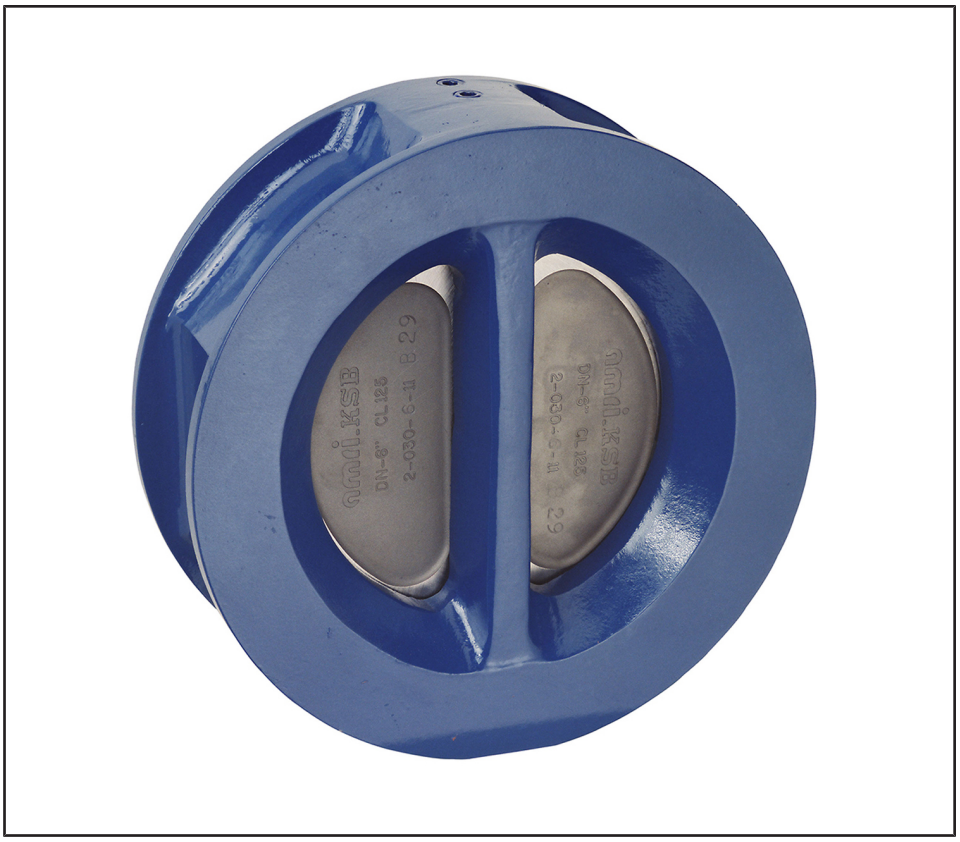
Dual-plate Check Valve

SERIE 2000

PN 16 / Class 150
DN 50-600 (2 - 24 in.)
Class 300
DN 50-300 (2-12 in.)

Type Series Booklet



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Type Series Booklet SERIE 2000

Contents

Check Valves and Strainers

Dual-plate Check Valve

SERIE 2000

Main applications

- Air-conditioning systems
- Water supply systems
- Process engineering
- Industrial recirculation systems
- General irrigation systems
- Water treatment
- Seawater desalination/reverse osmosis
- Chemical industry
- Paper industry / pulp industry
- Petrochemical industry
- Shipbuilding
- Sugar industry
- Hot-water heating systems

Fluids handled

- Hot water
- High-temperature hot water
- Service water
- Seawater
- Cooling water
- Drinking water
- Abrasive fluids
- Aggressive fluids
- Heat transfer fluids / Oils
- Fluids containing mineral oils
- Corrosive fluids
- Explosive fluids
- Flammable fluids
- Toxic fluids
- Volatile fluids
- Gas
- Steam

Operating data

Table 1: Characteristic

Parameter	Value
Nominal pressure	PN 16
Nominal size	DN 50 - 600
Max. permissible pressure [bar]	16
Max. permissible temperature [°C]	≤ +200
Min. permissible temperature [°C]	≥ -5

Parameter	Value	
Nominal pressure	Class 150	Class 300
Nominal size	DN 50 - 600	DN 50 - 300
Max. permissible pressure [bar]	20	50
Max. permissible temperature [°C]	≤ +538	≤ +538
Min. permissible temperature [°C]	≥ -196	≥ -196

Design details

Design

- Single-piece wafer-type body for long operating reliability and corrosion protection
- Dual-plate design
- Two types of seat/disc interface:
  - Metal/elastomer: SERIE 2000 PN 16 / Class 150 / Class 300
  - Metal/metal: SERIE 2000 Class 150 / Class 300
- Tight shut-off:
  - SERIE 2000 PN 16 / Class 150 / Class 300: metal/elastomer-seated to EN 12266-1 leakage rate A and ISO 5208 category A
  - SERIE 2000 Class 150 / Class 300: metal/metal-seated to API 598
- Face-to-face length to API 594 for version:
  - PN 16 (Class 125 except DN 65 to 300 (2½ to 12 inches)
  - Class 150
  - Class 300
- Installation between flanges to PN 10, 16, 25 and ASME B16.5 Class 150
- Marking in accordance with EN 19
- Exterior coating: Polyurethane, thickness 80 µm, RAL 5002 blue
- Exterior coating of stainless steel bodies: No coating required due to pickling and passivation

Variants

- On request:
  - SERIE 2000 Class 300: DN 350-600 (14 to 24 inches)
- Version to RCC-M and ASME for use in the nuclear sector

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Body materials

Table 2: Overview of available materials

Material	Equivalent DIN material:	Temperature limit
SERIE 2000 PN 16		
ASTM A126 Cl. B	EN-GJL-250	≤ 200 °C
SERIE 2000 Class 150 / Class 300		
ASTM A216 WCC	1.0619	≤ 427 °C
ASTM A351 CF8M	1.4408	≤ 538 °C

Product benefits

- Light-weight and compact
- Installation without additional piping support
- Easy to install without special tools
- Very long service life and excellent corrosion resistance
- Reduces friction and prevents damage to seat/disc interface

Product information

Product information as per Pressure Equipment Directive 2014/68/EU (PED)

The valves satisfy the safety requirements of Annex I of the European Pressure Equipment Directive 2014/68/EU (PED) for fluids in Groups 1 and 2.

Product information as per UK Pressure Equipment (Safety) Regulations 2016

The valves satisfy the safety requirements of the UK Pressure Equipment (Safety) Regulations 2016 (PER) for fluids in Groups 1 and 2.

Product information as per Regulation No. 1907/2006 (REACH)

For information as per European chemicals regulation (EC) No. 1907/2006 (REACH) see https://www.ksb.com/en-global/company/corporate-responsibility/reach.

Product information as per Directive 2014/34/EU (ATEX)

The valves do not have a potential internal source of ignition and can be used in potentially explosive atmospheres, Group II, category 2 (zones 1+21) to ATEX 2014/34/EU.

Certifications

Table 3: Overview

Label	Effective in:	Comment
BUREAU VERITAS	Worldwide	-
ACS	France	Approved in accordance with the French drinking water regulation

Related documents

Document	Reference No.
Operating manual	8000.86

Purchase order specifications

1. Type series
2. Nominal pressure
3. Nominal size
4. Fluid handled
5. Flow rate/velocity
6. Temperature
7. Materials required (body, valve disc, seat)
8. Mating dimensions
9. Reference number of type series booklet

Pressure/temperature ratings

Pressure/temperature ratings for PN 16

In pressure class PN 16, SERIE 2000 dual-plate check valves meet the requirements of the EN 12516-4 standard.

Table 4: Pressure/temperature ratings for PN 16

Material		Operating pressure in bar at a temperature in °C					
Body	**Seat**	**-5**	**50**	**100**	**120**	**150**	**200**
ASTM A126 Cl. B	Nitrile (K)	16	16	16	Not permitted		
	EPDM (X)	16	16	16	16	Not permitted	
	VITON (V)	16	16	16	16	14,3	12,7

Pressure/temperature ratings for Class 150

In pressure class "Class 150" (European materials), SERIE 2000 dual-plate check valves meet the requirements of the EN 12516-1 standard.
Dual-plate check valves subject to the PED 2014/68/EU requirements must comply with these values.

Table 5: Pressure/temperature ratings for Class 150 (European materials)

Material		Operating pressure in bar at a temperature in °C																	
Body	**Seat**	**-196**	**-40**	**-20**	**-10**	**-5**	**20**	**50**	**100**	**120**	**150**	**200**	**250**	**300**	**350**	**375**	**400**	**450**	**500**	**525**
1.0619	Metal/metal (M)	[1]			19,5	19,5	19,5	18,6	17,1	16,5	15,8	14,2	13,0	11,8	11,0	10,8	10,6	[1]		
	Nitrile (K)	[1]			19,5	19,5	19,5	18,6	17,1	[1]										
	EPDM (X)	[1]			19,5	19,5	19,5	18,6	17,1	16,5	[1]									
	VITON (V)	[1]				19,5	19,5	18,6	17,1	16,5	15,8	14,2	[1]							
1.4408	Metal/metal (M)	19,4	19,4	19,4	19,4	19,4	19,4	18,5	16,6	15,9	15,0	13,7	12,8	12,0	11,4	11,2	10,9	10,7	10,4	8,8
	Nitrile (K)	[1]		19,4	19,4	19,4	19,4	18,5	16,6	[1]										
	EPDM (X)	[1]	19,4	19,4	19,4	19,4	19,4	18,5	16,6	15,9	15,9	[1]								
	VITON (V)	[1]				19,4	19,4	18,5	16,6	15,9	15,9	15,0	13,7	[1]						

In pressure class "Class 150" (ASTM materials), SERIE 2000 dual-plate check valves meet the requirements of ASME B16.34 "Standard Class 150" as per the following table:

Table 6: Pressure/temperature ratings for Class 150 (ASTM materials)

Material		Operating pressure in bar at a temperature in °C																		
Body	**Seat**	**-196**	**-40**	**-29**	**-20**	**-5**	**38**	**100**	**120**	**149**	**204**	**260**	**316**	**343**	**371**	**399**	**427**	**454**	**482**	**538**
A 216 Gr. WCC	Metal/metal (M)	[1]		20,0	20,0	20,0	20,0	17,7	16,9	15,9	13,8	11,7	9,7	8,6	7,6	6,6	5,5	[1]		
	Nitrile (K)	[1]			20,0	20,0	20,0	17,7	[1]											
	EPDM (X)	[1]		20,0	20,0	20,0	20,0	17,7	16,9	[1]										
	VITON (V)	[1]				20,0	20,0	17,7	16,9	15,9	13,8	14,2	[1]							
A 351 Gr. CF8M	Metal/metal (M)	19,0	19,0	19,0	19,0	19,0	19,0	16,2	15,6	14,8	13,4	11,7	9,7	8,6	7,6	6,6	5,5	4,5	3,4	1,4
	Nitrile (K)	[1]			19,0	19,0	19,0	16,2	[1]											
	EPDM (X)	[1]	19,0	19,0	19,0	19,0	19,0	16,2	15,6	[1]										
	VITON (V)	[1]				19,0	19,0	16,2	15,6	14,8	13,4	[1]								

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[1] Not permitted

Pressure/temperature ratings for Class 300

In pressure class "Class 300" (European materials), SERIE 2000 dual-plate check valves meet the requirements of the EN 12516-1 standard.
Dual-plate check valves subject to the PED 2014/68/EU requirements must comply with these values.

Table 7: Pressure/temperature ratings for Class 300 (European materials)

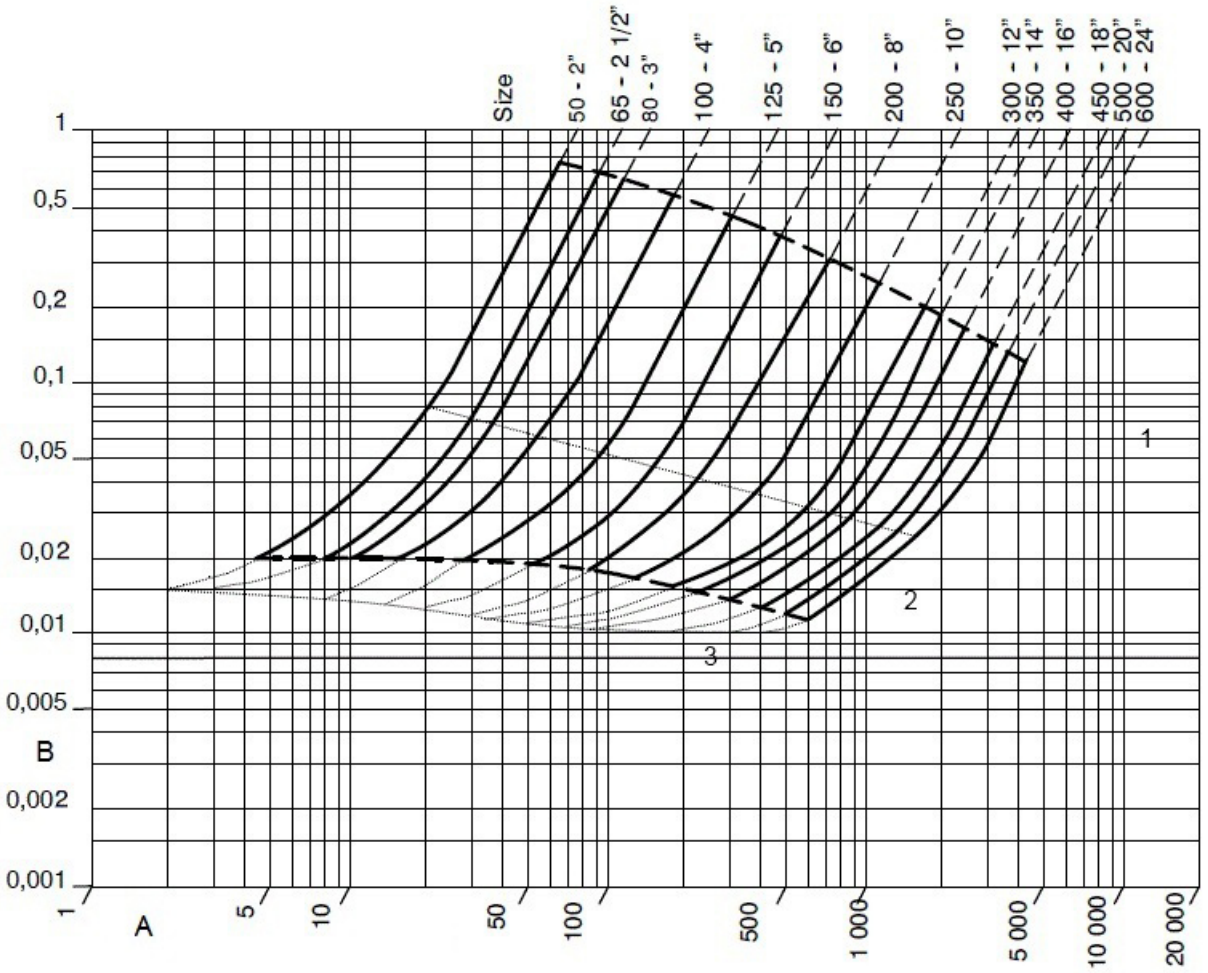
Material		Operating pressure in bar at a temperature in °C																		
Body	Seat	-196	-40	-20	-10	-5	20	50	100	120	150	200	250	300	350	375	400	450	500	525
1.0619	Metal/metal (M)				49,4	49,4	49,4	47,1	43,2	41,7	40,1	36,0	32,9	29,8	27,8	27,4	26,7			
	Nitrile (K)				49,4	49,4	49,4	47,1	43,2											
	EPDM (X)				49,4	49,4	49,4	47,1	43,2	41,7										
	VITON (V)					49,4	49,4	47,1	43,2	41,7	40,1	36,0								
1.4408	Metal/metal (M)	49,2	49,2	49,2	49,2	49,2	49,2	46,8	42,0	40,1	37,9	34,8	32,4	30,5	28,8	28,3	27,6	27,1	26,4	22,2
	Nitrile (K)			49,2	49,2	49,2	49,2	46,8	42,0											
	EPDM (X)		49,2	49,2	49,2	49,2	49,2	46,8	42,0	40,1										
	VITON (V)					49,2	49,2	46,8	42,0	40,1	37,9	34,8								

In pressure class "Class 300" (ASTM materials), SERIE 2000 dual-plate check valves meet the requirements of ASME B 16.34 "Standard Class 300" as per the following table:

Table 8: Pressure/temperature ratings for Class 300 (ASTM materials)

Material		Operating pressure in bar at a temperature in °C																		
Body	Seat	-196	-40	-29	-20	-5	38	100	120	149	204	260	316	343	371	399	427	454	482	538
A 216 Gr. WCC	Metal/metal (M)			51,7	51,7	51,7	51,7	51,5	51,0	50,3	48,6	45,9	41,7	40,7	39,3	34,8	28,3			
	Nitrile (K)				51,7	51,7	51,7	51,5												
	EPDM (X)			51,7	51,7	51,7	51,7	51,5	51,0											
	VITON (V)					51,7	51,7	51,5	51,0	50,3	48,6									
A 351 Gr. CF8M	Metal/metal (M)	49,6	49,6	49,6	49,6	49,6	49,6	42,7	40,8	38,6	35,5	33,1	31,0	30,7	29,6	29,3	29,0	29,0	28,6	24,1
	Nitrile (K)				49,6	49,6	49,6	42,7												
	EPDM (X)		49,6	49,6	49,6	49,6	49,6	42,7	40,8											
	VITON (V)					49,6	49,6	42,7	40,8	38,6	35,5									

Pressure losses as a function of flow rate



A: Flow rate in m^3/h
B: * Pressure loss in bar

1 : Valve fully open: stable
2 : Valve partially open: stable
3 : Valve partially open (operation at low velocity is possible, but pressure may fluctuate).

The continuous curves represent the flow rate range for optimum use of the dual-plate check valve.

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Materials

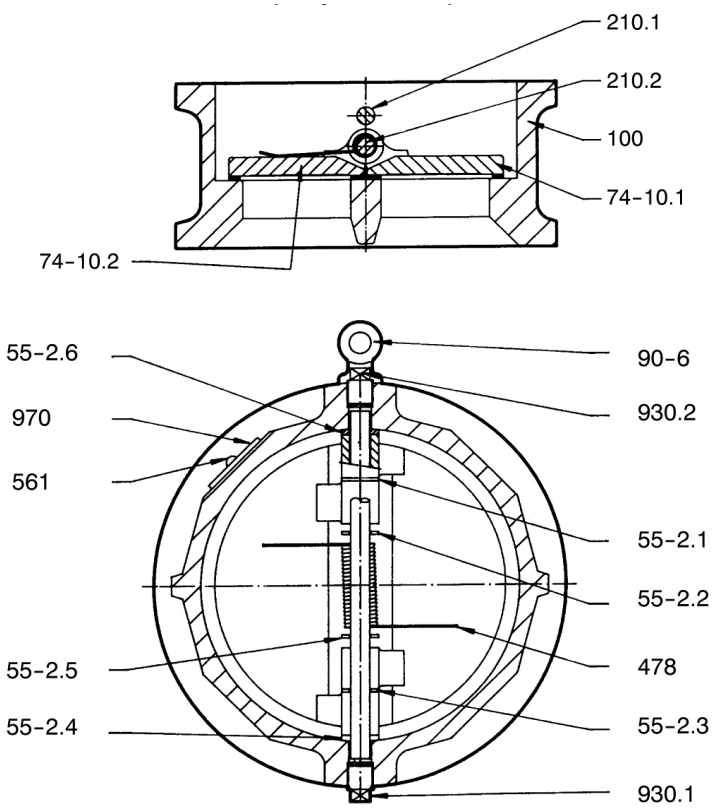

Fig. 1: Sectional drawings of SERIE 2000 PN 16 and Class 150: DN 50-350 and 450 / Class 300: DN 50-300 (single spring)

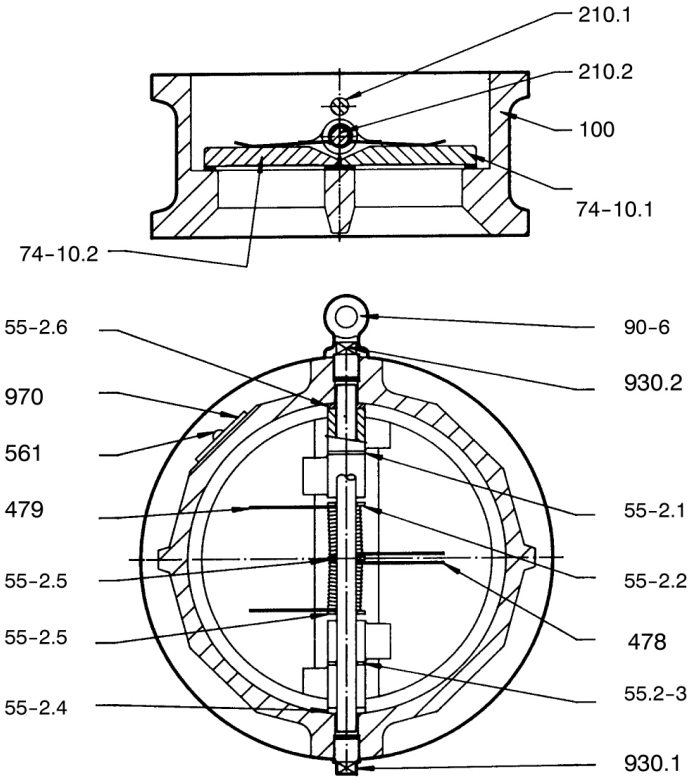

Fig. 2: Sectional drawings of SERIE 2000 PN 16 and Class 150: DN 400-600 (double spring)

Table 9: List of components in common

Part No.	Description	DN	Materials	KSB code
100	Body	50-600	Lamellar graphite cast iron ASTM A126 Cl. B	3t[2)]
100	Body	50-600	Nodular cast iron ASTM A395	3g
100	Body	50-600	Steel ASTM A 216 Gr. WCC/1.0619	1[3)4)]
100	Body	50-600	Stainless steel A 351 Gr. CF8M / 1.4408	6[3)4)]
210.1	Stop pin	50-600	Stainless steel 316	
210.2	Hinge pin	50-600	Stainless steel 316	
55-2.1	Anti-friction disc	50-600	Seats K, X, V: reinforced PTFE	
			Seat M: stainless steel 316L	
55-2.2	Anti-friction disc	50-600	Seats K, X, V: reinforced PTFE	
			Seat M: stainless steel 316L	
55-2.3	Anti-friction disc	50-600	Seat M: stainless steel 316L	
			Seats K, X, V: reinforced PTFE	
55-2.4	Anti-friction disc	50-600	Seat M: stainless steel 316L	
			Seats K, X, V: reinforced PTFE	
55-2.5	Anti-friction disc	50-600	Seat M: stainless steel 316L	
			Seats K, X, V: reinforced PTFE	
55-2.6	Anti-friction disc	50-600	Seat M: stainless steel 316L	
			Seats K, X, V: reinforced PTFE	
55-2.7	Anti-friction disc	400, 500 and 600	Seat M: stainless steel 316L	
			Seats K, X, V: reinforced PTFE	
561	Half round head grooved pin	50-600	Stainless steel	
74-10.1	Plate	50-600	Stainless steel ASTM A 351 Gr. CF8M[5)]	6
74-10.1	Plate	50-600	Nodular cast iron ASTM A395 (DN => 250)	3g
74-10.1	Plate	50-600	Steel ASTM A216 Gr. WCC / 1.0619 (DN=>350)[6)]	1
74-10.2	Plate	50-600	Stainless steel ASTM A 351 Gr. CF8M[5)]	6
74-10.2	Plate	50-600	Nodular cast iron ASTM A395 (DN => 250)	3g
74-10.2	Plate	50-600	Steel ASTM A216 Gr. WCC / 1.0619 (DN=>350)[6)]	1
90-6	Eyebolt	200-600	Carbon steel	
930.1	Pin retainer (stop pin)	50-450	Carbon steel	
		500 and 600	Stainless steel	
930.2	Pin retainer (hinge pin)	50-450	Carbon steel	
		500 and 600	Stainless steel	
970	Name plate	50-600	Stainless steel	

2 For SERIE 2000 PN 16

3 For SERIE 2000 Class 150

4 For SERIE 2000 Class 300

5 Can be used for bodies made of steel ASTM A 216 Gr. WCC / 1.0619 or stainless steel A 351 Gr. CF8M / 1.4408 for SERIE 2000 Class 150

6 Can be used for bodies made of steel ASTM A 216 Gr. WCC / 1.0619 for SERIE 2000 Class 150

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Table 10: List of components for SERIE 2000 PN 16 / Class 150 with seat made of Nitrile HT (KSB code: K) or EPDM (KSB code: X)

Part No.	Description	DN	Materials	KSB code
478	Spring (right-hand)	50-600	Stainless steel 316	
479	Spring (left-hand)	400, 500 and 600	Stainless steel 316	

Table 11: List of components for SERIE 2000 Class 300 with seat made of Nitrile HT (KSB code: K) or EPDM (KSB code: X) or HYPALON (KSB code: Y)

Part No.	Description	DN	Materials	KSB code
478	Spring (right-hand)	50-300	Stainless steel 316	

Table 12: List of components for SERIE 2000 PN 16 with seat made of VITON (KSB code: V)

Part No.	Description	DN	Materials	KSB code
478	Spring (right-hand)	50-600	Inconel 600	
479	Spring (left-hand)	400, 500 and 600	Inconel 600	

Table 13: List of components for SERIE 2000 Class 150 / Class 300 with seat made of VITON (KSB code: V) or metal-seated (KSB code: M)

Part No.	Description	DN	Materials	KSB code
478	Spring (right-hand)	50-600	Inconel 600	
479	Spring (left-hand)	400, 500 and 600	Inconel 600	

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Dimensions

Sectional drawing PN 16 / Class 150 / Class 300

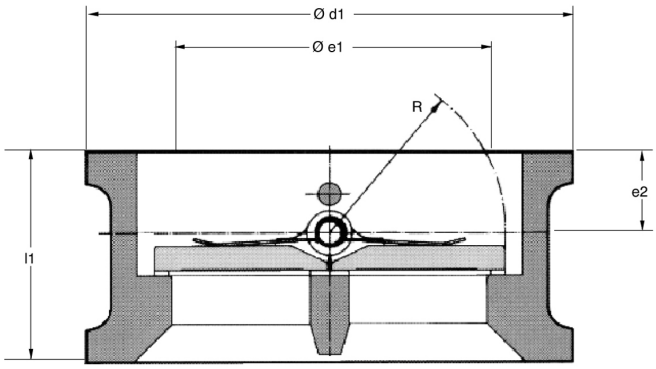

Fig. 3: Sectional drawing for PN 16 / Class 150 / Class 300

Dimensions/weights, PN 16

Table 14: Dimensions [mm]

DN	NPS	PN	Dimensions		Plate		
	[inch]		Ø d1	l1	e1	e2	R
50	2	10/16	110	54	35	25,8	30
65	2½	10/16	130	54	57	26,0	36
80	3	10/16	145	57	75	25,6	42
100	4	10/16	165	64	99	29,6	54
125	5	10/16	195	70	123	30,8	65
150	6	10/16	221	76	155	28,8	79
200	8	10/16	276	95	198	40,0	103
250	10	10	329	108	248	39,9	127
300	12	10	381	143	291	56,8	153
350	14	10	440	184	302	93,9	175
400	16	10	491	191	366	89,9	200
450	18	10	541	203	422	86,1	224
500	20	10	596	213	471	94,3	250
600	24	10	698	222	577	87,5	298
250	10	16	331	108	248	39,9	127
300	12	16	386	143	291	56,8	153
350	14	16	446	184	302	93,9	175
400	16	16	498	191	366	89,9	200
450	18	16	558	203	422	86,1	224
500	20	16	620	213	471	94,3	250
600	24	16	737	222	577	87,5	298

Dimensions, Class 150

Table 15: Dimensions [mm]

DN	NPS	PN	Dimensions		Plate		
			Ø d1	l1	e1	e2	R
50	2	25	104,6	60	-	33,6	30
65	2½	25	123,7	67	36	32,6	36
80	3	25	136,4	73	50	36,3	42
100	4	25	174,5	73	84	38,6	54
125	5	25	194	86	107	42,7	65
150	6	25	220	98	142	44,6	81
200	8	25	275	127	191	48,3	104
250	10	25	330	146	238	56,0	128
300	12	25	409,5	181	280	70,4	154

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DN	NPS	PN	Dimensions		Plate		
			Ø d1	l1	e1	e2	R
350	14	25	450,8	184	307	91,0	175
400	16	25	514,4	191	379	77,1	201
450	18	25	549,3	203	431	76,5	225
500	20	25	606,4	219	482	81,5	251
600	24	25	717,5	222	585	76,4	299

Dimensions, Class 300

Table 16: Dimensions [mm]

DN	NPS	PN	Dimensions		Plate		
			Ø d1	l1	e1	e2	R
50	2	50	111,0	60	-	33,6	30
65	2½	50	129,2	67	36	32,6	36
80	3	50	148,3	73	50	36,3	42
100	4	50	180,0	73	84	38,6	54
125	5	50	215,0	86	107	42,7	65
150	6	50	249,9	98	142	44,6	81
200	8	50	306,2	127	191	48,3	104
250	10	50	360,4	146	238	56,0	128
300	12	50	420,8	181	280	70,4	154

Installation information

Connections and weights

Connections and weights, PN 16

Table 17: Connections and weights, PN 16

DN	NPS	Connection						Weight[7)] [kg]
		PN 10		PN 16		Class 125		
		Ø d1	l1	Ø d1	l1	Ø d1	l1	
50	2	110	54	110	54	104,9	54	1,5
65	2½	130	54	130	54	123,9	54	2,8
80	3	145	57	145	57	136,6	57	3,6
100	4	165	64	165	64	174,7	64	4,5
125	5	195	70	195	70	196,8	70	6,5
150	6	221	76	221	76	222,2	76	9
200	8	276	95	276	95	279,4	95	16
250	10	329	108	331	108	339,5	108	27
300	12	381	143	386	143	409,4	143	42
350	14	440	184	446	184	450,8	184	77
400	16	491	191	498	191	514,3	191	107
450	18	541	203	558	203	536,7	203	134
500	20	596	213	620	213	606,5	213	170
600	24	698	222	737	222	717,5	222	254

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7 Mean weight of dual-plate check valves with mating dimensions in compliance with pressure class

Connections and weights, Class 150

Table 18: Connections and weights, Class 150

DN	NPS	Connection										Weight [kg]
		PN 10		PN 16		PN 20		PN 25		Class 150		
		Ø d1	l1	Ø d1	l1	Ø d1	l1	Ø d1	l1	Ø d1	l1	
50	2	104,6	60	104,6	60	104,6	60	104,6	60	104,6	60	2,5
65	2½	123,7	67	123,7	67	123,7	67	123,7	67	123,7	67	3
80	3	136,4	73	136,4	73	136,4	73	136,4	73	136,4	73	3,4
100	4	164	73	164	73	174,5	73	170	73	174,5	73	6,5
125	5	194	86	194	86	194	86	194	86	194	86	11
150	6	220	98	220	98	220	98	226	98	220	98	14,5
200	8	275	127	275	127	275	127	286	127	275	127	28
250	10	330	146	330	146	330	146	343	146	330	146	43
300	12	380	181	380	181	407,8	181	403	181	409,5	181	74
350	14	440	184	446	184	449,2	184	460	184	450,8	184	85
400	16	491	191	498	191	512,8	191	517	191	514,4	191	109
450	18	541	203	558	203	547,8	203	567	203	549,3	203	125
500	20	596	219	620	219	605	219	627	219	606,4	219	171
600	24	698	222	737	222	716,3	222	734	222	717,5	222	245

Connections and weights, Class 300

Table 19: Connections and weights, Class 300

DN	NPS	Connection								Weight [kg]
		PN 25		PN 40		PN 50		Class 150		
		Ø d1	l1	Ø d1	l1	Ø d1	l1	Ø d1	l1	
50	2	109	60	109	60	111	60	111,1	60	3,1
65	2½	129	67	129	67	129,2	67	130,3	67	4
80	3	144	73	144	73	148,3	73	149	73	4,6
100	4	170	73	170	73	180	73	181	73	8
125	5	196	86	196	86	215	86	215,9	86	14
150	6	226	98	226	98	249,9	98	250,6	98	16
200	8	286	127	293	127	306,2	127	307,9	127	32,5
250	10	343	146	355	146	360,4	146	361,9	146	54
300	12	403	181	420	181	420,8	181	422,2	181	86,5

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Installation

SERIE 2000 dual-plate check valves are designed for quick and straightforward installation between standard flanges:

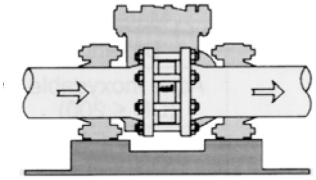
- Low weight and compact design
- Installation without additional piping support
- Can be installed in horizontal or vertical pipes
- Easy to install without special tools
- No maintenance required

Design of SERIE 2000 PN 16 dual-plate check valve:

- Standard: flat-face flanges (FF), flange faces machined to “smooth finish” Ra 3.2 to 6.3 (KSB code 1A)
- Optional: flat-face flanges (FF), flange faces machined to “stock finish” Ra 6.3 to 12.5 (KSB code 1B)
- On request: raised-face flanges (RF)

Design of SERIE 2000 Class 150 / Class 300 dual-plate check valve:

- Standard: flat-face flanges (FF), flange faces machined to “stock finish” Ra 6.3 to 12.5 (KSB code 1B)
- Optional: flat-face flanges (FF), flange faces machined to “smooth finish” Ra 3.2 to 6.3 (KSB code 1A)
- On request: raised-face flanges (RF)

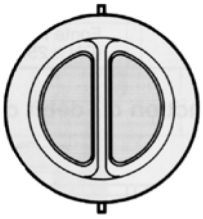


Dead-end service or downstream dismantling

Dual-plate check valves must not be used for downstream dismantling or dead-end service.

Optimum installation (horizontal pipe)

In a horizontal pipe, the dual-plate check valve must be installed with the hinge pin in a vertical position.



CORRECT

INCORRECT

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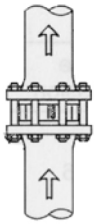
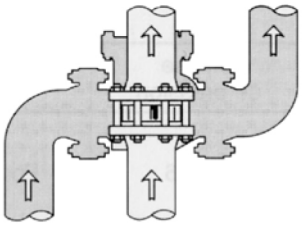
Installation in vertical pipe

When installed in a vertical pipe, the dual-plate check valve will only function reliably if fluid flow is upwards. (Please contact the manufacturer if the flow direction is reversed, i.e. downwards).





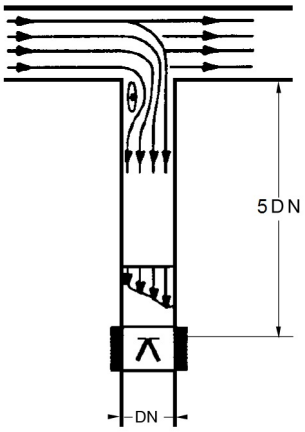
System configuration

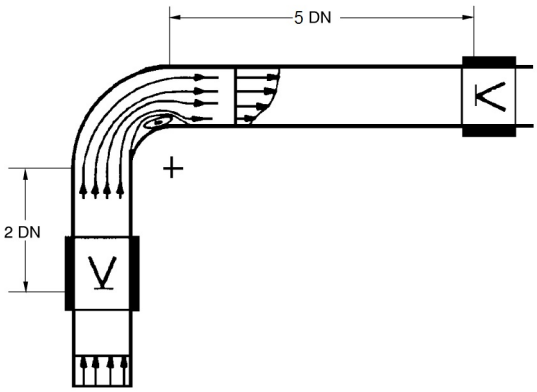
Depending on the system configuration, minimum distances must be observed between the dual-plate check valve and elbows or piping tees.

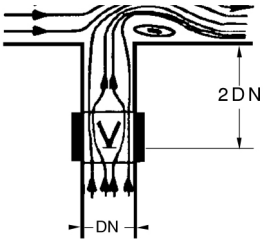
The drawings below show a horizontal pipe (viewed from above) in which the dual-plate check valve is installed with the hinge pin in a vertical position.

The minimum distance for a dual-plate check valve installed downstream of a turbulence-causing element (elbow, pump, valve, etc.) is 5 DN.

If a turbulence-causing element is installed downstream of the dual-plate check valve, any special instructions regarding the respective element or a minimum distance of 2 DN must be observed.







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KSB S.A.S.
4, allée des Barbanniers • 92635 Gennevilliers Cedex (France)
Tél. 09 69 39 29 79
www.ksb.com/fr-fr