

BAX high performance butterfly valve series for PSA plants on/off and control service

The BAX butterfly valve type is a high performance butterfly valve, especially designed for the needs in PSA plants. It is available as soft seated version with an eccentric disc, bubble tight in both flow directions. Additionally, it is also available as throttle valve with a centric disc and with step seat or no seat option.

Features

- Unique soft seat design for high number of switching cycles typical in PSA plants
- Bi-directional tightness is maintained even in high cycle applications
- Innovative valve design with stiffened disc, integrated trunnion and high capacity ensures lifetime performance for bearings and shaft sealing
- Drive shaft is not affected by bending stress through differential pressure allowed by an innovative and rigid design
- Small shaft diameter allows excellent shaft sealing performance in demanding PSA application
- Shaft to disc connection via plugged polygon for robust torque transmission capability and ease of maintenance
- Live loaded packing as standard
- Valve flow port free of any losable screws or pins

Low cost of ownership

- High life cycle performance minimizes the need for maintenance
- Strong reliability in high cycle applications
- Easy and fast maintenance
- Interchangeable seat without disassembling the disc and shaft. Seat replacement does not require any special tools



Increased safety and minimized emissions

- Field proven single piece seat design guarantees a reliable operation during the valve life-time
- Anti-blow-out shaft construction as a standard
- Special ATEX de-charging contacts establish best grounding performance and ATEX approval
- Stiffened disc with bearing trunnion avoid edge pressure effects on bearings
- High performance, low friction and self-lubricating bearings combined with a bearing protection as standard for high cycle applications with very less wear
- Polygon connection to actuator ensures play-free alternating torque transmission for high number of load cycles without risk of wear
- Special designed live loaded stuffing box packing with low torque consumption:
 - EN 15848-1 certified
 - Proven extended durability for PSA needs

Dimensions and weights

Wafer – BAX_6

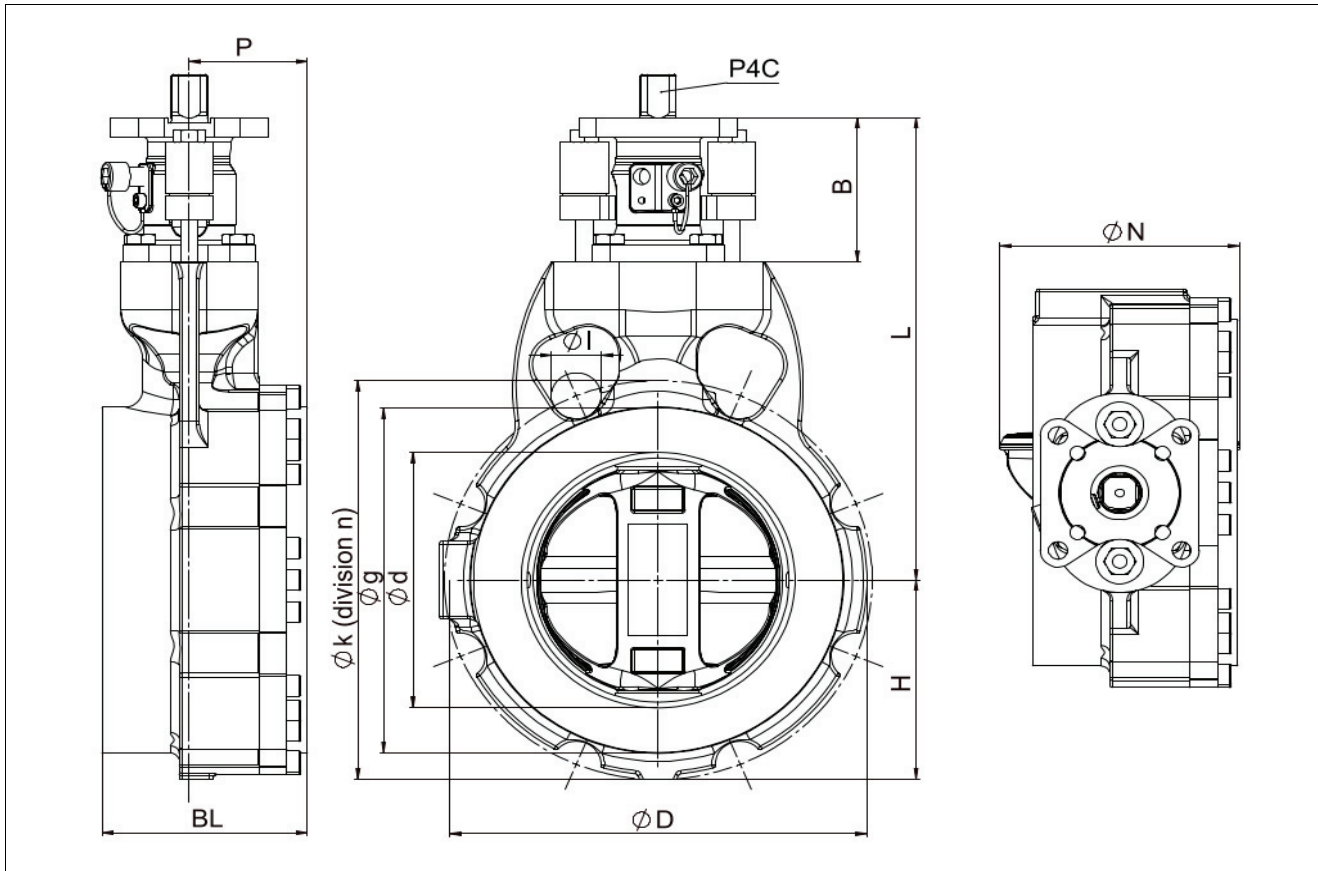


Figure 1 - Dimension drawing BAX_6 - wafer type

All dimensions are given in [mm], weight in [kg]

ASME B16.5 Class 300, Class 600 / DIN EN 1092 PN40 / PN63

Table 1 - dimensions wafer / ASME, DIN

NPS	DN	Standard Dimensions									Polygon P4C	Weight [kg]
		BL	øD	H	B	L	P	N	ød	øg		
3	80	100	150	85	80	213,5	47,5	83	85	127	P4C 18	11
4	100	100	180	95	80	221,5	51	98	110	157	P4C 18	15
6	150	120	244	125	90	290	69	141	160	216	P4C 25	30
8	200	130	300	158	118	372	73	189	210	269,7	P4C 32	50
10	250	150	357	185	118	397	85	231	255	323,9	P4C 32	70
12	300	170	420	209	138	464	99	276	302	381	P4C 35	120
16	400	230	531	285	138	523	123	368	405	469,9	P4C 35	240

Table 2 – flange bolting dimensions

NPS	ASME B16.5						DN	DIN EN 1092					
	CLASS 300			CLASS 600				PN40			PN63		
	øk	n	øl	øk	n	øl		øk	n	øl	øk	n	øl
3	168,1	8	22,4	168,1	8	22,4	80	160	8	18	170	8	22
4	200,2	8	22,4	215,9	8	25,4	100	190	8	22	200	8	26
6	269,7	12	22,4	292,1	12	28,4	150	250	8	26	280	8	33
8	330,2	12	25,4	349,3	12	35,1	200	320	12	30	345	12	36
10	387,4	16	28,4	431,8	16	35,1	250	385	12	33	400	12	36
12	450,9	16	31,8	489	20	35,1	300	450	16	33	460	16	36
16	571,5	20	35,1	603,3	20	41,1	400	585	16	39	585	16	42

The dimensions øl, øk and n refer to the pitch cycle, bolt diameters and number of bolts of the relevant flange connection according the standards and do not affect the body dimensions.

Lug - BAX_4

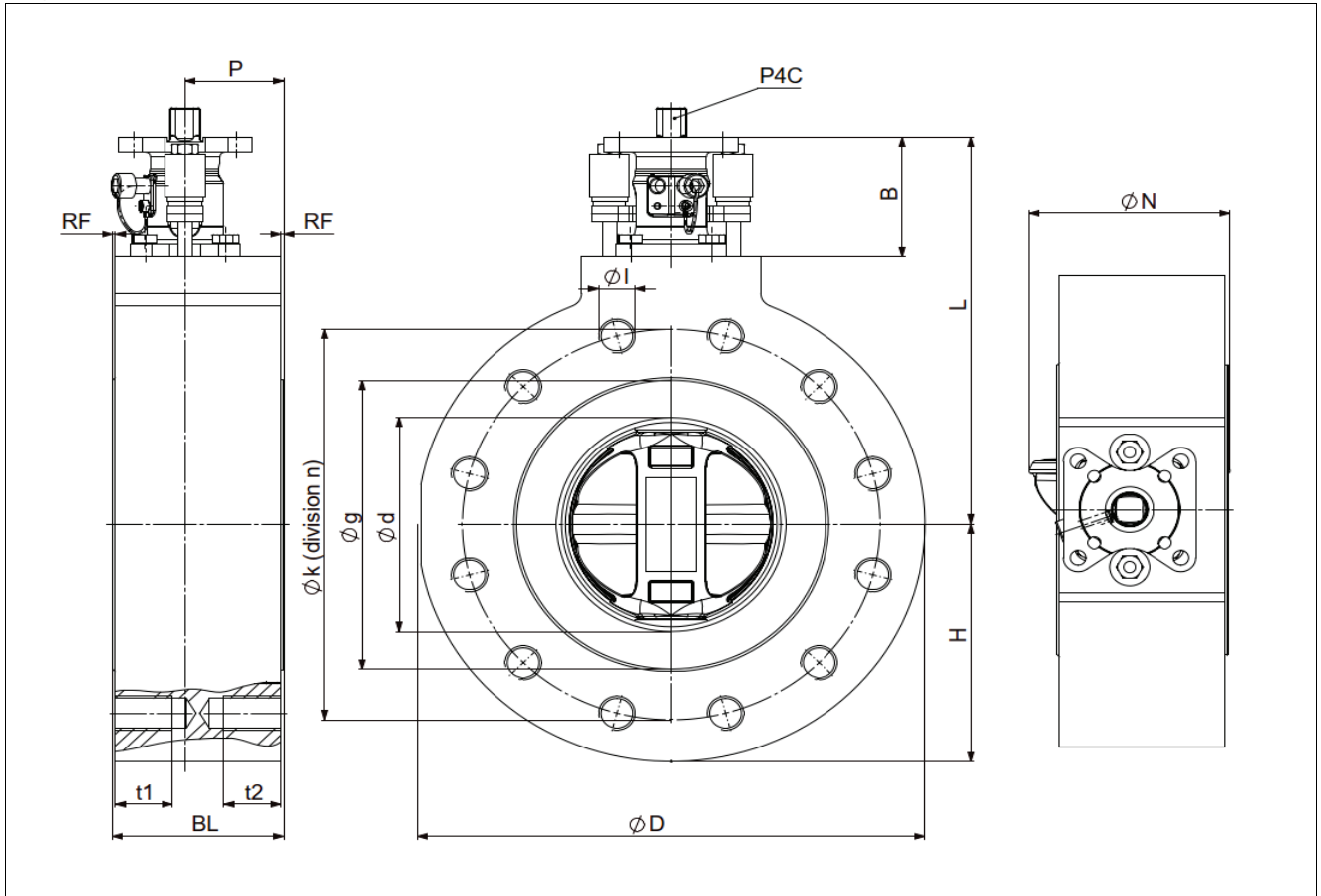


Figure 2 - Dimension drawing BAX_4 - lug type

All dimensions given in [mm] except threads; weight in [kg].

ASME B16.5

Table 3 - dimensions lug / ASME

NPS	Standard dimensions							ASME B16.5 - CL 300								ASME B16.5 - CL 600								Polygon P4C		
	BL	B	L	P	N	ød	RF	øD	H	og	øk	n	øl	t1	t2	Weight [kg]	øD	H	og	øk	n	øl	t1		t2	Weight [kg]
3	100	80	213,5	47,5	83	85	2	210	105	127	168,1	8	3/4"-10UNC	30	45,5	24	210	105	127	168,1	8	3/4"-10UNC	30	45,5	24	P4C 18
4	100	80	221,5	51	98	110	2	255	127,5	157	200,2	8	3/4"-10UNC	30	49	33	275	137,5	157	215,9	8	7/8"-9UNC	35	35	39	P4C 18
6	120	90	290	62	141	160	2	320	160	216	269,7	12	3/4"-10UNC	30	56	61	355	177,5	216	292,1	12	1"-8UN	40	40	75	P4C 25
8	130	118	372	73	189	210	2	380	190	269,7	330,2	12	7/8"-9UNC	35	53	95	420	210	269,7	349,3	12	1 1/8"-8UN	45	45	115	P4C 32
10	150	118	397	85	231	255	2	445	222,5	323,9	387,4	16	1"-8UN	40	59	137	510	255	323,9	431,8	16	1 1/4"-8UN	50	50	184	P4C 32
12	170	138	464	99	276	302	2	520	260	380	450,9	16	1 1/8"-8UN	45	69	218	560	280	381	489	20	1 1/4"-8UN	50	50	254	P4C 35
16	230	138	523	123	368	405	2	650	325	469,9	571,5	20	1 1/4"-8UN	50	76	422	685	342,5	469,9	603,3	20	1 1/2"-8UN	58	58	477	P4C 35

Flanged – BAX_3

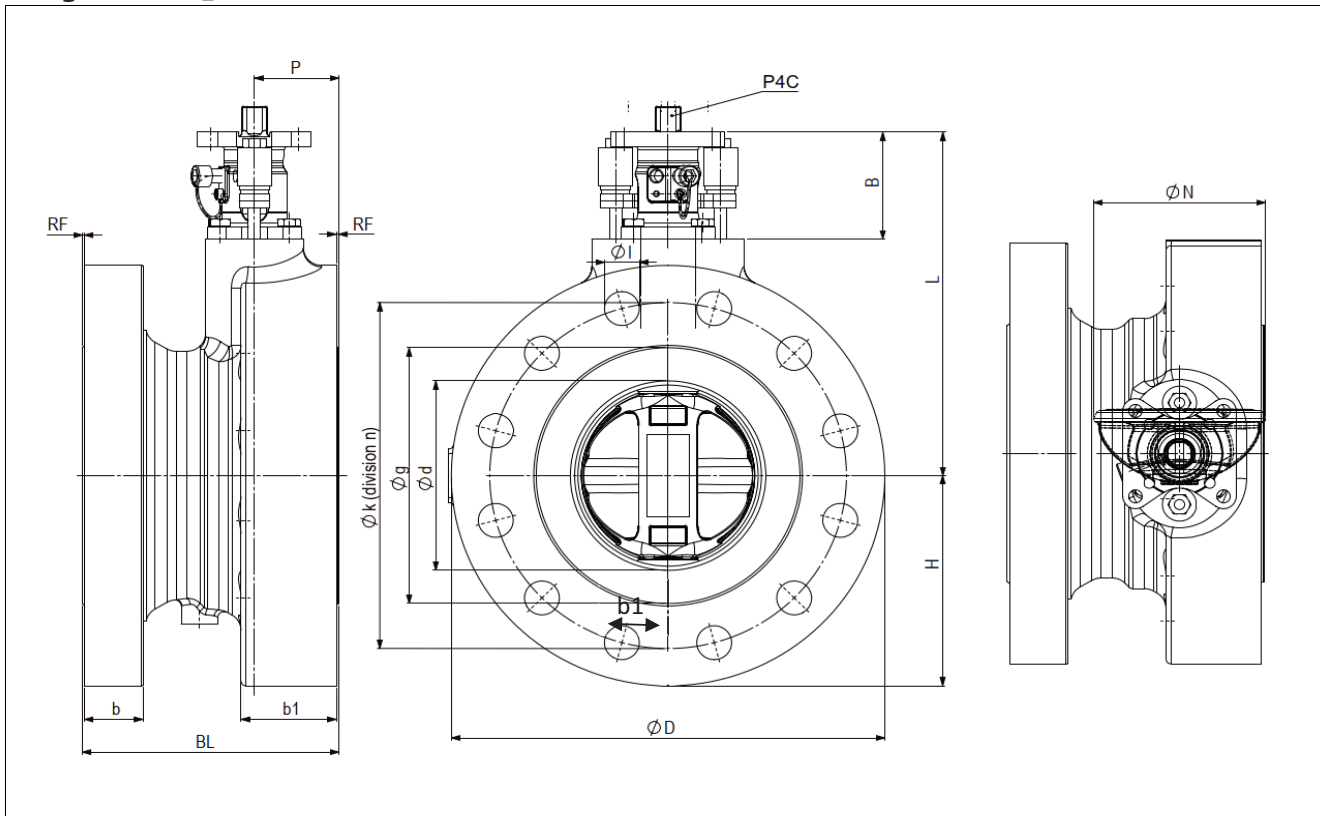


Figure 3 - Dimension drawing BAX_3 – double flange type

All dimensions given in [mm] except threads; weight in [kg]

ASME B16.5

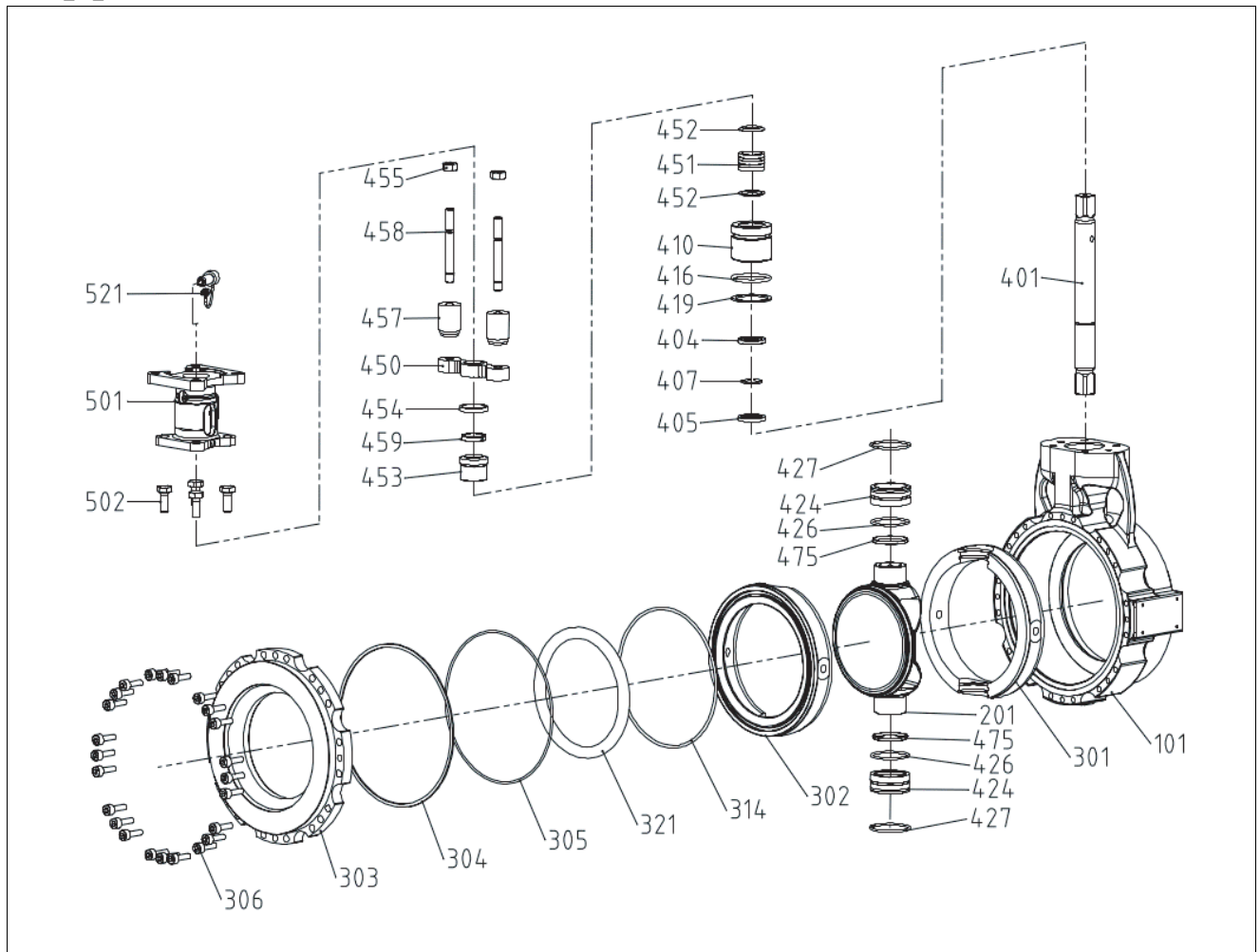
Table 4 - dimensions double flange / ASME

NPS	Standard Dimensions						ASME B16.5 - CL 300										ASME B16.5 - CL 600										Polygon P4C
	BL	B	L	P	ød	RF	øD	b	b1	H	og	ok	n	ø1)	Weight [kg]	øD	b	b1	H	og	ok	n	ø1)	Weight [kg]			
3	180	80	214	47,5	85	2	210	33	57	105	127	168,1	8	3/4"-10UNC	27	210	33	57	105	127	168,1	8	3/4"-10UNC	27	P4C 18		
4	190	80	221,5	51	110	2	255	30,2	51	127,5	157	200,2	8	3/4"-10UNC	37	275	39	61,3	137,5	157	215,9	8	7/8"-9UNC	51	P4C 18		
6	210	90	290	69	160	2	320	35	62,3	160	216	269,7	12	3/4"-10UNC	65	355	47,7	75	177,5	216	292,1	12	1"-8UN	90	P4C 25		
8	230	118	372	73	210	2	380	39,7	61	190	269,7	330,2	12	7/8"-9UNC	100	420	55,6	74,9	210	269,7	349,3	12	1 1/8"-8UN	145	P4C 32		
10	250	118	397	85	255	2	445	46,1	71	222,5	323,9	387,4	16	1"-8UN	135	510	63,5	85	255	323,9	431,8	16	1 1/4"-8UN	225	P4C 32		
12	270	138	464	99	302	2	520	49,3	80,3	260	381	450,9	16	1 1/8"-8UN	220	560	66,7	92	280	381	489	20	1 1/4"-8UN	290	P4C 35		
16	310	138	523	123	405	2	650	58	85,3	325	469,9	571,5	20	1 1/4"-8UN	400	685	76,2	104	342,5	469,9	603,3	20	1 1/2"-8UN	450	P4C 35		

1) refers to right flange for 2 upper threads, other flange drillings acc. ASME standard.

Exploded view BAX with soft seat

BAX_6_W



Bill of material BAX with soft seat

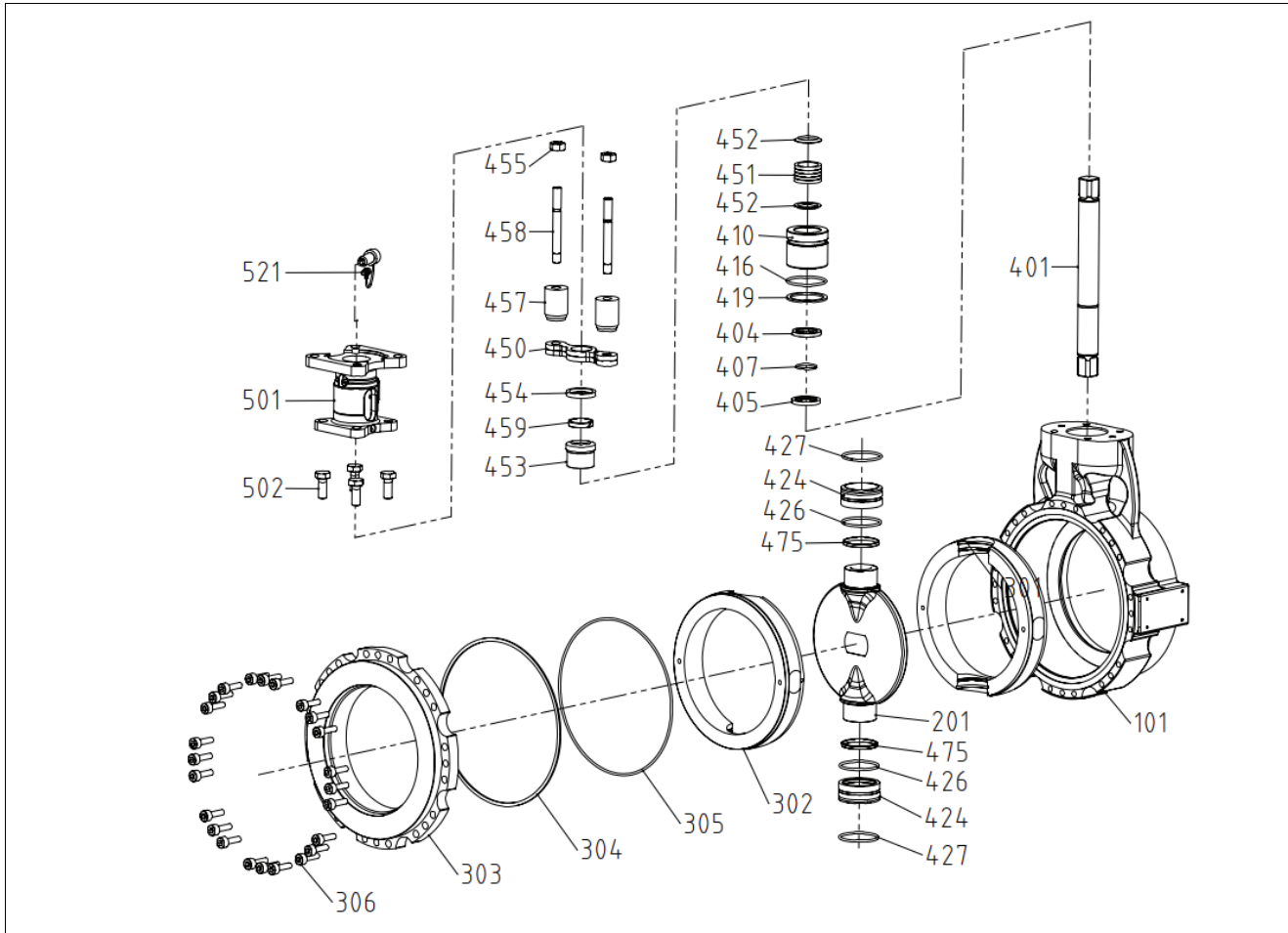
BAX_6_W

ITEM	QTY	DESCRIPITON	MATERIAL
101	1	BODY	ASTM A352 gr. LCB
201	1	DISC	EN 10283-1.4317 QT1
301	1	BEARING RING	ASTM A216 gr. WCB/1.0619
302	1	BEARING RING	ASTM A216 gr. WCB/1.0619
303	1	FLANGE	ASTM A352 gr. LCB
304	1	SEAL	Graphite
305	1	O-RING	FKM
306	24	SOCKET HEAD SCREW	ISO 3506 A2-70
314	1	O-RING	FKM
321	1	SEALING ELEMENT	FKM 90 Shore A
401	1	SHAFT	ASTM A564 gr.630 H1025
404	1	THRUST BEARING	EN 1.0088-1.4305
405	1	THRUST BEARING	EN 1.0088-1.4305
407	1	RETAINING RING	Spring steel
410	1	SLEEVE	EN 1.0088-1.4301
416	1	O-RING	NBR
419	1	SEAL	PTFE

ITEM	QTY	DESCRIPITON	MATERIAL
424	2	BEARING SLEEVE	EN 1.0088-1.4305
426	2	O-RING	NBR
427	2	RETAINING RING	Spring steel
450	1	GLAND	EN 1.0088-1.4301
451	1	PACKING	PTFE
452	2	RING	PEEK
453	1	RING	EN 1.0088-1.4021
454	1	RING	EN 1.0088-1.4021
455	2	HEXAGON NUT	ISO 3506 A2-70
457	2	DISC SPRING SET	-
458	2	STUD	DIN 267 PART 11 A2-70
459	1	SLIDE RING	PTFE
475	2	SEAL RING	PTFE
501	1	BRACKET	A351 gr. CF8/1.4308
502	4	HEXAGON SCREW	ISO 3506 A2-70
521	1	CONTACT	COPPER

Exploded view BAX with step or without seat

BAX_6_W0,1



Bill of material BAX with step or without seat

BAX_6_W0,1

ITEM	QTY	DESCRIPION	MATERIAL
101	1	BODY	ASTM A352 gr. LCB
201	1	DISC	EN 10283-1.4317 QT1
301	1	BEARING RING	ASTM A216 gr. WCB/1.0619
302	1	BEARING RING	ASTM A216 gr. WCB/1.0619
303	1	FLANGE	ASTM A352 gr. LCB
304	1	SEAL	Graphite
305	1	O-RING	FKM
306	24	SOCKET HEAD SCREW	ISO 3506 A2-70
401	1	SHAFT	ASTM A564 gr.630 H1025
404	1	THRUST BEARING	EN 1.0088-1.4305
405	1	THRUST BEARING	EN 1.0088-1.4305
407	1	RETAINING RING	Spring steel
410	1	SLEEVE	EN 1.0088-1.4301
416	1	O-RING	NBR
419	1	SEAL	PTFE
424	2	BEARING SLEEVE	EN 1.0088-1.4305

ITEM	QTY	DESCRIPION	MATERIAL
426	2	O-RING	NBR
427	2	RETAINING RING	Spring steel
450	1	GLAND	EN 1.0088-1.4301
451	1	PACKING	PTFE
452	2	RING	PEEK
453	1	RING	EN 1.0088-1.4021
454	1	RING	EN 1.0088-1.4021
455	2	HEXAGON NUT	ISO 3506 A2-70
457	2	DISC SPRING SET	-
458	2	STUD	DIN 267 PART 11 A2-70
459	1	SLIDE RING	PTFE
475	2	SEAL RING	PTFE
501	1	BRACKET	A351 gr. CF8/1.4308
502	4	HEXAGON SCREW	ISO 3506 A2-70
521	1	CONTACT	COPPER

Technical product specification

Body types:

- Type BAX_6: Wafer (DIN and ASME sizes)
- Type BAX_4: Lug (ASME sizes only)
- Type BAX_3: Flange (ASME sizes only)

Nominal sizes:

- NPS 3, 4, 6, 8, 10, 12, 16 as soft seated valve
- NPS 3, 4, 6 as throttle valve
- PN40, PN63
- Class 300, Class 600 (max. pressure for Class 600 is limited to 63 bar g)
- Other pressure classes on request
- Maximum differential pressure for tight shut off: 55 bar

Operating Temperature range:

- Long term operating temperature: -10°C ... +110°C
- Long term storage temperature: -40°C ... +110°C

Design standards

- ASME 16.5
- EN 1092
- ASME 16.34
- ASME VIII-1:2013
- EN 12516-2:2004
- PED III/H according 27/23/EC
- IEC 60534-8-1

Main materials

- Body LCB
- Disc 1.4317
- Shaft 17-4PH
- Bearing 1.4305 with bonded PTFE texture
- Seat FKM
- Shaft sealing PTFE
- Material certificates EN 10204-3.1 for body and disc

Approvals

- Emission: EN 15848-1 BH
- ATEX II G/D category 2 or 3 EN 13463

Valve tightness – bi-directional

- Seat leakage test up to 60 bar in both directions according customer specification
 - EN12266 – A (air)
 - API598:2016 bubble tight
 - FCI 70-2 class VI
 - Other standards on request

Actuator selection

The BAX butterfly valve can be operated either with F1 actuator or with B1-series actuator. Spring return actuators are selected for 2 bar differential pressure in the pipeline. Pilot air is 4 bar.

BAX valve size	DN	80 100	150	200 250	300	400
	NPS	3 4	6	8 10	12	16
F1F / F1A actuator size		30	60	120	250	
Weight F1A [kg]		10	16	28	51	
Weight F1F [kg]		13	21	56	85	
B1C actuator size		9	11	13	17	17
Weight B1C [kg]		9,6	16	31	54	54
B1J actuator size		8	10	12	16	16
Weight B1J [kg]		17	17	30	57	100

Cv values

Soft seated

NPS	DN	Cvs gal/min	Kvs m ³ /h
3	80	338	292
4	100	522	451
6	150	1224	1058
8	200	2266	1958
10	250	3481	3008
12	300	4981	4304
16	400	9461	8174

Step seated

NPS	DN	Cvs gal/min	Kvs m ³ /h
3	80	409	353
4	100	656	567
6	150	1282	1108

No seat (swing through)

NPS	DN	Cvs gal/min	Kvs m ³ /h
3	80	591	511
4	100	935	808
6	150	1869	1615

Control rate for BAX valve

The following tables show the control or rangeability ratio between maximum capacity and capacity at specified opening angle of the disc.

Soft seated

Inch/DN	C_V / C_{VS} [%]								
	Opening angle disc								
	10°	20°	30°	40°	50°	60°	70°	80°	90°
3/80	1%	7%	14%	23%	36%	53%	75%	96%	100%
4/100	1%	6%	12%	20%	31%	48%	70%	94%	100%
6/150	2%	7%	12%	19%	30%	45%	66%	93%	100%
8/200	2%	8%	13%	20%	31%	46%	68%	93%	100%
10/250	2%	8%	13%	20%	29%	44%	65%	91%	100%
12/300	2%	7%	12%	19%	29%	43%	65%	91%	100%
16/400	2%	7%	12%	18%	28%	41%	62%	87%	100%

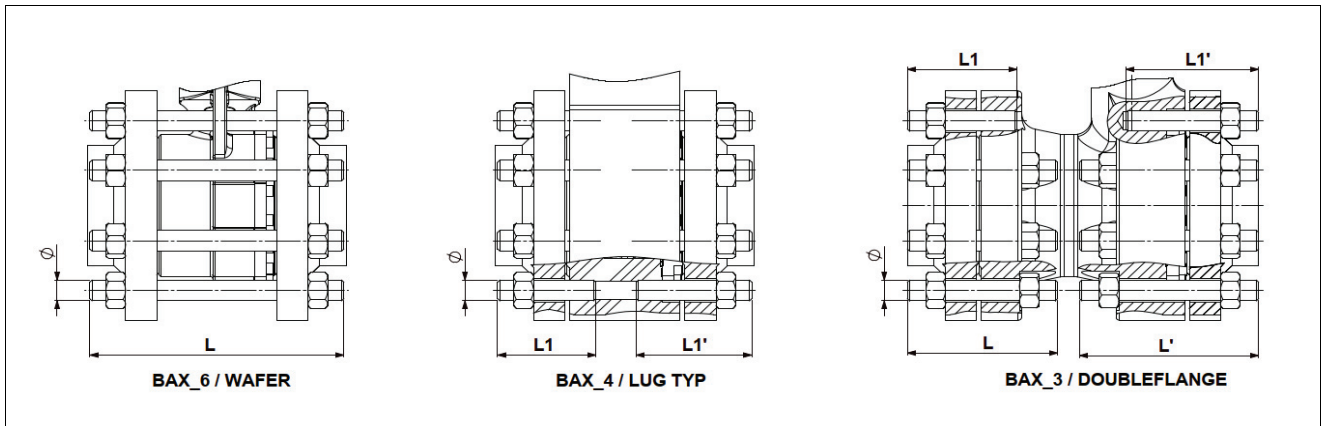
Step seated

Inch/DN	C_V / C_{VS} [%]								
	Opening angle disc								
	20°	30°	40°	50°	60°	70°	80°	85°	90°
3/80	7%	14%	23%	35%	52%	75%	95%	100%	98%
4/100	6%	12%	20%	31%	49%	70%	94%	99%	100%
6/150	7%	12%	19%	30%	45%	66%	92%	100%	99%

No seat (swing through)

Inch/DN	C_V / C_{VS} [%]								
	Opening angle disc								
	20°	30°	40°	50°	60°	70°	80°	85°	90°
3/80	7%	14%	23%	35%	52%	75%	95%	100%	98%
4/100	6%	12%	20%	31%	49%	70%	94%	99%	100%
6/150	7%	12%	19%	30%	45%	66%	92%	100%	99%

Bolt sizes and lengths:



WAFER:

NPS	thread bolt Ø	thread bolts for BAX_D_6 (wafer)/ ASME B 16.5- Class 300		
		L		total quantity of bolts
		Length	Qty	
3	3/4"-10UNC	220	8	8
4	3/4"-10UNC	220	8	8
6	3/4"-10UNC	250	12	12
8	7/8"-9UNC	280	12	12
10	1"-8UN	320	16	16
12	1 1/8"-8UN	360	16	16
16	1 1/4"-8UN	440	20	20

NPS	thread bolt Ø	thread bolts for BAX_F_6 (wafer)/ ASME B 16.5- Class 600		
		L		total quantity of bolts
		Length	Qty	
3	3/4"-10UNC	240	8	8
4	7/8"-9UNC	260	8	8
6	1"-8UN	310	12	12
8	1 1/8"-8UN	340	12	12
10	1 1/4"-8UN	380	16	16
12	1 1/4"-8UN	410	20	20
16	1 1/2"-8UN	510	20	20

NPS	thread bolt Ø	thread bolts for BAX_M_6 (wafer)/ DIN EN 1092-1 PN40		
		L		total quantity of bolts
		Length	Qty	
80	M16	200	8	8
100	M20	210	8	8
150	M24	250	8	8
200	M27	280	12	12
250	M30	320	16	16
300	M30	340	16	16
400	M36	440	16	16

LUG:

NPS	thread bolt Ø	thread bolts for BAX_D_4 (lug type)/ ASME B 16.5- Class 300				total quantity of bolts
		L1		L1'		
		Length	Qty	Length	Qty	
3	3/4"-10UNC	90	8	105	8	16
4	3/4"-10UNC	95	8	115	8	16
6	3/4"-10UNC	100	12	125	12	24
8	7/8"-9UNC	115	12	130	12	24
10	1"-8UN	130	16	150	16	32
12	1 1/8"-8UN	140	16	165	16	32
16	1 1/4"-8UN	155	20	180	20	40

NPS	thread bolt Ø	hex screws for BAX_D_4 (lug type)/ ASME B 16.5- Class 300				total quantity of bolts
		L1		L1'		
		Length	Qty	Length	Qty	
3	3/4"-10UNC	60	8	75	8	16
4	3/4"-10UNC	65	8	85	8	16
6	3/4"-10UNC	70	12	95	12	24
8	7/8"-9UNC	80	12	95	12	24
10	1"-8UN	90	16	110	16	32
12	1 1/8"-8UN	100	16	120	16	32
16	1 1/4"-8UN	110	20	135	20	40

NPS	thread bolt Ø	thread bolts BAX_F_4 (lug type)/ ASME B 16.5- Class 600				total quantity of bolts
		L1		L1'		
		Length	Qty	Length	Qty	
3	3/4"-10UNC	100	8	115	8	16
4	7/8"-9UNC	115	8	115	8	16
6	1"-8UN	135	12	135	12	24
8	1 1/8"-8UN	150	12	150	12	24
10	1 1/4"-8UN	170	16	170	16	32
12	1 1/4"-8UN	175	20	175	20	40
16	1 1/2"-8UN	200	20	200	20	40

NPS	thread bolt Ø	hex screws BAX_F_4 (lug type)/ ASME B 16.5- Class 600				total quantity of bolts
		L1		L1'		
		Length	Qty	Length	Qty	
3	3/4"-10UNC	70	8	85	8	16
4	7/8"-9UNC	80	8	80	8	16
6	1"-8UN	95	12	95	12	24
8	1 1/8"-8UN	105	12	105	12	24
10	1 1/4"-8UN	120	16	120	16	32
12	1 1/4"-8UN	120	20	120	20	40
16	1 1/2"-8UN	140	20	140	20	40

DOUBLE FLANGE:

NPS	thread bolt Ø	thread bolts for BAX_D_3 (doubleflange)/ ASME B 16.5- Class 300								total quantity of bolts
		L		L1		L'		L1'		
		Length	Qty	Length	Qty	Length	Qty	Length	Qty	
3	3/4"-10UNC	120	6	85	2	145	6	105	2	16
4	3/4"-10UNC	120	8			140	6	115	2	16
6	3/4"-10UNC	130	12			155	10	125	2	24
8	7/8"-9UNC	150	12			170	10	130	2	24
10	1"-8UN	170	16			195	14	150	2	32
12	1 1/8"-8UN	185	16			215	14	165	2	32
16	1 1/4"-8UN	205	18	150	2	235	18	180	2	40

NPS	thread bolt Ø	thread bolts BAX_F_3 (doubleflange)/ ASME B 16.5- Class 600								total quantity of bolts
		L		L1		L'		L1'		
		Length	Qty	Length	Qty	Length	Qty	Length	Qty	
3	3/4"-10UNC	130	6	95	2	155	6	115	2	16
4	7/8"-9UNC	150	8			175	6	135	2	16
6	1"-8UN	175	12			205	10	160	2	24
8	1 1/8"-8UN	200	12			220	10	170	2	24
10	1 1/4"-8UN	225	16			245	14	190	2	32
12	1 1/4"-8UN	230	18	165	2	255	16	195	4	40
16	1 1/2"-8UN	270	18	195	2	295	18	225	2	40

How to order – type code

Standard selection:

Standard temperature valve for PSA plants

Example for a standard BAX valve, Class 300, ATEX IIG/D category 3, wafer, standard version with soft seat, drive shaft with polygon profile P2

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.
-	BA	X	D	B1	6	06	P	W	-	-	P2

1. sign	RESERVED FOR FUTURE USE
-	

2. sign	PRODUCT SERIES
BA	Standard temperature soft seated valve with single eccentric disc, double flanged, Lug or Wafer type, soft seated butterfly valve for PSA applications. BA valves are exclusively for LINDE only

3. sign	DESIGN VERSION
X	Version X

4. sign	BODY PRESSURE RATING
D	ASME class 300
F	ASME class 600
M	DIN PN40
N	DIN PN63

5. sign	BEARING AND BODY DESIGN
B1	Soft bearing, Shaft 17-4PH and ATEX II 3 G/D certified
B2	Soft bearing, Shaft 17-4PH and ATEX II 2 G/D certified
Y	Special, to be specified

6. sign	BODY CONSTRUCTION, FACE-TO-FACE LENGTH
3	Double flanged for • ASME cl.300, ASME cl. 600 - FtF length acc. manufacturer standard
4	Lug, Mono flange • ASME cl.300, ASME cl. 600 - FtF length acc. manufacturer standard
6	Wafer • for PN40, PN63, ASME cl.150, ASME cl.300, ASME cl. 600 - FtF length acc. manufacturer standard
Y	Special, to be specified

7. sign	SIZE Note: Pressure rating = ASME -> inch sizes Pressure rating = DIN -> metric sizes
	Inch: 03, 04, 06, 08, 10, 12, 16 Metric: 080, 100, 150, 200, 250, 300, 400

8. sign	BODY & DISC MATERIAL
	Standard version BAX
P	Body: ASTM A352 LCB (for wafer and double flanged body design) Disc: A487 gr. EN 1.4317
Y	Special, to be specified

9. sign	SEAT & PACKING
	<u>For version BAX</u> Standard operating temperature: T = -10°C ... +110°C for permanent use
W	Shaft sealing PTFE Packing acc. EN15848 Sealing Element FKM
Y	Special, to be specified

10. sign	SEAT TYPE
-	Standard soft seat for tight shut-off purpose
0	Control disc with No seat Only sizes NPS 3,4,6 / DN 80,100,150
1	Control disc with Step seat Only for size NPS 3,4,6 / DN 80,100,150
Y	Special, to be specified

11. sign	FLANGE Rating - flange face finish in marked flanges always check suitability from factory
-	without sign according to valve body pressure rating EN1092-1 B1 (Ra 3.2 - 12.5) ASME B 16.5 sizes up to 16" (Ra 3.2 - 6.3)
	Special, to be specified

12. sign	Drive connection
P1	Polygon profile P4C 18 for valve 3" and 4" (DN80, DN100)
P2	Polygon profile P4C 25 for valve 6" (DN150)
P3	Polygon profile P4C 32 for valve 8" and 10" (DN 200, 250)
P4	Polygon profile P4C 35 for valve 12" and 16" (DN 300, 400)
S1	Square profile SW17 for valve 3" and 4" (DN80, DN100)
S2	Square profile SW22 for valve 6" (DN150)
S3	Square profile SW27 for valve 8" and 10" (DN200, DN250)
S4	Square profile SW36 for valve 12" and 16" (DN300, DN400)

Valmet Flow Control Oy

Vanha Porvoontie 229, 01380 Vantaa, Finland.

Tel. +358 10 417 5000.

www.valmet.com/flowcontrol

Subject to change without prior notice.

Neles, Neles Easyflow, Jamesbury, Stonel, Valvcon and Flowrox, and certain other trademarks, are either registered trademarks or trademarks of Valmet Oyj or its subsidiaries in the United States and/or in other countries.

For more information www.neles.com/trademarks

