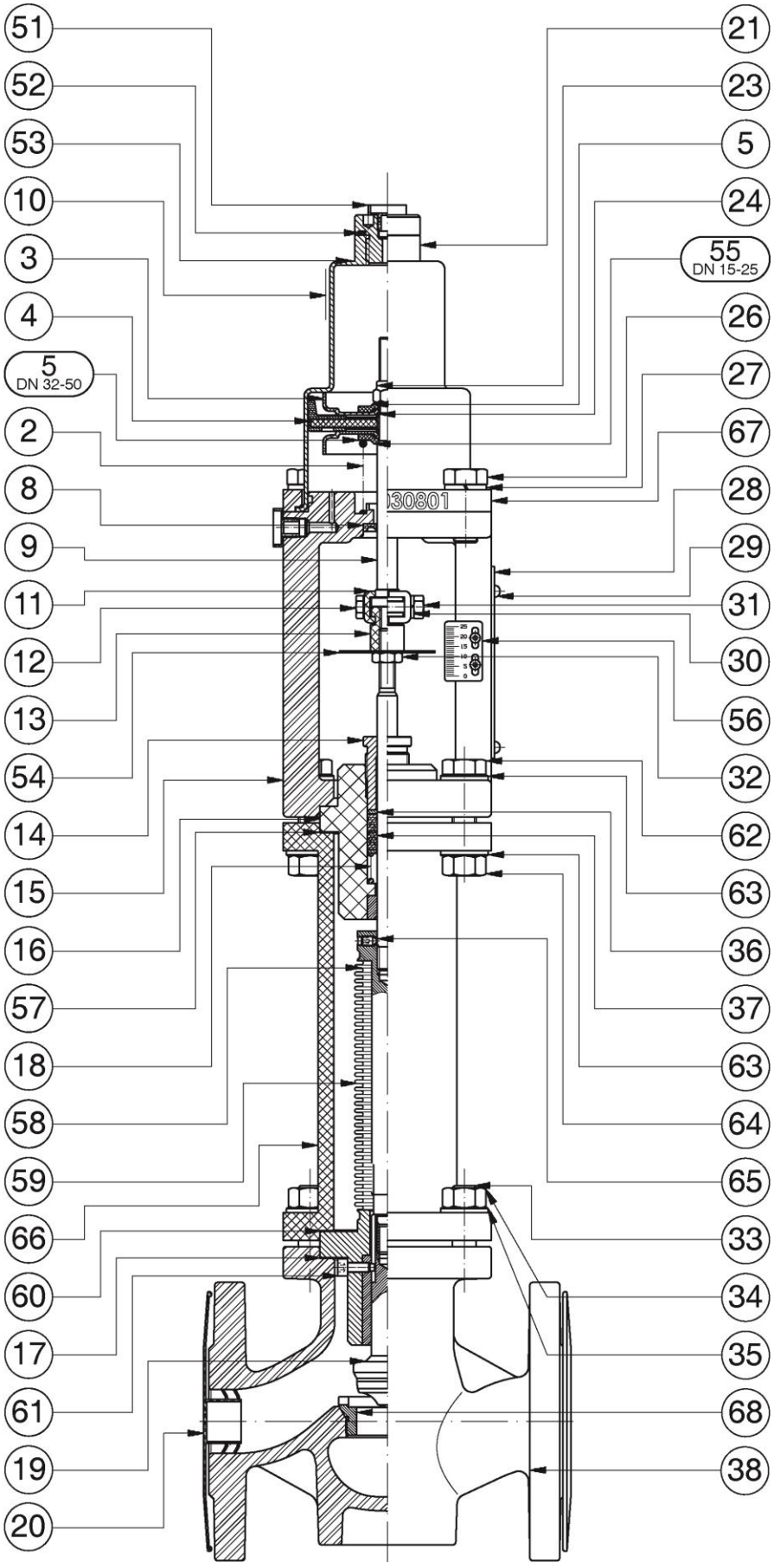
Spare part code		5429	5430	5431	5432	5433	5434
N° Part.	Q.ty	ND 15	ND 20	ND 25	ND 32	ND 40	ND 50
17	1	GCD086194			GCD086195		GCD086196
18	1	MTD086109			MTD086110		
37	1	PT00810TT			PT01020TT		
42	1	GD0960673	GD0960674	GD0960675	GD0960676	GD0960677	GD0960678
57	1	GCD086194			OR003237VI		
60	1	GCD086194			GCD086195		

Section Plane – 3-way GRS NC Cast Iron D.V. ND 15 to 50 with bellows



Drawing nr. 030099 Rev.:01

Section Plane – 2-way GRS NO Cast Iron Valves ND 15 to 50 with bellows



Drawing nr. 030105 Rev.:01

5.27. Components and spare parts of 2–way GRS NO Vavles ND 15 to 50 with bellows

N° PAR.	Q.ty	DESCRIPTION		MATERIAL	GROUP	ND 15	ND 20	ND 25	ND 32	ND 40	ND 50
2	1	Spring		Spring steel	552	MTD092510					
3	2	Piston support		Fe 360	545	AFD087239			AFD087240		
4	1	TDUOP gasket		NBR+Steel.	566	TDUOP7065			TDUOP8073		
5	2	Piston bearing washer		Fe 360	671	RAD087233			RAD087234		
7	1	O-Ring gasket		Gaco	548	OR03256GA			OR03300GA		
8	1	BA gasket		VITON	567	BA0V08224			BA0V10244		
9	1	Servocontrol stem		AISI 304	561	ASD092183			ASD092184		
10	1	Arrow label		Polyester	506	EAFRECCIA					
11	2	Connection blocks		Fe 360	593	BVD086251					
12	2	Hexagon head screw		Fe 360	607	VTE0630FE					
13	1	Loading adjusting nut		Fe 360	558	DRD086048					
14	1	Packing gland screw		AISI 420	559	VVD086076			VVD086077		
15	1	Valve mounting		CAST IRON	570	CAST960248			CAST960249		CAST960250
16	1	Intermediate body		ASTM A105	594	CIFD86034			CIFD86035		CIFD86036
17	1	Body gasket		FASIT 400	511	GCD086194			GCD086195		GCD086196
18	1	Packing gland spring		AISI 316	552	MTD086109			MTD086110		
19	1	Shutter	Plastic seal	AISI 316 TEFLON -	675	OVD088084	OVD088085	OVD088086	OVD088087	OVD088088	OVD088089
			Metallic seal	AISI 316	595	OVD086053	OVD086054	OVD086055	OVD086056	OVD086057	OVD086058
			Stellited seal	AISI 316 STELLITE		OTTR092234	OTTR092239	OTTR092244	OTTR092250	OTTR092255	OTTR092261
20	2	Flange cap		Polyethylene	505	TEP3050015	TEP3050020	TEP3050025	TEP3050032	TEP3050040	TEP3050050
21	1	Spring bearing washer		AISI 304	651	PAMC941010			PAMC950781		
23	1	Self-braking nut		Fe 360	576	D06AUTOFE			D08AUTOFE		
24	2	O-Ring gasket		Gaco	548	OR02025GA			OR02031GA		
26	4	Hexagon head screw		AISI 304	500	VTE081604			VTE122004		
27	4	Spring washer		AISI 304	503	RE0800304			RE1200304		
28	1	Rating plate		Polyester	506	ERD086150					
29	2	Tear rivets		Aluminum	589	RIV32510A					
30	2	Spring washers		Fe 360	610	RE06000FE					
31	2	Hexagon nuts		Fe 360	608	D0605588F					
32	1	Hexagon nut		Fe 360	608	D0805588F					
33	4	Stud bolts		Fe 360	555	PVFD86011			PVFD86012		
34	4	Hexagon nut		Fe 360	608	D1005588F			D1205588F		
35	4	Plane washers		Fe 360	609	RP10000FE			RP12000FE		
36	2	Distance ring washer		AISI 316	703	RDD086256			RDD086274		
37	1	Packing gland		TEFLON GRAPHITE	587	PT00810TT			PT01020TT		
38	1	Valve body		Cast Iron	597	CG2C030724	CG2C030576	CG2C030561	CG2C030615	CG2C030621	CG2C030718
51	2	Threaded cap		Polyethylene	505	TEP400G018					
52	1	Air inlet fitting		AISI 304	811	RRDD93955					
53	1	O-Ring gasket		Gaco	548	533					
54	1	Stroke indicator disk		Fe 360	585	DCD086096					
55	1	Piston support inverted washer		Fe 360	671	RAD092502					
56	1	Stroke rating plate		Aluminum	590	ERD086151					
57	1	Body gasket		FASIT 400	511	GCD086194			OR003237VI		
58	1	Grub screw		AISI 304	542	VST050804					
59	1	Intermediate with bellows		AISI 316	855	INSF089002			INSF089003		INSF089004
60	1	Body gasket		FASIT 400	511	GCD086194			GCD086195		
61	1	Socket head screw manufactured for bellows		AISI 316	855	ZSVD88126			ZSVD88127		
62	4	Hexagon head screw		Fe 360	607	VTE10045PF			VTE12050PF		
63	8	Plane washers		Fe 360	609	RP10000FE			RP12000FE		
64	4	Hexagon nuts		Fe 360	608	D1005588F			D1205588F		
65	1	Bellows upper stem		AISI 304	676	STOT091362			STOT091363		
66	1	Mounting extension		Fe 360	857	PRCA091365			PRCA091366		
67	1	Fixing plate		Cast Iron	645	CVGR040082			CVGR040083		
68	1	Valve sat	standard	AISI 316	598	SCOM030710	SCOM030711	SCOM030707	SCOM030712	SCOM030701	SCOM030704
			stellited			SCOS030713	SCOS030716	SCOS030725	SCOS030717	SCOS030703	SCOS030719

GROUP 100

Air side spare parts

Spare part code		3953			3954		
N° Part.	Q.ty	ND 15	ND 20	ND 25	ND 32	ND 40	ND 50
4	1	TDUOP7065			TDUOP8073		
8	2	BA0V08224			BA0V10244		
24	2	OR02025GA			OR02031GA		
52	1	533					

Body side spare parts

Spare part code		5426			5427		5428
N° Part.	Q.ty	ND 15	ND 20	ND 25	ND 32	ND 40	ND 50
17	1	GCD086194			GCD086195		GCD086196
18	1	MTD086109			MTD086110		
37	1	PT00810TT			PT01020TT		
57	1	GCD086194			OR003237VI		
60	1	GCD086194			GCD086195		

5.28. Components and spare parts – 3-way GRS NO Valves ND 15 to 50 with bellows

N° PAR.	Q.ty	DESCRIPTION		MATERIAL	GROUP	ND 15	ND 20	ND 25	ND 32	ND 40	ND 50
2	1	Spring		Spring steel	552	MTD092510					
3	2	Piston support		Fe 360	545	AFD087239			AFD087240		
4	1	TDUOP gasket		NBR+Steel.	566	TDUOP7065			TDUOP8073		
5	2	Piston bearing washer		Fe 360	671	RAD087233			RAD087234		
7	1	O-Ring gasket		Gaco	548	OR03256GA			OR03300GA		
8	1	BA gasket		VITON	567	BA0V08224			BA0V10244		
9	1	Servocontrol stem		AISI 304	561	ASD092183			ASD092184		
11	2	Connection blocks		Fe 360	593	BVD086251					
12	2	Hexagon head screw		Fe 360	607	VTE0630FE					
13	1	Loading adjusting nut		Fe 360	558	DRD086048					
14	1	Packing gland screw		AISI 420	559	VVD086076			VVD086077		
15	1	Valve mounting		CAST IRON	570	CAST960248			CAST960249		CAST960250
16	1	Intermediate body		ASTM A105	594	CIFD86034			CIFD86035		CIFD86036
17	1	Body gasket		FASIT 400	511	GCD086194			GCD086195		GCD086196
18	1	Packing gland spring		AISI 316	552	MTD086109			MTD086110		
19	1	Shutter	Plastic seal	AISI 316 TEFLON -	807	OV3D88215	OV3D88214	OV3D88178	OV3D88179	OV3D88177	OV3D88180
			Metallic seal	AISI 316	654	OV3D86245	OV3D86234	OV3D86231	OV3D86226	OV3D96223	OV3D86220
			Stellited seal	AISI 316 STELLITE					OT3MXX0391	OT3MXX0392	OT3M990662
20	2	Flange cap		Polyethylene	505	TEP3050015	TEP3050020	TEP3050025	TEP3050032	TEP3050040	TEP3050050
21	1	Spring bearing washer		AISI 304	651	PAMC941010			PAMC950781		
23	1	Self-braking nut		Fe 360	576	D06AUTOFE			D08AUTOFE		
24	2	O-Ring gasket		Gaco	548	OR02025GA			OR02031GA		
26	4	Hexagon head screw		AISI 304	500	VTE081604			VTE122004		
27	4	Spring washer		AISI 304	503	RE0800304			RE1200304		
28	1	Rating plate		Polyester	506	ERD086150					
30	2	Spring washers		Fe 360	610	RE06000FE					
31	2	Hexagon nuts		Fe 360	608	D0605588F					
32	1	Hexagon nut		Fe 360	608	D0805588F					
33	4	Stud bolts		Fe 360	555	PVFD86011			PVFD86012		
34	4	Hexagon nut		Fe 360	608	D1005588F			D1205588F		
35	4	Plane washers		Fe 360	609	RP10000FE			RP12000FE		
36	2	Distance ring washer		AISI 316	703	RDD086256			RDD086274		
37	1	Packing gland		TEFLON GRAPHITE	587	PT00810TT			PT01020TT		
38	1	Valve body		Cast Iron	597	CG3C030573	CG3C030579	CG3C030564	CG3C030618	CG3C030624	CG3C030558
42	1	Bottom gasket		FASIT 400	511	GD0960673	GD0960674	GD0960675	GD0960676	GD0960677	GD0960678
49	1	Three-way bottom		ASTM A105	756	FONDXX0142	FONDXX0143	FONDXX0144	FONDXX0145	FONDXX0146	FONDXX0147
50	1	Three-way flange		Fe 360	578	F3VD86152	F3VD86153	F3VD86154	F3VD86155	F3VD86156	F3VD86157
52	1	Air inlet fitting		AISI 304	811	RRDD93955					
53	1	O-Ring gasket		Gaco	548	533					
54	1	Stroke indicator disk		Fe 360	585	DCD086096					
55	1	Piston support inverted washer		Fe 360	671	RAD092502					
56	1	Stroke rating plate		Aluminum	590	ERD086151					
57	1	Body gasket		FASIT 400	511	GCD086194			OR003237VI		
58	1	Grub screw		AISI 304	542	VST050804					
59	1	Intermediate with bellows		AISI 316	855	INSF089002			INSF089003		INSF089004
60	1	Body gasket		FASIT 400	511	GCD086194			GCD086195		
61	1	Socket head screw worked for bellows		AISI 316	855	ZSVD88126			ZSVD88127		
62	4	Hexagon head screw		Fe 360	607	VTE10045PF			VTE12050PF		
63	8	Plane washers		Fe 360	609	RP10000FE			RP12000FE		
64	4	Hexagon nuts		Fe 360	608	D1005588F			D1205588F		
65	1	Bellows upper stem		AISI 304	676	STOT091362			STOT091363		
66	1	Mounting extension		Fe 360	857	PRCA091365			PRCA091366		
67	1	Fixing plate		Cast Iron	645	CVGR040082			CVGR040083		
68	1	Valve sat	standard	AISI 316	598	SCOM030710	SCOM030711	SCOM030707	SCOM030712	SCOM030701	SCOM030704
			stellited			SCOS030713	SCOS030716	SCOS030725	SCOS030717	SCOS030703	SCOS030719

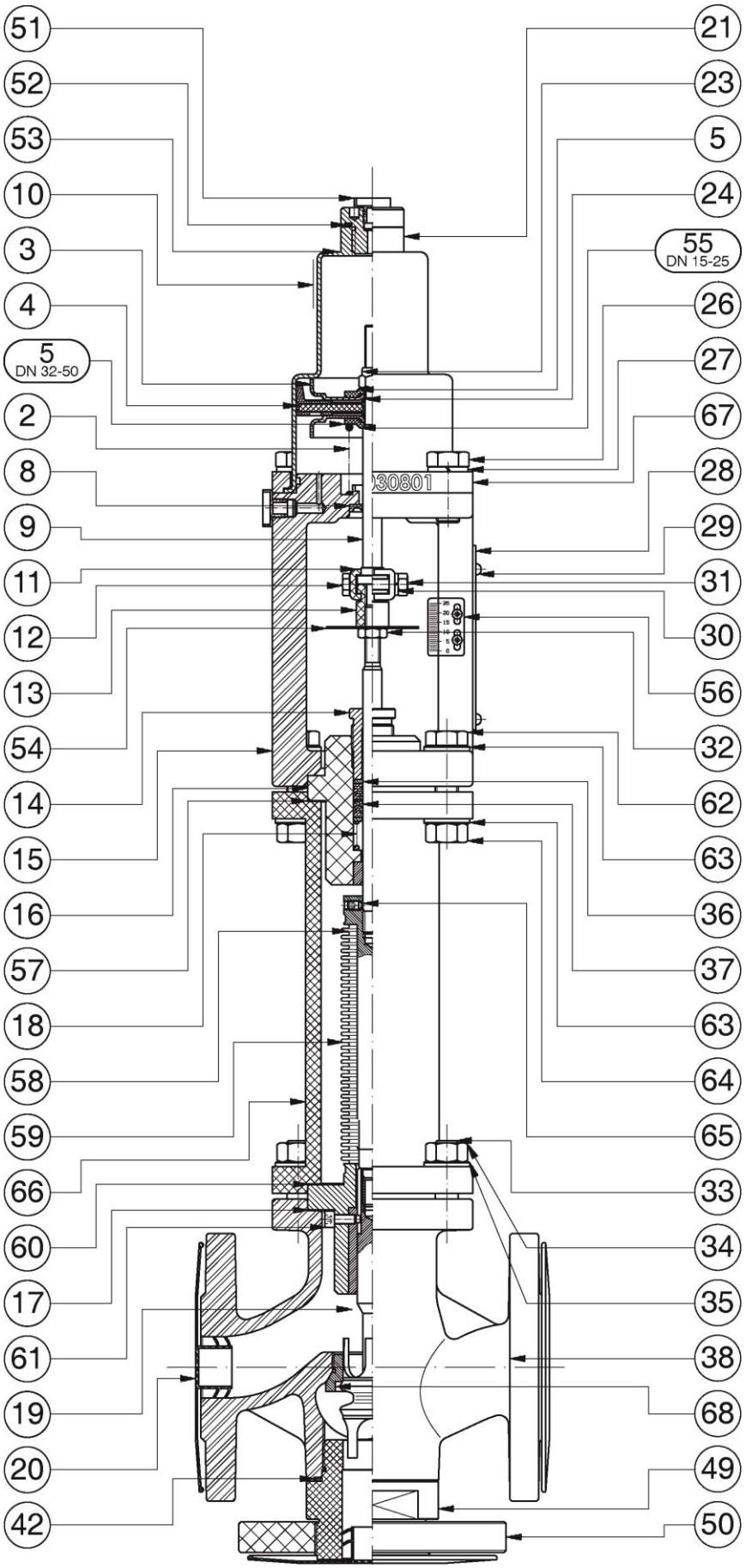
GROUP 100 Air side spare parts

Spare part code		3953			3954		
N° Part.	Q.ty	ND 15	ND 20	ND 25	ND 32	ND 40	ND 50
4	1	TDUOP7065			TDUOP8073		
8	2	BA0V08224			BA0V10244		
24	2	OR02025GA			OR02031GA		
52	1	533					

Body side spare parts

Spare part code		5429	5430	5431	5432	5433	5434
N° Part.	Q.ty	ND 15	ND 20	ND 25	ND 32	ND 40	ND 50
17	1	GCD086194			GCD086195		GCD086196
18	1	MTD086109			MTD086110		
37	1	PT00810TT			PT01020TT		
42	1	GD0960673	GD0960674	GD0960675	GD0960676	GD0960677	GD0960678
57	1	GCD086194			OR003237VI		
60	1	GCD086194			GCD086195		

Section Plane- 3 way GRS NO Cast Iron ND 15 to 50with bellows



Drawing nr. 030107 Rev.:00

6. Table 4: Tightening Torques

Detail Combination	Tightening torque for threaded couplings in GRS valves [$Kg_f \cdot m$]							
	ND 15	ND 20	ND 25	ND 32	ND 40	ND 50	ND 65	ND 80
P.33-P.34	3.3			5.8				
P.12-P.31	0.6							
P.26	1.4			5.0				
P.26-P.45							1.4	
P.46-P.45							1.4	
P.48-P.38							60	60
P.49-P.38	40	60	60	60	60	60	60	60
P.52-P.21	7.0						19.6	
P.58-P.59	0.4							
P.62-P.64	3.3			5.8				

7. Valve Life

The GRS series valves 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.

8. 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:

- The safety conditions shall not be guaranteed and malfunctions shall not be subjected to valves in case:
  - the disassembly, re-assembly, maintenance are not carried out in compliance with the use and maintenance 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.
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