

Applications

- LNG process / All liquefied gases.
- Oil and gas, chemicals, petrochemicals, nuclear industry.
- Compressed gas, Hydrocarbon.

Working conditions

- Temperature :
MT versions: from $-46\text{ }^{\circ}\text{C}$ min. up to $+260\text{ }^{\circ}\text{C}$ max.
TBT versions: from $-196\text{ }^{\circ}\text{C}$ min. up to $+200\text{ }^{\circ}\text{C}$ max.
- Allowable pressure (PS): depends on the body material and the working temperature, see page 2.
- Operating under $\Delta P = PS$
- Vacuum service down to 0 absolute bar.
- Maximum fluid velocity under allowable pressure:
4 m/s for liquids and 50 m/s for clean gases.
- Lower neck extension seal for valve positioned at an angle
 $\pm 20\text{ }^{\circ}\text{C}$ for vertical position.

Materials

See page 2.

Design

- Full-lug type body with raised faces (Type 4): DN 6" to 24"
- Flanged type body (Type 7): 6" to 36"
- Face-to-face according to:
Cl. 300 Type 4 -> API 609-B(A) cl. 300,
Cl. 300 Type 7 -> ISO 5752 serie 13, EN 558.1 serie 13.
- Marking in accordance with EN 19 standard.
- Steel body: paint grey colour, internal thickness $30\text{ }\mu\text{m}$,
Stainless steel body: pickling and passivation.

- The valves meet the safety requirements of the Pressure Equipments Directive 97/23/EC (PED) Appendix I for fluids of the groups 1 and 2.
- Fire-safe in accordance with ISO 10497.
- Zero leakage, bi-directional.

Connections

- PN 40 according to EN 1092-1 (DN 6" to 24"),
- ASME B16-5 cl. 300 UN/UNC (DN 6" to 24"),
- ASME B16-47 serie A class 300 (DN 28" to 36"),
- ASME B16-47 serie B class 300 (DN 28" to 36").

Standard variants

- Pneumatic actuator ACTAIR / DYNACTAIR
- Manual actuator MR
- Hydraulic actuator ACTO / DYNACTO
- Multi turn electric actuator ACTELEC

Options

- Bottom with purge plug
- Fugitive emission version
- ATEX version in accordance with 94/9/EC directive

Data to be supplied when ordering

- TRIODIS valve in accordance with type series booklet 8613.1783-EN.
- Size + Type.
- Materials (body, disc, seat).
- Working conditions: nature of fluid, pressure, flow, temperature.
- Connection.
- Flange facing finish and type of contact faces.
- Actuation.



Materials

MT Version

Body	KSB code
Steel ASTM A 216 gr. WCC and EN 10213 1.0619 + stellite	1
Steel ASTM A 216 gr. WCB + stellite	1p
Steel ASTM A 352 gr. LCB + stellite	1n
Steel ASTM A 352 gr. LCC and EN 10213 1.6220 + stellite	1m
Stainless steel ASTM A 351 gr. CF8M and EN 10213 1.4408 + stellite	6
Extension	KSB code
Steel ASTM A 216 gr. WCC and EN 10213 1.0619	1
Steel ASTM A 216 gr. WCB	1p
Steel ASTM A 352 gr. LCB	1n
Steel ASTM A 352 gr. LCC and EN 10213 1.6220	1m
Stainless steel ASTM A 351 gr. CF8M and EN 10213 1.4408	6
Shaft	KSB code
Stainless steel AISI 431 and EN 10272 1.4057 (from 0 °C min. up to +260 °C)	6h
Stainless steel ASTM A 564 gr. 630 and EN 10088-3 1.4542 (from -50 °C min. up to + 0 °C)	6e
Disc	KSB code
Steel ASTM A 216 gr. WCC and EN 10213 1.0619	1
Steel ASTM A 216 gr. WCB	1p
Steel ASTM A 352 gr. LCB	1n
Steel ASTM A 352 gr. LCC and EN 10213 1.6220	1m
Stainless steel ASTM A 351 gr. CF8M and EN 10213 1.4408	6
Seat	KSB code
Stainless steel Duplex	7e
Stainless steel Duplex + graphite	7f

Other materials, consult us.

TBT Version

Body	KSB code
Stainless steel ASTM A 351 gr. CF8M and EN 10213 1.4408 + stellite	6
Extension	KSB code
Stainless steel ASTM A 351 gr. CF8M and EN 10213 1.4408	6
Shaft	KSB code
Stainless steel ASTM A 479 gr. XM19	6r
Stainless steel ASTM A 479gr. 316L EN 10213 1.4404 (for reduced working pressure)	6
Stainless steel ASTM A 638 gr. 660 (for exceptional working conditions)	6f
Disc	KSB code
Stainless steel ASTM A 351 gr. CF8M and EN 10213 1.4408	6
Seat	KSB code
Stainless steel Duplex	7e
Austenitic Stainless steel XM19	6r
Inconel	8j

Other materials, consult us.

Pressure / Temperature

In pressure class 300 (european materials), TRIODIS 300 valves are in accordance with EN 12516-1 standard and ASME B 16-34.

The values in the table below must be used for valves which have to comply with PED 97/23/CE:

Material Body + extension	Working pressure in bar at temperature °C									
	-196	-46	-29	-10	50	100	150	200	250	260
ASTM A 216 gr. WCC / EN10213 1.0619	Forbidden	Forbidden	51,7*	51,7	51,7	51,5	50,2	48,6	46,3	45,6
ASTM A 216 gr. WCB	Forbidden	Forbidden	51,1*	51,1	50,1	46,4	45,1	43,8	41,7	41,1
ASTM A 352 gr. LCB	Forbidden	47,9*	47,9*	47,9	47,3	45,1	43,9	42,5	40,6	40
ASTM A 352 gr. LCC / EN10213 1.6220	Forbidden	51,7*	51,7*	51,7	51,7	51,5	50,2	48,6	46,3	45,6
ASTM A 351 gr. CF8M / EN10213 1.4408	49,6	49,6	49,6	49,6	48,1	42,2	38,5	35,7	33,4	33

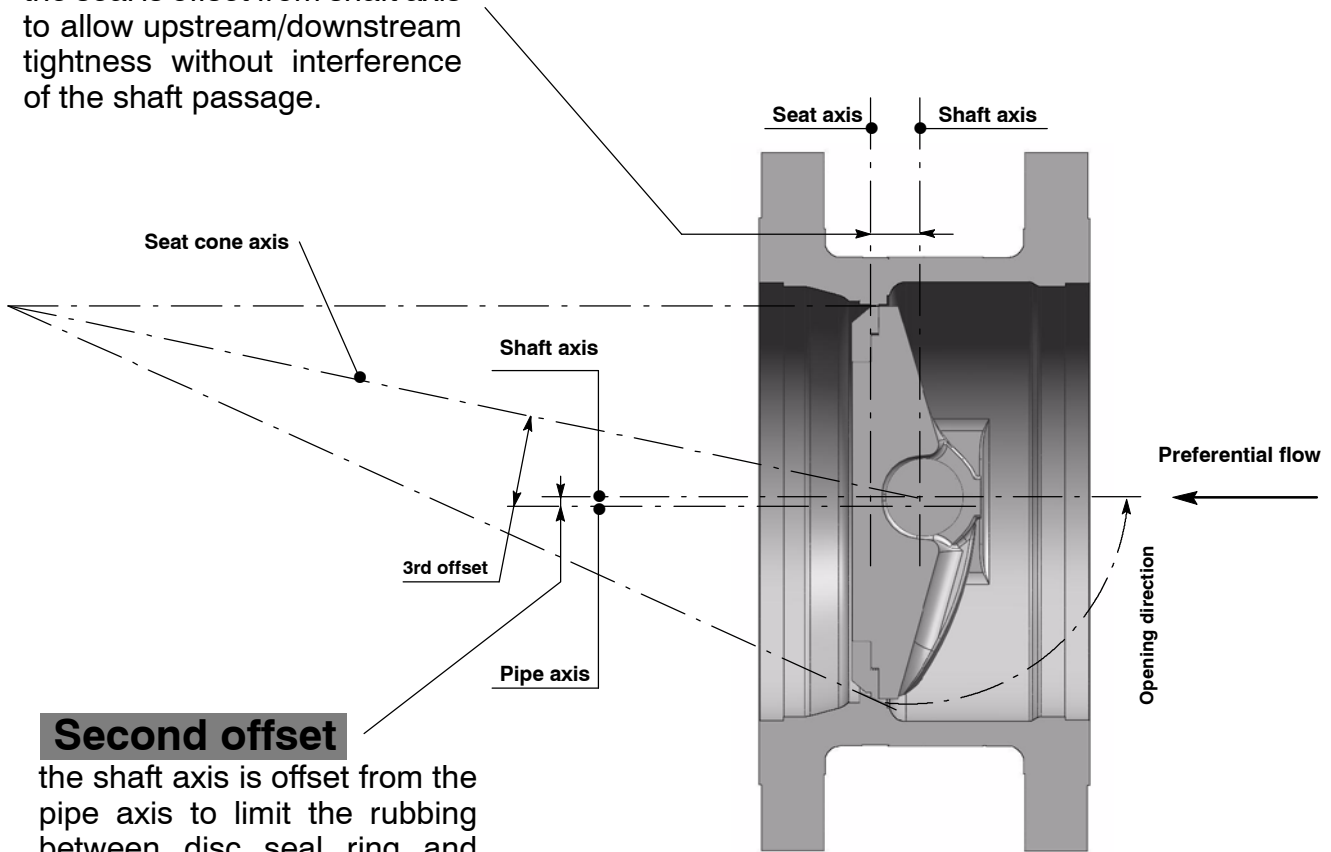
* Only according to ASME B16-34

Hydraulic characteristics

DN	NPS	Flow coefficient in full open position		Zeta
		Kv ₀	Cv ₀	
150	6	601	697	2,24
200	8	1131	1312	2,00
250	10	1948	2260	1,64
300	12	2778	3222	1,68
350	14	4130	4791	1,40
400	16	5192	6023	1,52
450	18	7745	8984	1,09
500	20	10410	12076	0,92
600	24	16138	18720	0,79
700	28	18489	21448	1,12
750	30	22370	25950	1,01
800	32	25432	29501	1,01
900	36	31555	36603	1,05

First offset

the seal is offset from shaft axis to allow upstream/downstream tightness without interference of the shaft passage.

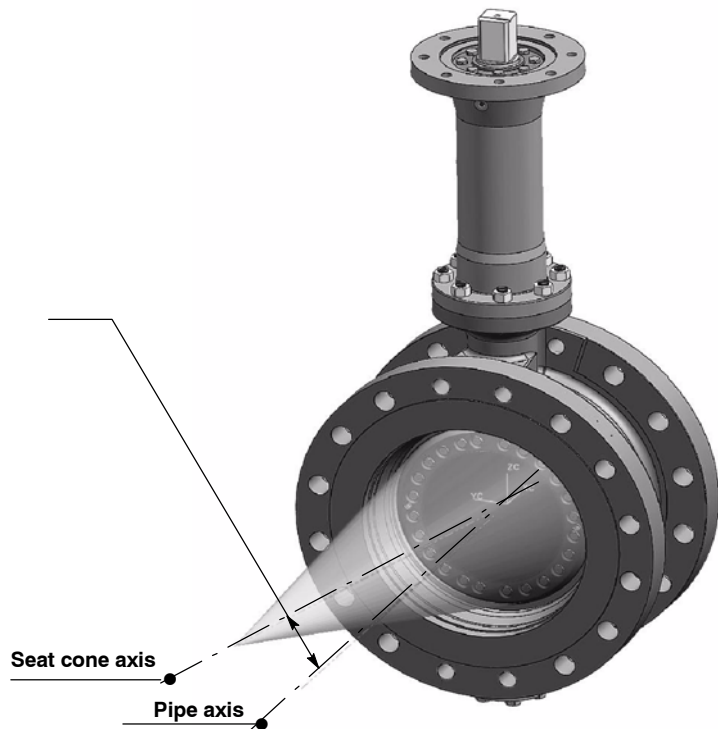


Second offset

the shaft axis is offset from the pipe axis to limit the rubbing between disc seal ring and body seat

Third offset

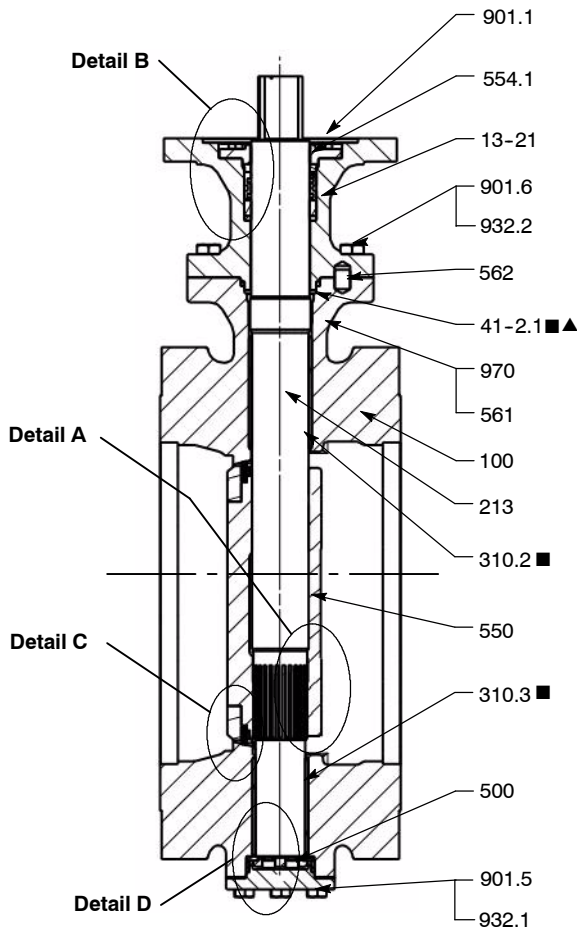
the seat cone axis is inclined of a specific angle from pipe axis:
 - to provide the perfect matching of the sealing conical surfaces so that the valve is bubble tighten at high pressure levels,
 - to eliminate rubbing during the operating of the valve in order to guarantee a long service life.



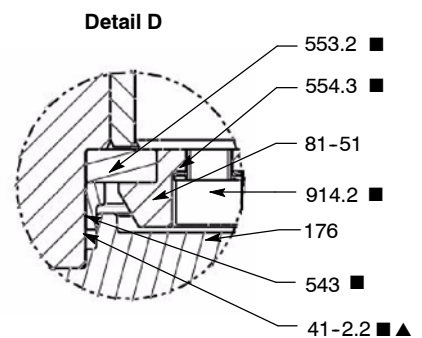
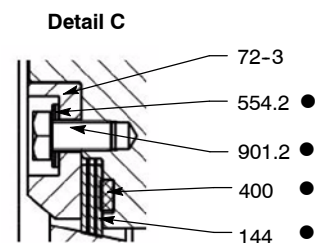
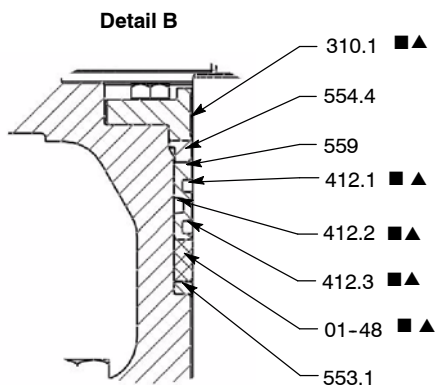
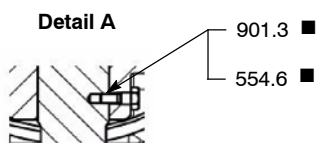
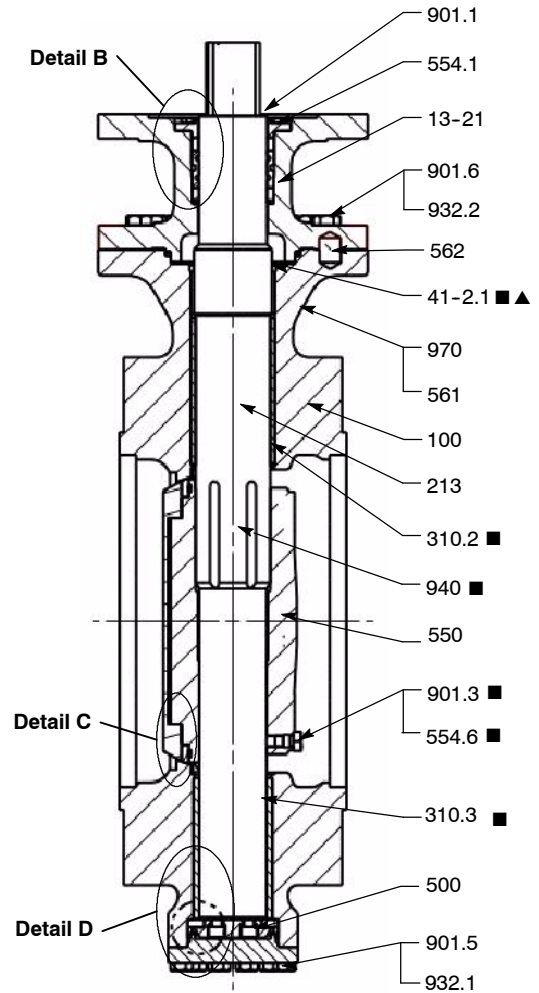
Construction

MT version (Type 7 represented)

Disc drive with splines
DN ≤ 16"



Disc drive with cylindrical keys
DN 18" to DN 36"



- Spare parts kit for seat
- Spare parts kit for bearing
- ▲ Spare parts kit for shaft sealing

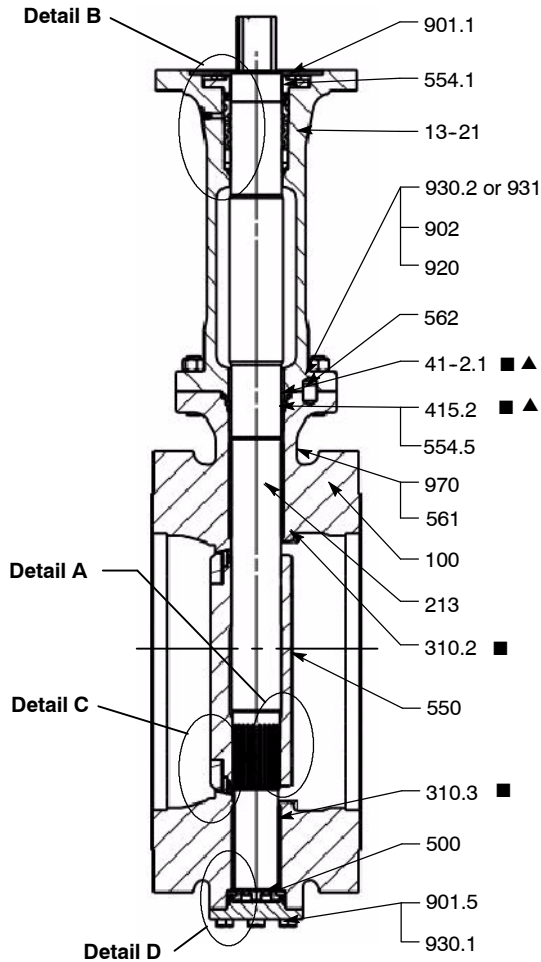
Parts list for MT version

Item	Designation	Materials
01-48	Sealing packing	Expanded graphite
100	Body	See page 2
13-21	Extension	See page 2
144	Seat	See page 2
176	Bottom	A516 gr 70 or Stainless Steel 316L
213	Shaft	See page 2
310.1	Self lubricating strip	Stainless steel + PTFE
310.2	Upper bearing	Stainless steel 316L hard faced or Stainless steel + PTFE
310.3	Lower bearing	Stainless steel 316L hard faced or Stainless steel + PTFE
400	Static gasket	Stainless steel 316L + graphite or expanded graphite
41-2.1	Extension static joint	Expanded graphite
41-2.2	Bottom static joint	Expanded graphite
412.1	O-Ring	VITON®
412.2	O-Ring	VITON®
412.3	O-Ring	VITON®
500	Anti static device	EN 10213 1.4310
543	Spacer bush	Stainless steel 316L
550	Disc	See page 2
553.1	Upper thrust insert	Stainless steel 316L
553.2	Thrust insert	Stainless steel 316L hard faced
554.1	Upper washer	Stainless steel 316L or EN 10025 S235
554.2	Nord Lock® washer	Stainless steel 316
554.3	Nord Lock® washer	Stainless steel 316
554.4	Spacer	Stainless steel 316L
554.6	Nord Lock® washer	Stainless steel 316L
559	Gasket holder	Stainless steel 316L or EN 10025 S235
561	Grooved nail	EN 10213 1.4303
562	Pin	A638 gr. 660
72-3	Tightening flange	EN 10025 S355 or EN 10088-2 1.4462
81-51	Tightening part	Stainless steel 316L
901.1	Hexagon screw	Steel Cl. 8-8 or Stainless steel A4-70
901.2	Hexagon screw	Steel Cl. 8-8 or Stainless steel A4-80
901.3	Liaison screw	Stainless steel A4-70
901.5	Hexagon screw	Stainless steel A4-70
901.6	Hexagon screw	Stainless steel A4-70
914.2	Hexagon socket head cap screw	Stainless steel A4-70
932.1	Lock washer	Stainless steel 316L
932.2	Lock washer	Stainless steel 316L
940	Cylindrical key	A638 GR 660 (for DN > 12")
970	Identity plate	Stainless steel 316 or equivalent

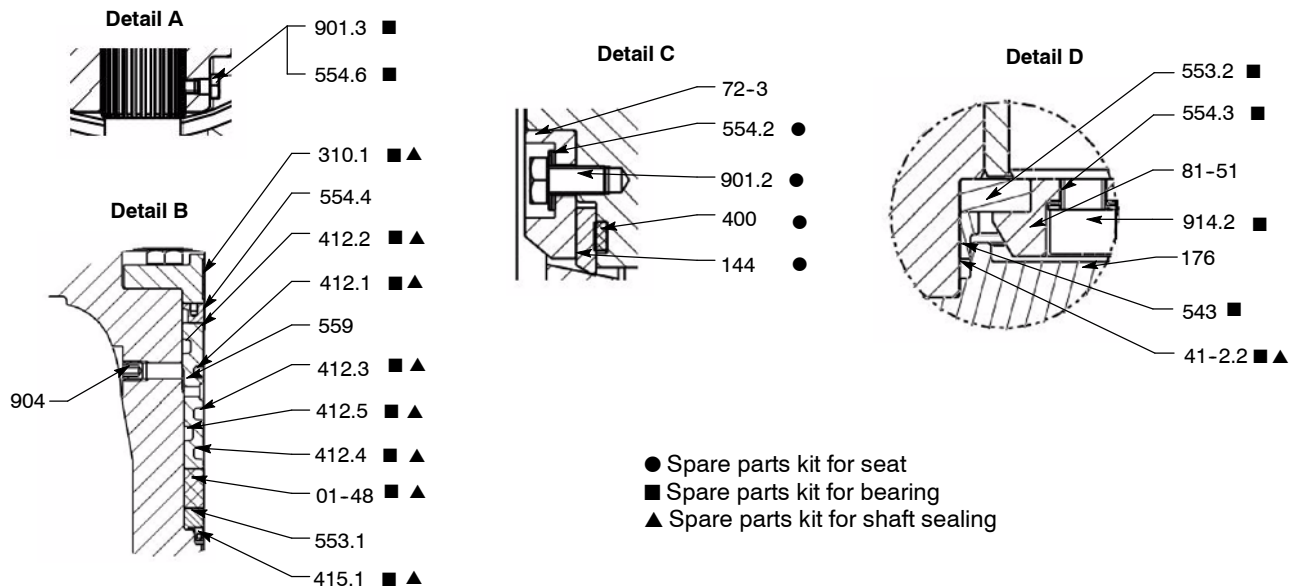
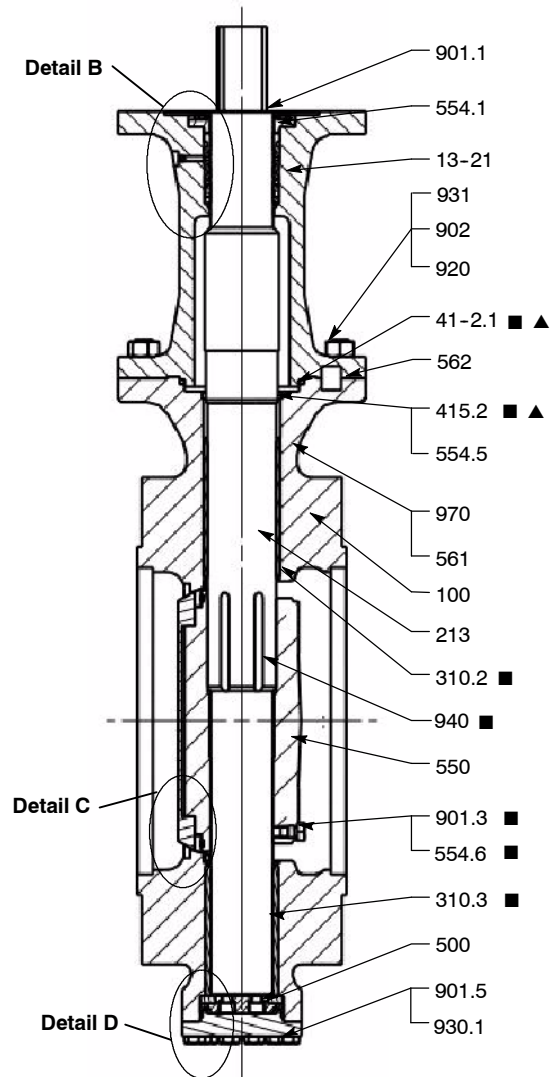
Construction

TBT version (Type 7 represented)

Disc drive with splines
DN ≤ 16"



Disc drive with cylindrical keys
DN 18" to DN 36"



Parts list for TBT version

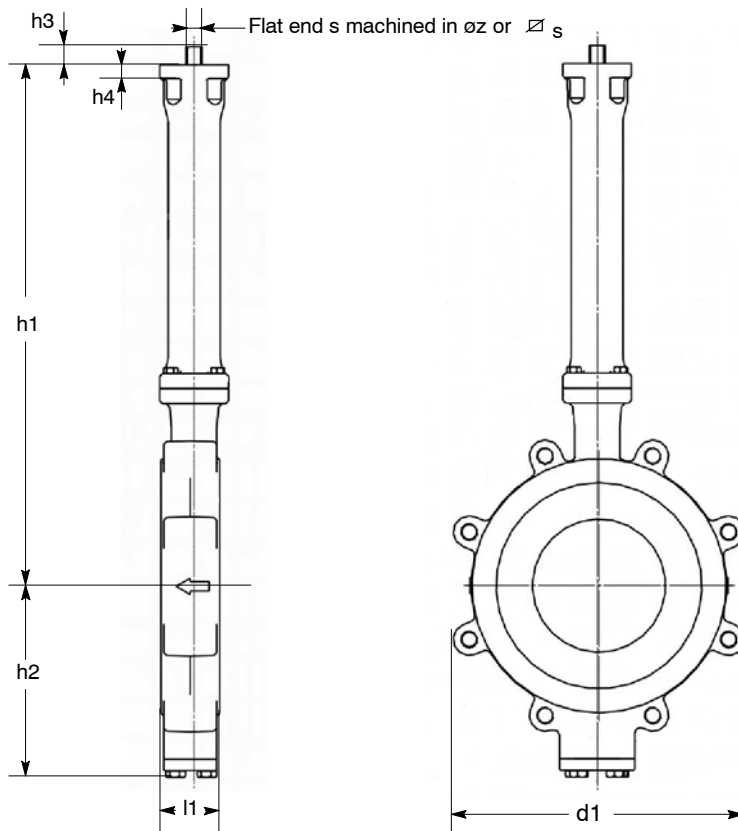
Item	Designation	Materials
01-48	Sealing packing	Expanded graphite
100	Body	See page 2
13-21	Extension	See page 2
144	Seat	See page 2
176	Bottom	Stainless steel 316L
213	Shaft	See page 2
310.1	Self lubricating strip	Stainless steel + PTFE
310.2	Upper bearing	Stainless steel 316L hard faced or Stainless steel + PTFE
310.3	Lower bearing	Stainless steel 316L hard faced or Stainless steel + PTFE
400	Static gasket	Stainless steel 316L+ graphite or expanded graphite
41-2.1	Extension static joint	Expanded graphite
41-2.2	Bottom static joint	Expanded graphite
412.1	O-Ring	HC Nitrile(*)
412.2	O-Ring	HC Nitrile(*)
412.3	O-Ring	HC Nitrile(*)
412.4	O-Ring	HC Nitrile(*)
412.5	O-Ring	HC Nitrile(*)
415.1	Lip Seal Ring	PTFE + ELGILOY
415.2	Lip Seal Ring	PTFE + ELGILOY (Option)
500	Anti static device	EN 10213 1.4310
543	Spacer bush	Stainless steel 316L
550	Disc	See page 2
553.1	Upper thrust insert	Stainless steel 316L
553.2	Thrust insert	Stainless steel 316L hard faced
554.1	Upper washer	Stainless steel 316L
554.2	Nord Lock® washer	Stainless steel 316
554.3	Nord Lock® washer	Stainless steel 316
554.4	Spacer	Stainless steel 316L
554.5	Spacer	Stainless steel 316L (Option)
554.6	Nord Lock® washer	Stainless steel 316L
559	Gasket holder	Stainless steel 316L
561	Grooved nail	EN 10213 1.4303
562	Pin	A638 gr. 660
72-3	Tightening flange	EN 10088-2 1.4462 or Stainless steel 316L or A479 XM19
81-51	Tightening part	Stainless steel 316L
901.1	Hexagon screw	Stainless steel A4-70
901.2	Hexagon screw	Stainless steel A4-70
901.3	Liaison screw	Stainless steel A4-70
901.5	Hexagon screw	A320 GR. B8M cl.2
902	Stud bolt	A320 GR. B8M cl.2
904	Socket screw	Stainless steel A4-70
914.2	Hexagon socket head cap screw	Stainless steel A4-70
920	Hexagon nut	A 194 GR. 8M
930.1	Lock retainer	Stainless steel 316L
930.2	Nut lock	Stainless steel 316L
931	Lock washer	Stainless steel 316L
940	Cylindrical key	A638 gr 660 (DN > 12")
970	Identity plate	Stainless steel 316 or equivalent

*HC Nitrile: Epichlorohydrin for ambient temperature below minus 25 °C.

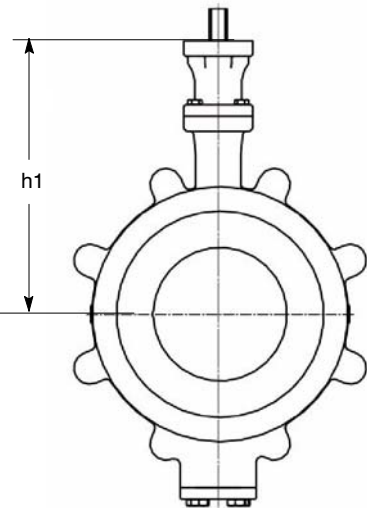
Dimensions

Full-lug type body - Type 4 Class 300

TBT version



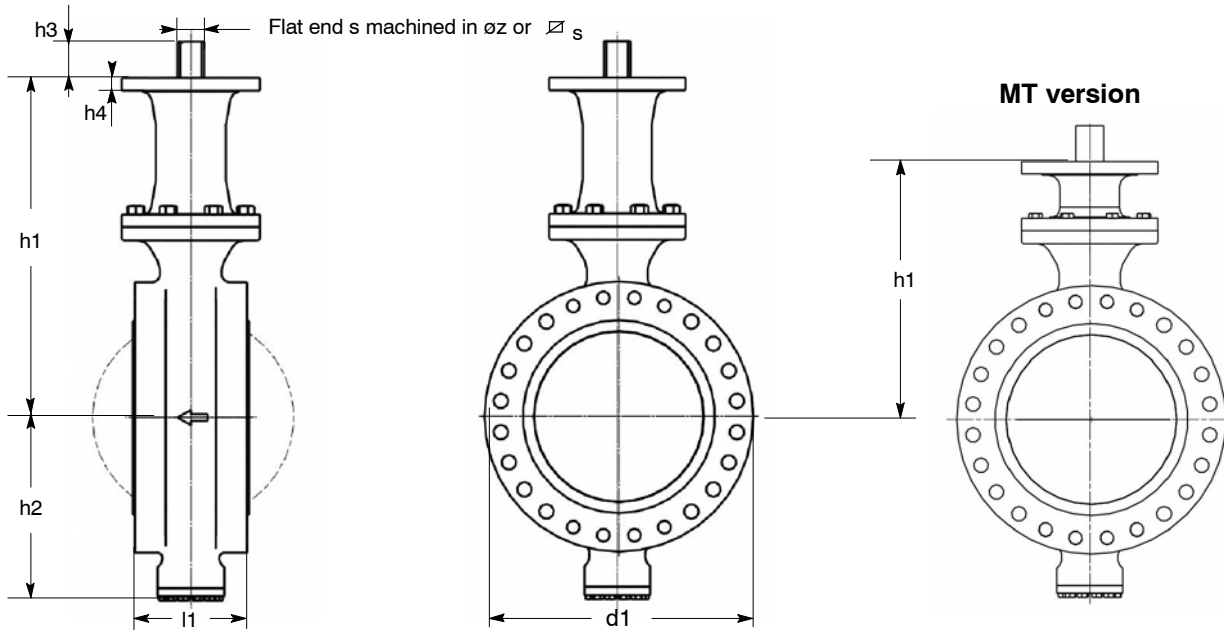
MT version



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DN*	NPS	d1	l1	MT		h2	Mounting plate ISO 5211		Flat shaft end			Square shaft end		Weight Kg	
				h1	TBT		n°	h4	s	øz	h3	∇ s	h3	MT	TBT
150	6	300	61	300	565	185	F10	15	22	28	40			21	40
200	8	365	75	345	635	210	F12	18				27	45	54	59
250	10	440	86	410	710	260	F14	23				36	55	75	95
300	12	505	95	480	785	290	F16	27				50	65	120	140
350	14	570	120	520	825	350		27							
400	16	650	135	600	900	385	F25	30				60	80	270	300
450	18	690	152	660	960	430		30							
500	20	745	162	725	1010	465	F30	34				70	105	439	493
600	24	885	184	810	1085	565		34							

* For other diameters, please, consult us.

Dimensions
Flanged type body - Type 7 Class 300
TBT version


mm

DN*	NPS	d1	l1	Mounting plate		h2	Flat shaft end end			Square shaft end		Weight Kg					
				MT	TBT		n°	h4	s	øz	h3	∇ s	h3	MT	TBT		
150	6	320	140	300	565	185	F10	15	22	28	40			50	56		
200	8	380	152	345	635	210	F12	18				27	45	92	102		
250	10	450	165	410	710	260	F14	23				36	55	120	140		
300	12	520	178	480	785	290	F16	27				50	65	180	205		
350	14	585	190	520	825	350		27							250	270	
400	16	660	216	600	900	385	F25	30				60	80	360	395		
450	18	710	222	660	960	430		30							420	455	
500	20	775	229	725	1000	465	F30	34				70	105	560	600		
600	24	915	267	810	1085	565		34							840	920	
ASME B16-47-A																	
700	28	1035	292	910	1150	650	F35	38				80	110	1250	1350		
750	30	1090	318	970	1210	680									1435	1520	
800	32	1150	318	1010	1250	735								90		1650	1800
900	36	1270	330	1130	1380	750	F40	45				110	130	2000	2200		
ASME B16-47-B																	
700	28	920	292	910	1150	650	F35	38				80	110	1000	1100		
750	30	990	318	970	1210	680										1200	1285
800	32	1055	318	1010	1250	735								90		1400	1500
900	36	1170	330	1130	1380	750	F40	45				110	130	1800	1900		

* For other diameters, please, consult us.

Connections

The valves can be fitted between flanges according to EN 1092-1 PN 40, ASME B16.5 Cl. 300, ASME B16-47-A and ASME B16-47-B standards (other connections on request).

Full-lug type body - Type 4 - Class 300

DN	NPS	EN 1092-1 PN 40	ASME B16.5 Cl. 300
150	6	✓	✓
200	8	✓	✓
250	10	✓	✓
300	12	✓	✓
350	14	✓	✓
400	16	✓	✓
450	18	✓	✓
500	20	✓	✓
600	24	✓	✓

Flanged type body - Type 7 - Class 300

DN	NPS	EN 1092-1 PN 40	ASME B16.5 Cl. 300	ASME B16-47-A	ASME B16-47-B
150	6	✓	✓		
200	8	✓	✓		
250	10	✓	✓		
300	12	✓	✓		
350	14	✓	✓		
400	16	✓	✓		
450	18	✓	✓		
500	20	✓	✓		
600	24	✓	✓		
700	28			✓	✓
750	30			✓	✓
800	32			✓	✓
900	36			✓	✓

Fitting allowed

Flange facing

	Raised face RF	Flat face FF
Smooth finish	Standard	On request
Stock finish	On request	On request

End of line and downstream dismantling

TRIODIS	Gases or liquids		Liquids*	
	hazardous **	non hazardous **	hazardous **	non hazardous **
class 300	Not permitted	Not permitted	Not permitted	Not permitted

* Liquids having a vapour pressure at the maximum allowable temperature of not more than 0,5 bar above atmospheric pressure (1013 mbar).

** Fluids hazardous and not hazardous according to PED.

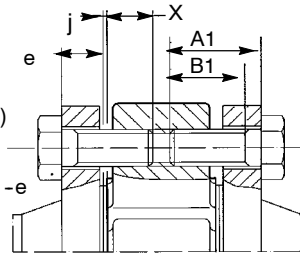
ΔPS Differential pressure

For special applications, please consult us.

Bolting for full-lug type body - Type 4

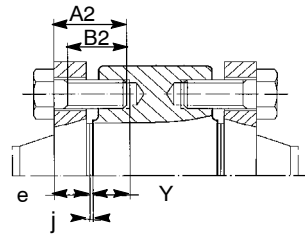
Screw length of the lugs
A1 max. = e + X + j

e : Flange thickness (customer specification)
 X : Max. implantation of the screw
 j : Thickness of the flange gasket
 B1 : Min. threaded length of the screw $B1 > A1 - e$



Screw length at shaft passages
A2 max. = e + Y + j

e : Flange thickness (customer specification)
 Y : Optimal implantation of the screw
 j : Thickness of the flange gasket
 B2 : Min. threaded length of the screw $B2 > A2 - e$



NB: We do not supply the bolting and flange gasket.

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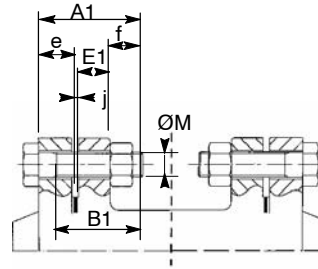
DN	NPS	EN 1092-1 PN 40					ASME B16-5 class 300				
		ØM	Screw A1		Screw A2		UN or UNC	Screw A1		Screw A2	
			X	Qty*	Y	Qty*		X	Qty*	Y	Qty*
150	6	M24	29	8			3/4"	29	12		
200	8	M27	35	12			7/8"	35	12		
250	10	M30	41	12			1"	40	12	20,5	4
300	12	M30	45	12	23	4	1 1/8"	45	12	23	4
350	14	M33	53	12	26,5	4	1 1/8"	50	16	20	4
400	16	M36	58	12	38,5	4	1 1/4"	52	16	29	4
450	18	M36	58	16	32	4	1 1/4"	54	20	27,5	4
500	20	M39	64	16	28,5	4	1 1/4"	58	20	26	4
600	24	M45	75	16	33,5	4	1 1/2"	65	20	30	4

* Quantity of screws by face

Bolting for flanged type body - Type 7

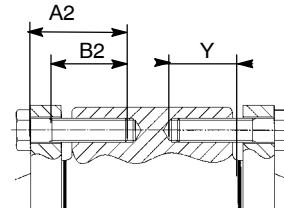
Screw length on flanges
A1 max. = e + j + E1 max. + f

E1 : Thickness of valve flange
e : Flange thickness (customer specification)
f : Overlength of the screw
j : Thickness of flange gasket
B1 : Min. threaded length of the screw $B1 > A1 - e$



Screw length at shaft passages
A2 max. = e + j + Y

e : Flange thickness (customer specification)
Y : Max. implantation of the screw
j : Thickness of flange gasket
B2 : Min. threaded length of the screw $B2 > A2 - e$



NB: We do not supply the bolting and flange gasket.

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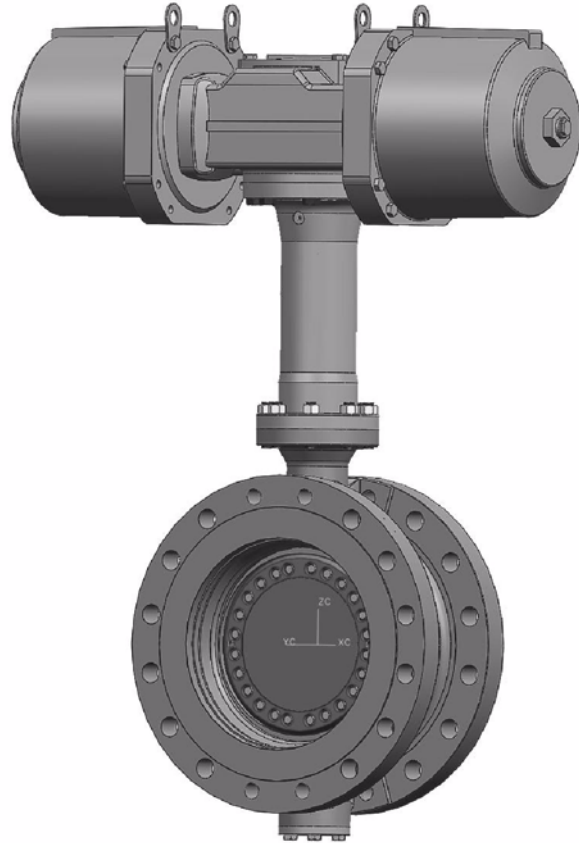
DN	NPS	E1	EN 1092-1 PN 40				ASME B16-5 class 300				ASME B16-47-A				ASME B16-47-B								
			ØM	Screw A1		Screw A2		UN or UNC	Screw A1		Screw A2		UN or UNC	Screw A1		Screw A2							
				f	Qty*	Y	Qty*		f	Qty*	Y	Qty*	UN or UNC	f	Qty*	Y	Qty*	UN or UNC	f	Qty*	Y	Qty*	
150	6	36	M24	26	4	30	4	3/4 ⁽¹⁾	22	8	30	4											
200	8	45,5	M27	28	8	35	4	7/8 ⁽¹⁾	25	8	35	4											
250	10	49	M30	31	8	40	4	1 ⁽¹⁾	28	12	40	4											
300	12	54,5	M30	31	12	45	4	1 1/8	32	12	45	4											
350	14	58,5	M33	34	12	45	4	1 1/8	32	16	45	4											
400	16	60,5	M36	39	12	50	4	1 1/4	34	16	50	4											
450	18	67	M36	39	16	52	4	1 1/4	34	20	52	4											
500	20	69	M39	41	16	55	4	1 1/4	34	20	52	4											
600	24	74	M45	45	16	65	4	1 1/2	41	20	65	4											
700	28	84,5											1 5/8	48	20	56	8						
700	28	90																1 1/4	34	28	56	8	
750	30	100											1 3/4	54	20	62	8	1 3/8	38	28	62	8	
800	32	97											1 7/8	55	20	60	8						
800	32	103																1 1/2	41	24	60	8	
900	36	103,5											2"	55	24	48,5	8	1 5/8	48	24	48,5	8	

* Quantity of screws by face

(1) Only UNC.

Standard variants

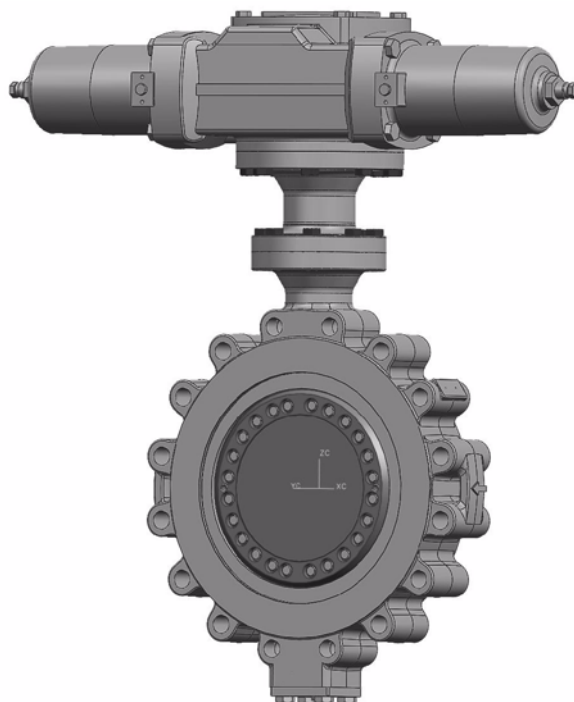
Pneumatic actuator ACTAIR / DYNACTAIR



Manual actuator MR



Hydraulic actuator ACTO / DYNACTO





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