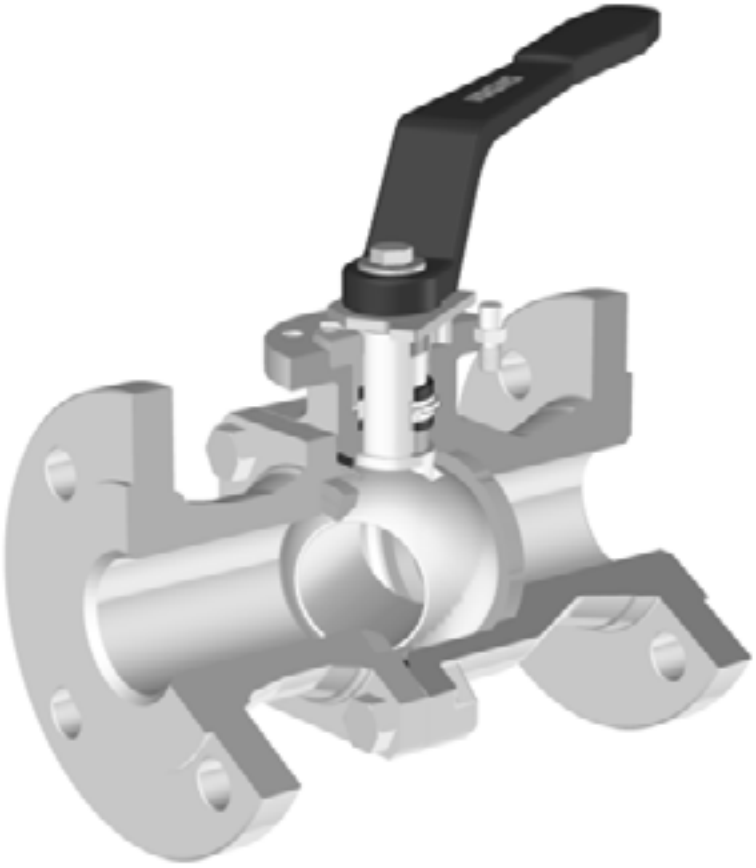
FLOWSERVE

TECHNICAL BULLETIN

Argus

FK 79

FCD ARENTB0002



Experience in Motion

Ball valve FK 79 :

Designed to meet API-6D / ASME B16.34 / PED 97/23/EC requirements, the FK79 ball valve represents the highest standards in valve technology. Its superfine finished seat supported ball is just one of many innovative design features.

Sizes:

ASME Pressure Classes:	DN ½“ – DN 2“	Class 150 - 2500
	DN 3“ – DN 4“	Class 150 - 300
DIN Pressure Classes:	DN 15 – DN 50	PN 16 – 250
	DN 80 – DN 100	PN 16 - 40

Technical Design Features:

Design to API 6D /ASME B16.34 / PED 97/23/EC.

Materials: ASME Section II; Pressure / Temperature rating : ASME B16.34; Wall thickness : ASME B16.34; face to face dimensions : ASME B16.10, Flange connection ASME B16.5

DIN Design and materials according to PED 97/23/EC.

Split body, floating ball design, full bore, ends ASME B16.5 or EN or EN 1092-1.

- Fire-safe according to BS 6755 Part 2, ISO 10497 or API 607 6th ed.
- Anti-blow out stem, long life double stem seal system and stem supported in bearings to ensure seals are free form operation loads
- Stem sealing system according to TA-Luft VDI 2440, EPA or EN ISO 15848-1:2006
- Face to face dimensions according to EN 558-1, EN 12980 or ASME B16.10
- Anti-static Design according to DIN EN ISO 17292, chapter 5.2.7
- Ball valve certification for “Exida“ for Functional safety according to IEC 61598 SIL 3

Materials:

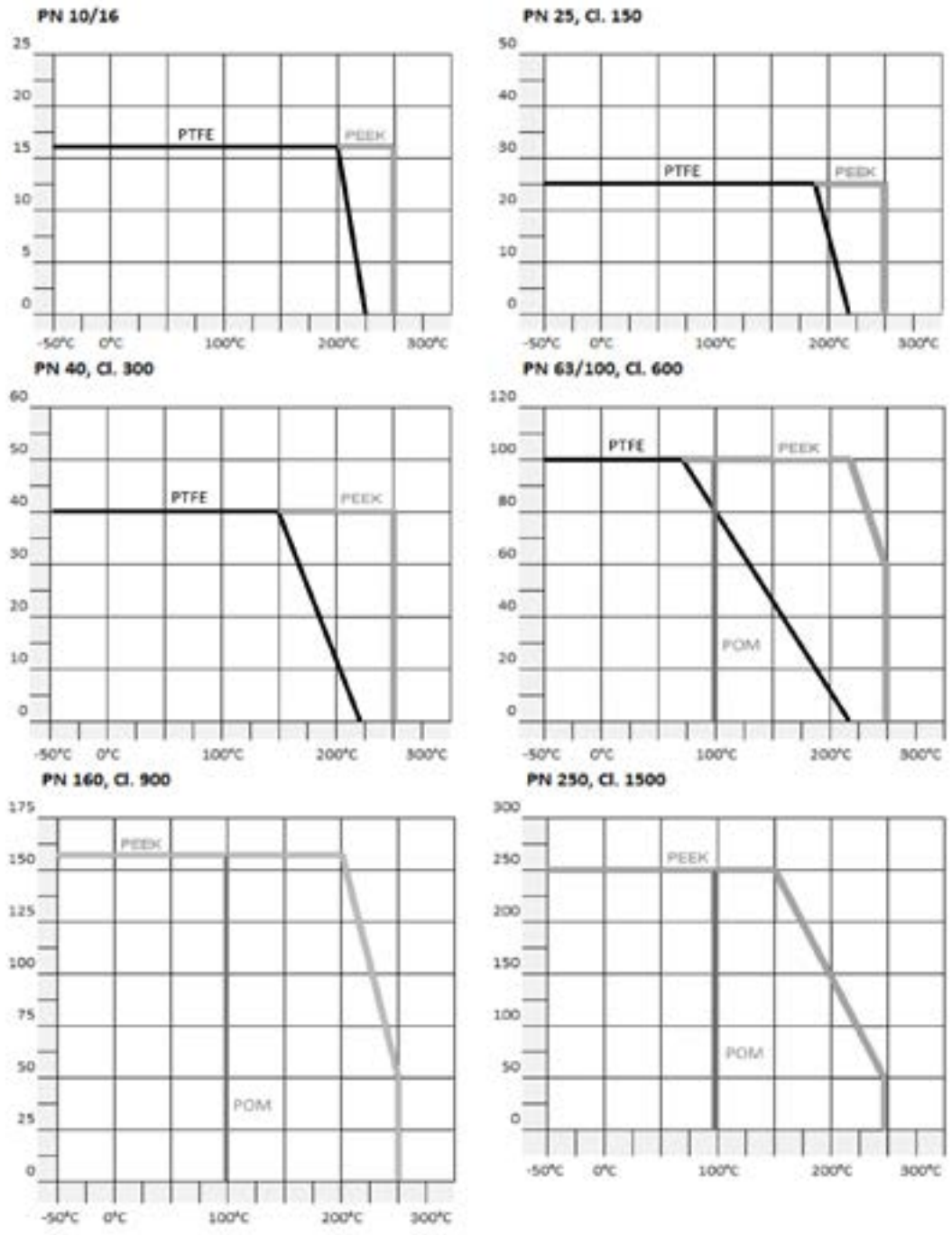
Description	ED Material Code	Material DIN EN	Equivalent ASTM Material
Body/flanges	GP240GH+N	CS Casting DIN EN 1.0619	A216WCB
	G20Mn5	LCS Casting DIN EN 1.6220	A352LCB
	P355NL1+N	LCS TSTE 355N DIN EN 1.0566	A350LF2
	X6CrNiMoTi17-12-2	SS DIN EN 1.4571	A182 Gr. F 316
	GX5CrNiMo19-11-2	SS DIN EN 1.4408	A351 Gr.CF8M
Ball	X2CrNiMoN22-5-3	Duplex DIN EN 1.4462	A182 F51
	NiCu30FE	Monel	
	X2CrNiMoN22-5-3 CRABIDE	Duplex DIN EN 1.4462/1.4470 CRABIDE	A182 F51 CRABIDE
	X2CrNiMoN22-5-3 ARGULOY	Duplex DIN EN 1.4462/1.4470 ARGULOY	A182 F51 ARGULOY
	X6CrNiMoTi17-12-2 CRABIDE	SS DIN EN 1.4571 CRABIDE	A351 Gr.CF8M CRABIDE
	X6CrNiMoTi17-12-2 ARGULOY	SS DIN EN 1.4571 ARGULOY	A351 Gr.CF8M ARGULOY
Stem	X2CrNiMoN22-5-3	Duplex DIN EN 1.4462	A182 F51
	X5CrNiCuNB16-4	17-4 PH	17-4PH
	X2CrNiNMMoNNb21653	Nitronic	Nitronic 50
Stem seals		PTFE; Graphite	
Ball seats		PTFE, POM, LYTON	
		PTFE/ss, POM/ss; LYTON; spring loaded seats, cavity relief	
	X2CrNiMoN22-5-3 CRABIDE	Duplex DIN EN 1.4462 CRABIDE	A182 F51 CRABIDE
	X2CrNiMoN22-5-3 ARGULOY	Duplex DIN EN 1.4462 ARGULOY	A182 F51 ARGULOY
Body seals		PTFE ; Graphite	
Bolts		A193 B7; A4-70	
Nuts		A194 Gr.4, A194 8M, A4-70	

Soft Seat Materials:

PTFE: Polytetrafluorethene; very high chemical resistance, minimized coefficient of friction

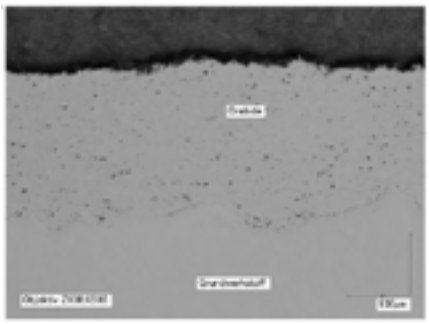
POM: Polyoxymethylene; high solidity, hardness and rigidity values by high abrasion resistance and low coefficient of friction

LYTON (PEEK) Polyetheretherketone; high chemical resistance, higher temperature rating; high solidity in combination with high abrasion resistance



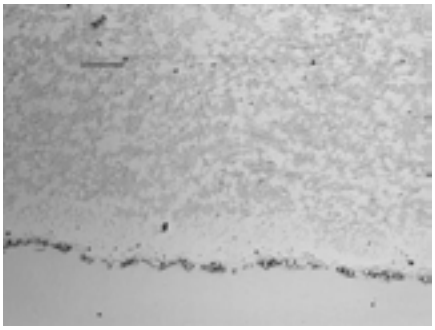
Metal Coatings:

CRABIDE: CRABIDE is a hard metal alloy based on Chromium-carbide and Nickel/Chromium



Composition:	Cr_2C_2/Ni-Cr 75/25
Hardness:	900 – 1100 $HV_{0.3}$ (>67 HRC)
Temperature limit:	max. 970° (depending from base material and process conditions)
Thickness:	200 – 300 µm (usual)
Chemical properties:	Resistance versus media in the range of pH 5 and pH 12, as well under high temperature conditions
Mechanical properties:	High resistance especially against abrasion and adhesive wear and sliding abrasion.

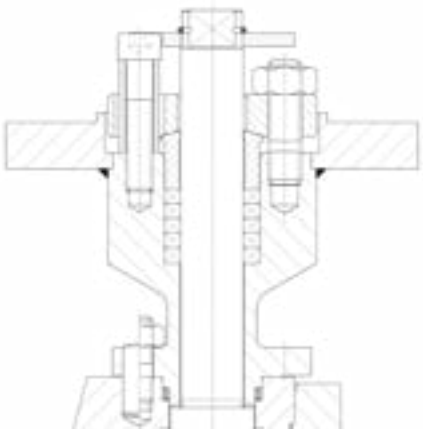
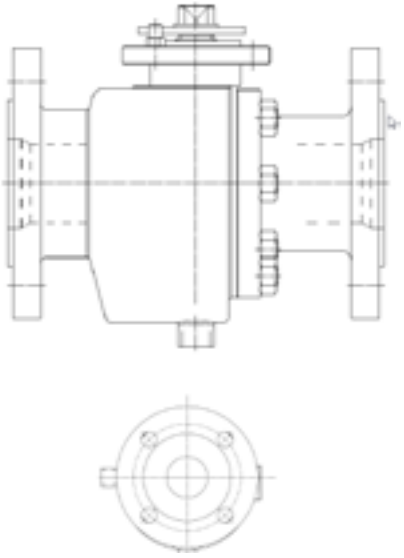
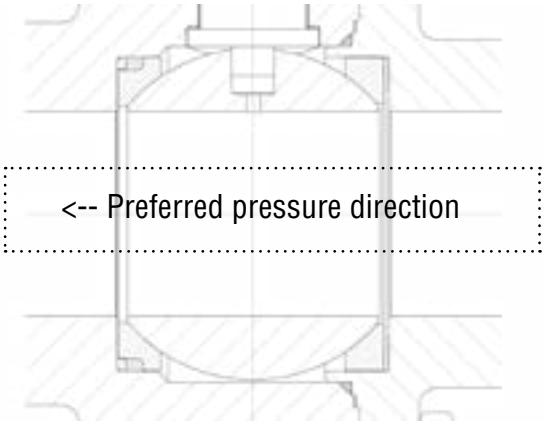
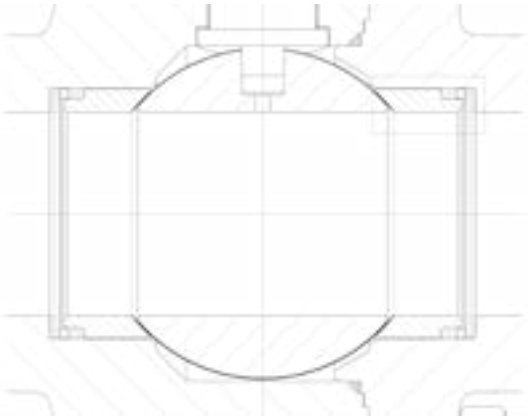
ARGULOY: ARGULOY is a Nickel based-based hard alloy. It is applied by flame-spraying and a special heat treatment after application ensures intimate bonding to the base material. The applied layers are homogenous, crack free, and resistant to corrosion and wear.



Composition:	Ni >70 %, Cr, B, Si
Hardness:	58 – 62 HRC
Temperature limit:	max. 750° (depending from base material and process conditions)
Thickness:	500 - 800 µm (usual)
Chemical properties:	High corrosion resistance against liquid and gaseous media; chemical base and halogen acids, as well as under high temperature conditions.
Mechanical properties:	High resistance especially against abrasion and adhesive wear and sliding abrasion. The diffusion zone between coating and base material after sintering is about 50µm. That's why the coating is preserved in case of wear.

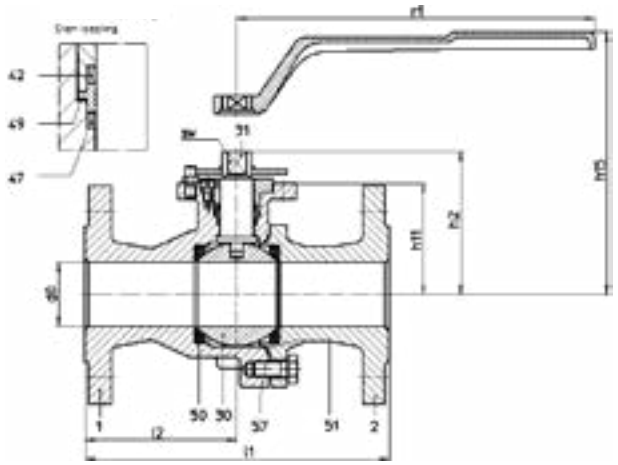
Note: Additional metal coating systems on request

Design options:

High temperature stuffing box with DIN ISO Top plate (Standard design to comply TA-Luft, EPA / ISO 15848)	**Single side heating jacket valve type, pipe connections** (Defined standard; alternative connections or double seated design on request)
	
Metal sealing system Type "M" Uni-directional sealing; single spring loaded seat (Defined standard for Cl. 150-300 / PN 16-40; for alternative pressure classes on request)	**Metal sealing system Type "N"** Bi-directional sealing, double spring loaded seats (Defined standard for Cl.600 / PN 63-100; for alternative pressure classes on request)
	

Sectional drawing serial FK 79

(Standard design: soft seated, compact seats, TA-Luft stem sealing system)



Dimensions:

A: FK 79 DIN PN 40 Investment casting

DN*	PN	l 1* EN 558-1 Gr. 27	l 2* EN 558-1 Gr. 27	l 1* EN 558-1 Gr. 28	l 2* EN 558-1 Gr. 28	h2*	h11*	h15*	r1*	d0*	SW*2-FL	Topwork DIN/ISO 5211
15	40	115	51,5	130	56	65,5	45	117	220	15	14	F05
20	40	120	54,5	150	70	66,5	46	118	220	20	14	F05
25	40	125	57	160	80	67,5	47	119	220	25	14	F05
32	40	130	58	180	90	79	58,5	131	220	30	14	F05
40	40	140	53	200	100	101	76,5	150	270	38	17	F07
50	40	150	58	230	115	108,5	84	157,5	270	48	17	F07
80	40	180	78	310	75	153	126	182	327,5	76	19	F10
100	40	190	94	350	94	169	142	198	327,5	100	19	F10
80	16	180	75	310	75	153	126	182	327,5	76	19	F10
100	16	190	91	350	91	169	142	198	327,5	100	19	F10

Note: * in mm

B: FK 79 DIN PN 63/100 Forged Design

DN	PN	l 1* EN 558-1 Gr. 28	l 2*	h2*	h15*	r1*	d0*	SW 2-FL	Topwork DIN/ISO 5211
15	63/100	130	65	47,5	120	173	15		F05
20	63/100	150	75	54,5	126	173	20		F05
25	63/100	160	80	57	128,5	173	25		F05
40	63/100	200	100	82	152,5	220	38		F07
50	63/100	230	115	89,5	160	220	48		F07

Note: * in mm

C: FK 79 ASME Class 150 Investment casting

Inch	Flange	l1*	l2*	h2*	h11*	h15*	r1*	d0	Topwork DIN/ISO 5211
½	RF	108	49	65	45	117	220	15	F05
¾	RF	117,5	54,5	66	46	118	220	20	F05
1	RF	127	57	67	47	119	220	25	F05
11/2	RF	165,1	75	101	76,5	150	270	38	F07
2	RF	177,8	85	108,5	84	157,5	270	48	F07

Note: * in mm

D : FK 79 ASME Class 300 Investment casting

Inch	Flange	l1*	l2*	h2*	h11*	h15*	r1*	d0*	Topwork DIN/ISO 5211
½	RF	139,7	58	65	45	117	220	15	F05
¾	RF	152,4	66	66	46	118	220	20	F05
1	RF	165,1	75	67	47	119	220	25	F05
11/2	RF	190,5	85	101	76,5	150	270	38	F07
2	RF	215,9	105	108,5	84	157,5	270	48	F07

Note: * in mm

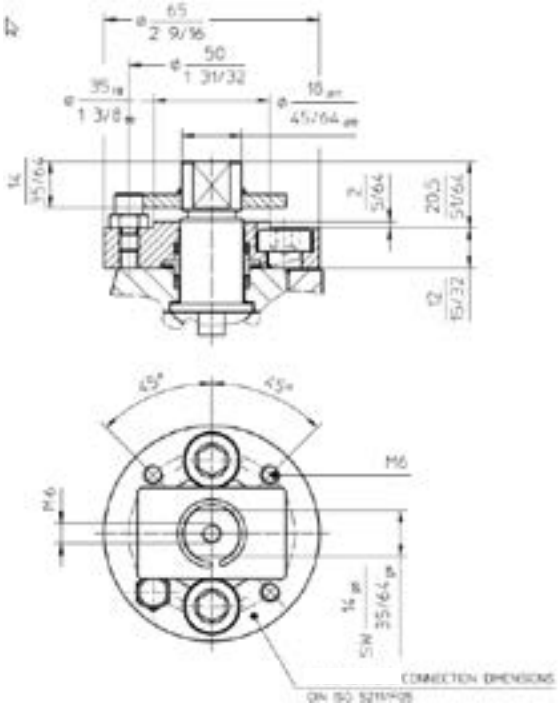
E: FK 79 ASME Class 600 Forged design

Inch	Flange	l1*	l2*	h2*	h15*	r1*	d0	Topwork DIN/ISO 5211
½	RF	165,1	74	47,5	120,5	155	15	F05
¾	RF	190,5	95,5	58,5	130	173	20	F05
1	RF	216,9	108	61	132,5	173	25	F05
11/2	RF	241,3	120,5	94	164,5	220	38	F07
2	RF	292,1	146	101,5	172	220	48	F07

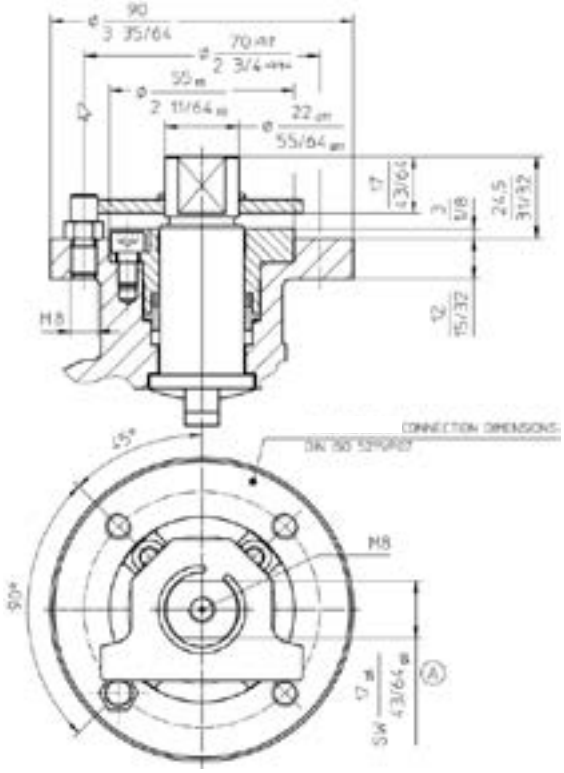
Note: * in mm

Standard topwork drawings:

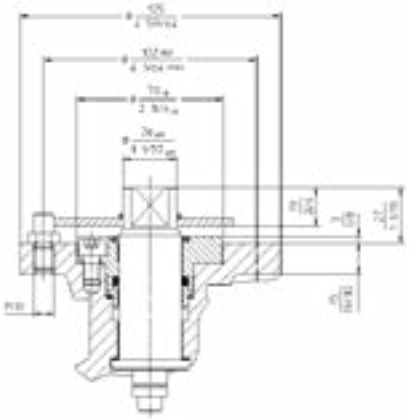
FK 79 Serial index AE DN 15 + 20; Serial index AB DN 25 + 32

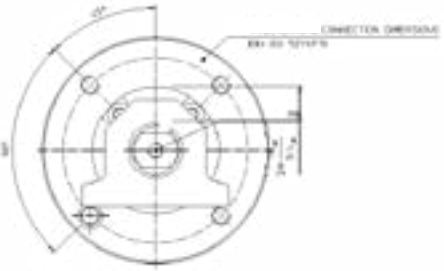


FK 79 Serial index AB DN 40 + 50

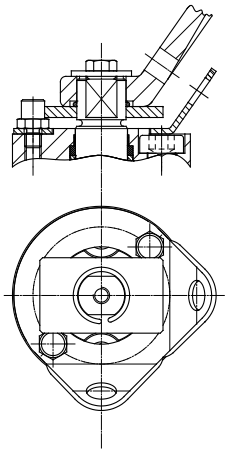
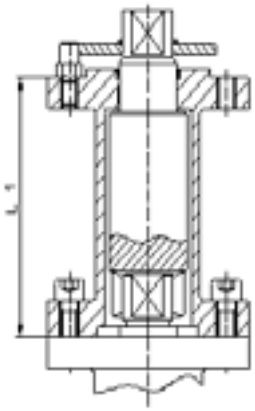
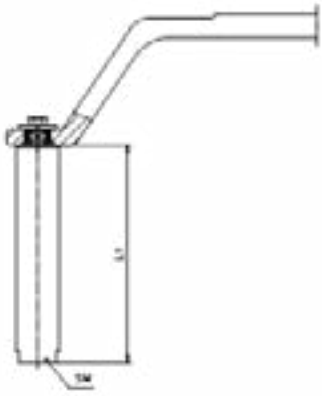


FK 79 Serial index AB DN 80 + 100





Accessories :

Locking device (defined standard)	**DIN ISO Stem extension** (defined standard: DN 15-50 L=100mm; DN 80-100 L=150mm)	**Lever extension** (defined standard : L =100mm)
		

Flowserve Flow Control GmbH
Rudolf-Plank-Straße 2
D-76275 Ettlingen
Germany,
T: +49 7243 103-0
F: +49 7243 103-222

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To find your local Flowserve representative
or for more information about Flowserve Corporation,
visit www.flowserve.com or call USA 1 800 225 6989

FLOWSERVE

TECHNICAL BULLETIN

Argus

FK 76M

FCD ARENTB0001

Experience in Motion

Ball Valve FK 76M:

Designed to meet API-6D / ASME B16.34 / PED 97/23/EC requirements, the FK76M ball valve represents the highest standards in valve technology. Innovative design features include a superfine finished trunnion mounted ball, low operating torques and an extended service life.

Sizes:

ASME Pressure Classes:	DN 2 ½“ – DN 36“	Class 150 - 900
DIN Pressure Classes:	DN 65 – DN 900	PN 16 – 160

Technical Design Features:

Design to API 6D /ASME B16.34 / PED 97/23/EC.

Materials: ASME Section II; Pressure / Temperature rating: ASME B16.34; Wall thickness: ASME B16.34; face to face dimension: ASME B16.10, Flange connection ASME B16.5

DIN Design and materials according to PED 97/23/EC.

Split body / 3-piece design, trunnion mounted design, full bore, ends ASME B16.5 or EN or EN 1092-1.

- Fire-safe according to BS 6755 Part 2, ISO 10497 or API 607 6th ed.
- Anti-blow out stem, long life double stem seal system and stem supported in bearings to ensure seals are free form operation loads
- Stem sealing system according to TA-Luft VDI 2440, EPA or EN ISO 15848-1:2006
- Face to face dimensions according to EN 558-1, EN 12980 or ASME B16.10
- Anti-static Design according to DIN EN ISO 17292, chapter 5.2.7
- Ball valve certification for “Exida” for Functional safety according to IEC 61598 SIL 3

Materials:

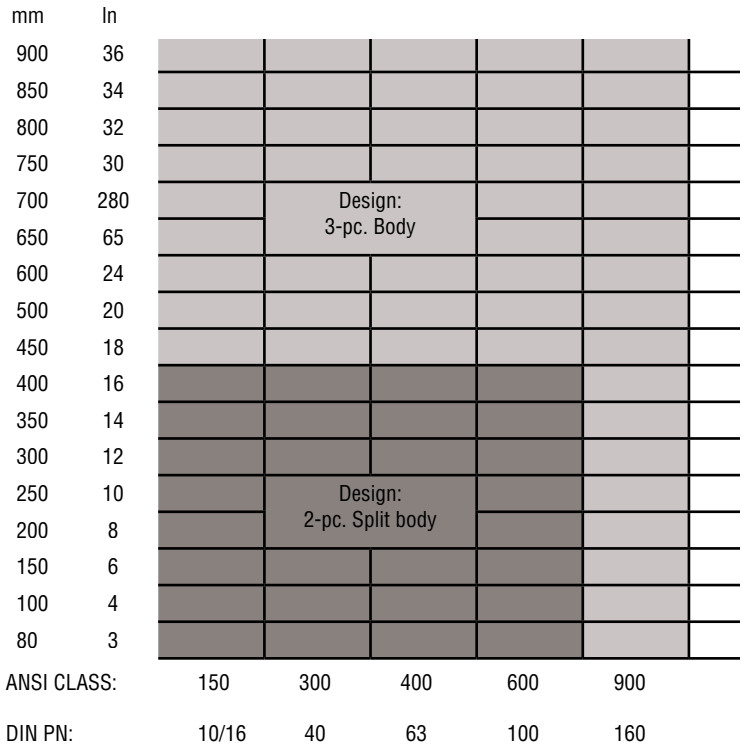
Description	PED Description	Material Description DIN EN	Nearest theoretical ASTM Material
Body/Flanges	P355NL1+N	LCS TSTE 355N DIN EN 1.0566	A350LF2
	G20Mn5	LCS Casting DIN EN 1.6220	A352LCB
	X6CRNiMoTi17-12-2	SS DIN EN 1.4571	A182 Gr. F 316
	GX5CrNiMo19-11-2	SS DIN EN 1.4408	A351 Gr. CF8M
	GX2CrNiMoN18 10	SS DIN EN 1.4404	A182 GR. F 316L
	GX5CrNiMoNb19-11-2	SS DIN EN 1.4581	A351 Gr. CF10C
	P250GH+N	C22.8 (DIN EN)	A105
Ball	GX20Cr14	CR 13 DIN EN 1.4027	A217 Gr. CA15
	X6CrNiMoTi17-12-2	SS DIN EN 1.4571	A182 Gr. F 316
	P355NL1+N + ENP	LCS TSTE 355N DIN EN 1.0566 ENP	A350LF2 ENP
	X2CrNiMoN22-5-3	Duplex DIN EN 1.4462	A182 F51
	GX5CrNiMo19-11-2	SS DIN EN 1.4408	A351 Gr. CF8M
	NiCu3OFE	Monel K 400 DIN EN 2.4360	B564-99 / B164-98
	X2CrNiMoN22-5-3 ENP	Duplex DIN EN 1.4462 ENP	A182 F51 ENP
	X2CrNiMoN22-5-3 CRABIDE	Duplex DIN EN 1.4462 CRABIDE	A182 F51 CRABIDE
	X2CrNiMoN22-5-3 ARGULOY	Duplex DIN EN 1.4462 ARGULOY	A182 F51 ARGULOY
	GX5CrNiMo19-11-2 ENP	SS DIN EN 1.4408 ENP	A351 Gr. CF8M ENP
	GX5CrNiMo19-11-2 CRABIDE	SS DIN EN 1.4408 CRABIDE	A351 Gr. CF8M CRABIDE
	GX5CrNiMo19-11-2 ARGULOY	SS DIN 1.4408 ARGULOY	A351 Gr. CF8M ARGULOY
Stem	X2CrNiMoN22-5-3	Duplex DIN EN 1.4462	A182 F51
	X5CrNiCuNB16-4	17-4 PH DIN EN 1.4542	17-4 PH
	X2CrNiMNMoNNb211653	Nitronic DIN EN1.3964	Nitronic 50
	X5CrNiCuNB16-4	17-4 PH (NACE) UNS S17400 Type 630	17-4 PH (NACE) UNS S17400 Type 630

Materials (...):

Stem Seals		PTFE; FPM, Graphite	
Ball seats		PTFE/ss, POM/ss; LYTON/ss spring loaded, Cavity Relief	
	X2CrNiMon22-5-3 ENP	Duplex DIN EN 1.4462 ENP	A182 F51 ENP
	X2CrNiMoN22-5-3 CRABIDE	Duplex DIN EN 1.4462 CRABIDE	A182 F51 CRABIDE
	X2CrNiMoN22-5-3 ARGULOY	Duplex DIN EN 1.4462 ARGULOY	A182 F51 ARGULOY
Body Seals		PTFE; FPM, Graphite	
Screws		A193 Gr. B8MN Cl.2; A193 GR. 88mN2 Cl.2B; A4-70; A198 Gr. B7; A198 Gr. B7M; A320 Gr.L7; A320Gr. L/M; 1.4980	
Nuts		A192 Gr.8M; A4-70; A194 Gr.2HM; A194 Gr. 7M;A194 Gr. 4; 1.4980	
Note: Speccial materials and alloy on requesty; e.g. inconel, Alloy 20, Super Duplex, Monel, Hastelloy or seawater resistant bronze			

Valve Body Design:

(Standard, alternative design on request)



Soft Seat Materials:

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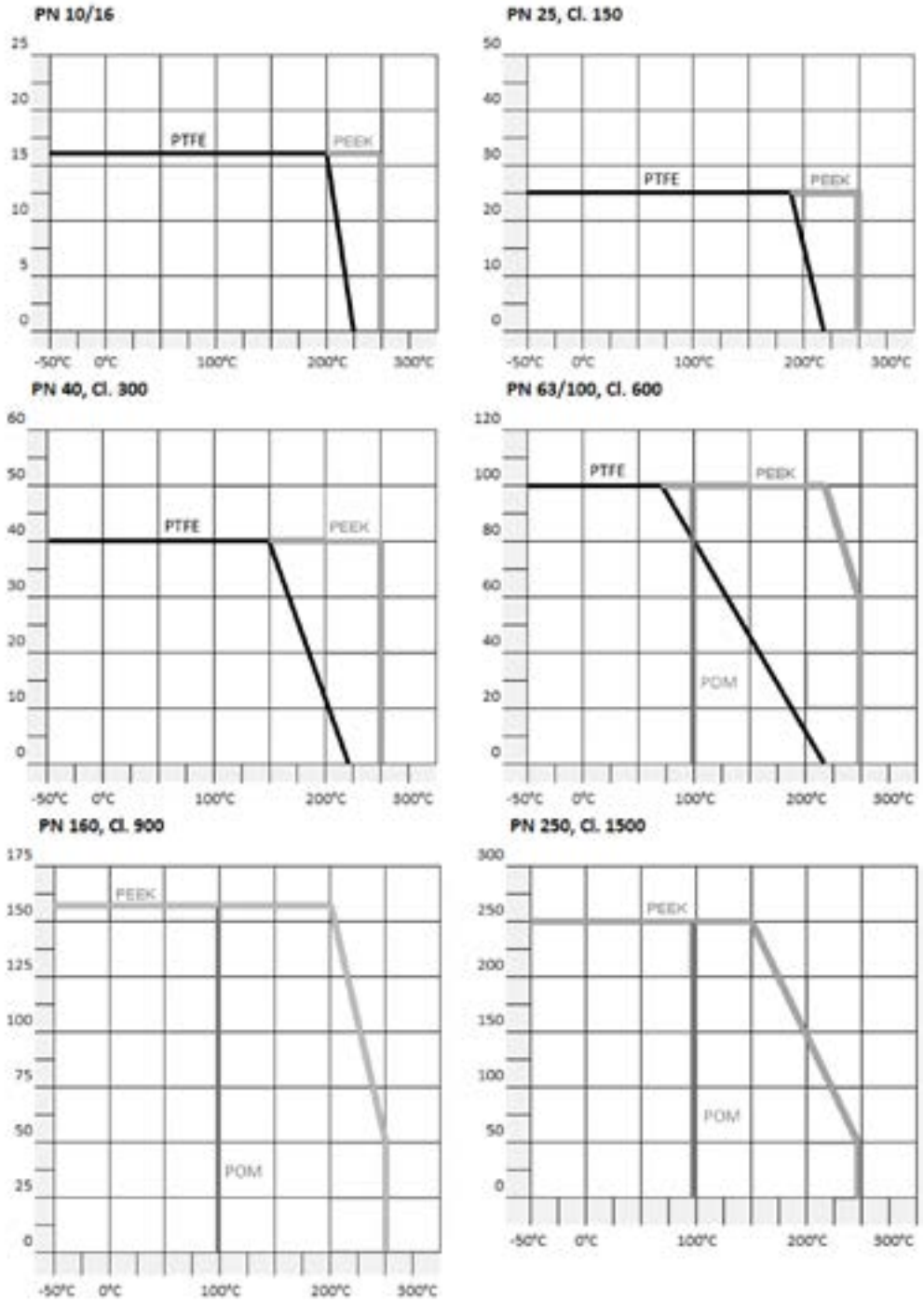
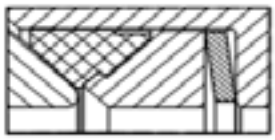
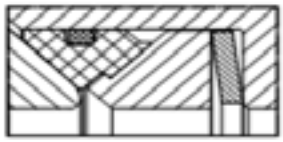
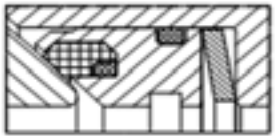
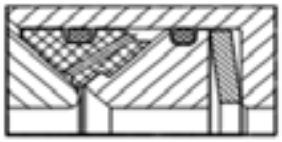
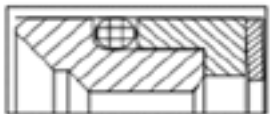
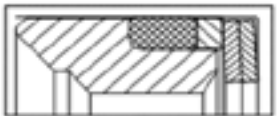
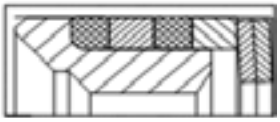
POM: Polyoxymethylene; high solidity, hardness and rigidity values by high abrasion resistance and low coefficient of friction

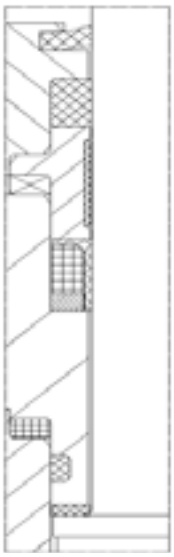
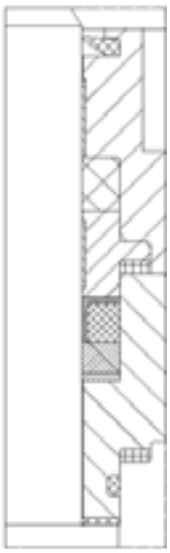
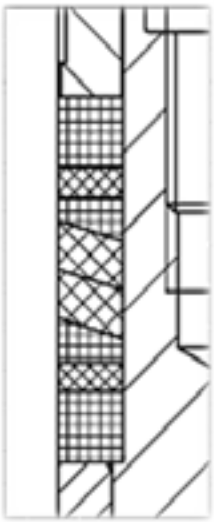
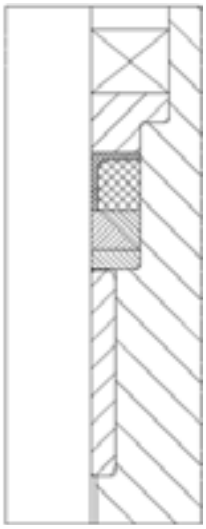
LYTON (PEEK): Polyetheretherketone; high chemical resistance, higher temperature rating; high solidity in combination with high abrasion resistance



Ball Seat Systems:

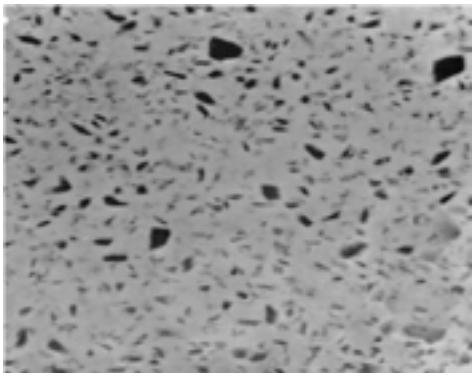
PTFE / SS / Duplex	POM / SS / Duplex	Lyton (PEEK) / POM / SS / Duplex Chambered version	POM / SS /. Duplex – Secondary - sealing system
			
Metal seated O-ring Version	**Metal seated Graphite version DN 80-150**	**Metal seated Graphite version from DN 200**	**Optional: Double Piston, cavity relief**
			**on request**

Stem Sealing Systems:

PTFE (TA-Luft)/Graphite (Fire-safe)	PTFE (ISO 15848)/Graphite (Fire-safe)	Graphite (TA-luft) High temperature	Graphite (ISO 15848) High temperature
			

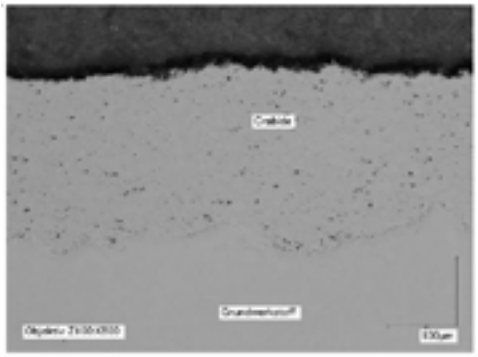
Metal Coatings :

ENP / Nikadur: Electroless nickel coating



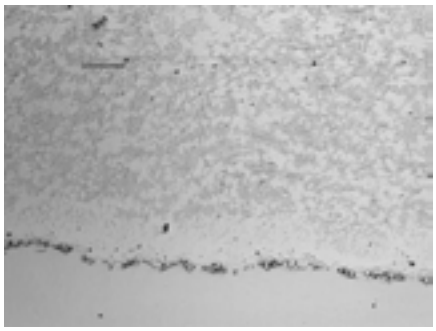
Composition:	Nickel + Cr + others
Hardness:	> 70 HRC
Temperature limit:	+ 350°C
Thickness:	50 -80µ
Chemical properties:	Corrosion resistance against liquid and gaseous medias as well under high temperature conditions up to +350°C
Mechanical properties:	Hard surface and high resistance against corrosion and adhesive wear

CRABIDE: Crabide is a hard metal alloy based on Chromium-carbide and Nickel/Chromium



Composition:	Cr_2C_2/Ni-Cr 75/25
Hardness:	900 – 1100 $HV_{0.3}$ (>67 HRC)
Temperature limit:	max. 970° (depending from base material and process conditions)
Thickness:	200 – 300 µm (usual)
Chemical properties:	Resistance versus media in the range of pH 5 and pH 12, as well under high temperature conditions
Mechanical properties:	High resistance especially against abrasion and adhesive wear and sliding abrasion.

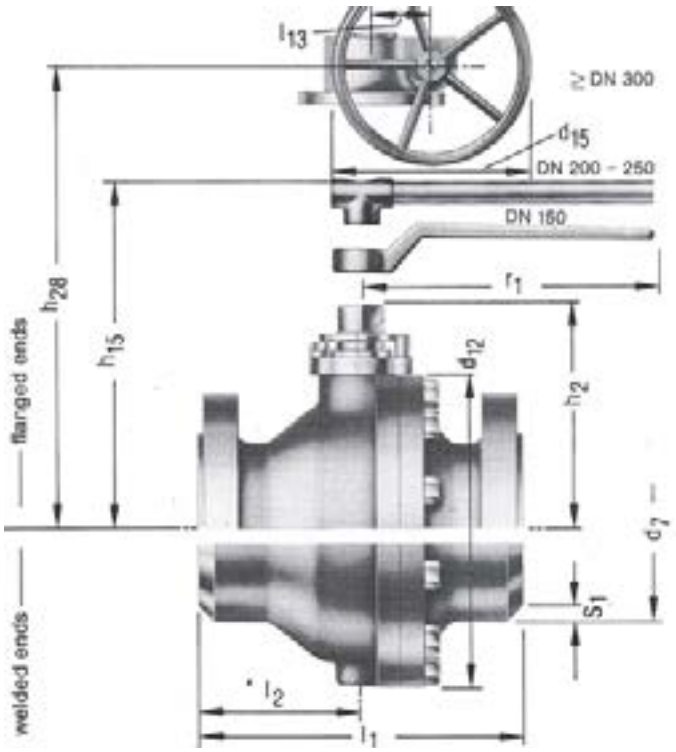
ARGULOY: ARGULOY is a Nickel based-based hard alloy. It is applied by flame-spraying and a special heat treatment after application ensures intimate bonding to the base material. The applied layers are homogenous, crack free, and resistant to corrosion and wear.



Composition:	Ni >70 %, Cr, B, Si
Hardness:	58 – 62 HRC
Temperature limit:	max. 750° (depending on base material and process conditions)
Thickness:	500 - 800 µm (usual)
Chemical properties:	High corrosion resistance against liquid and gaseous media; chemical base and halogen acids, as well under high temperature conditions.
Mechanical properties:	High resistance especially against abrasion and adhesive wear and sliding abrasion. The diffusion zone between coating and base material after sintering is about 50µm. That's why the coating is preserved in case of wear.

Note: Additional metal coating systems on request

Assembly Drawing: Serial 76M



Ball Valves – Full Bore:

Face to face dimensions according to EN 558-1, Connector/flange specifications EN 1092-1, ANSI B16.10 RF or RTJ (Welded ends according to DIN EN 12892 / DIN 3357 T2 on request)

Diameter Inch/mm	DIN EN 558-1 PN 10/16		DIN EN 558-1 PN 25/40		DIN EN 558-1 PN 63/100	ANSI B16.10				
	Short mm	Long mm	Short mm	Long mm	Long mm	Class 150 mm/RF	Class 300 mm/RF	Class 600 mm/RF	Class 900 mm/RF	Class 900 mm/RTJ
2.5 65	170	290	170	290	290	190.5	241.3	-	-	-
3 80	180	310	180	310	310	203	283	356	381	384
4 100	190	350	190	350	350	229	305	432	457	460
5 125	325	-	325	-	400	325	381	400	-	-
6 150	350	-	350	-	450	394	403	55	610	613
8 200	400	-	400	-	550	457	502	660	737	740
10 250	*450	650	*450	650	650	533	568	787	838	841
12 300	*500	750	*500	750	750	610	648	838	965	968
14 350	-	**650	550			685.4	762	889	-	-
16 400	762	-	762	-	950	762	838.2	991	1130	1140
18 450	-	-	-	-	-	-	914	-	1219	1232
20 500		**1150	-	**1150	-	914	990	1194	1321	1334
24 600	-	-	-	-	-	1067	1134	1397	1549	1568
30 750							1397	1651		
36 900						1524		2083		

*Ball valve in stainless steel material

**Ball Valves in carbon steel ASTM A 350 Gr. LF2 TSTE 355 DIN 1.0566 / stainless steel casting DIN 1.4408

Ball valves – Reduced Bore:

Face to face dimensions according to ANSI B16.10-2000 RF

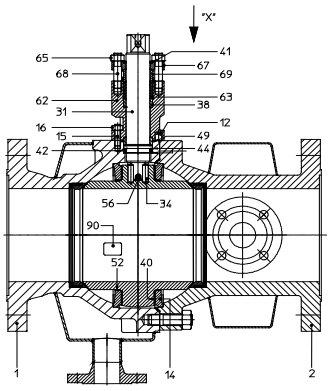
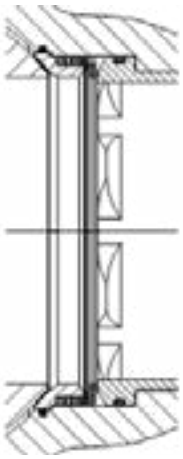
Diameter Inch/mm		ANSI B16.10	ANSI B16.10	ANSI B16.10
		Class 150 MM	Class 300 mm	Class 600 mm
6x4x6	150x100x150	267	403	558
8x6x8	200x150x150	*292	*419	660
10x8x10	250x200x250	*330	*457	787
12x10x12	300x250x300	610	648	838
14x12x14	350x300x350	686	762	889
16x12x16	400x300x400	762	838	991
18x16x18	450x400x450	864	914	1092
20x16x20	500x400x500	914	900	1092
20x16x20	600x500x600	1067	1143	1397
36x30x36	900x750x900	1524		

*Ball valve in short pattern

Serial Classification:

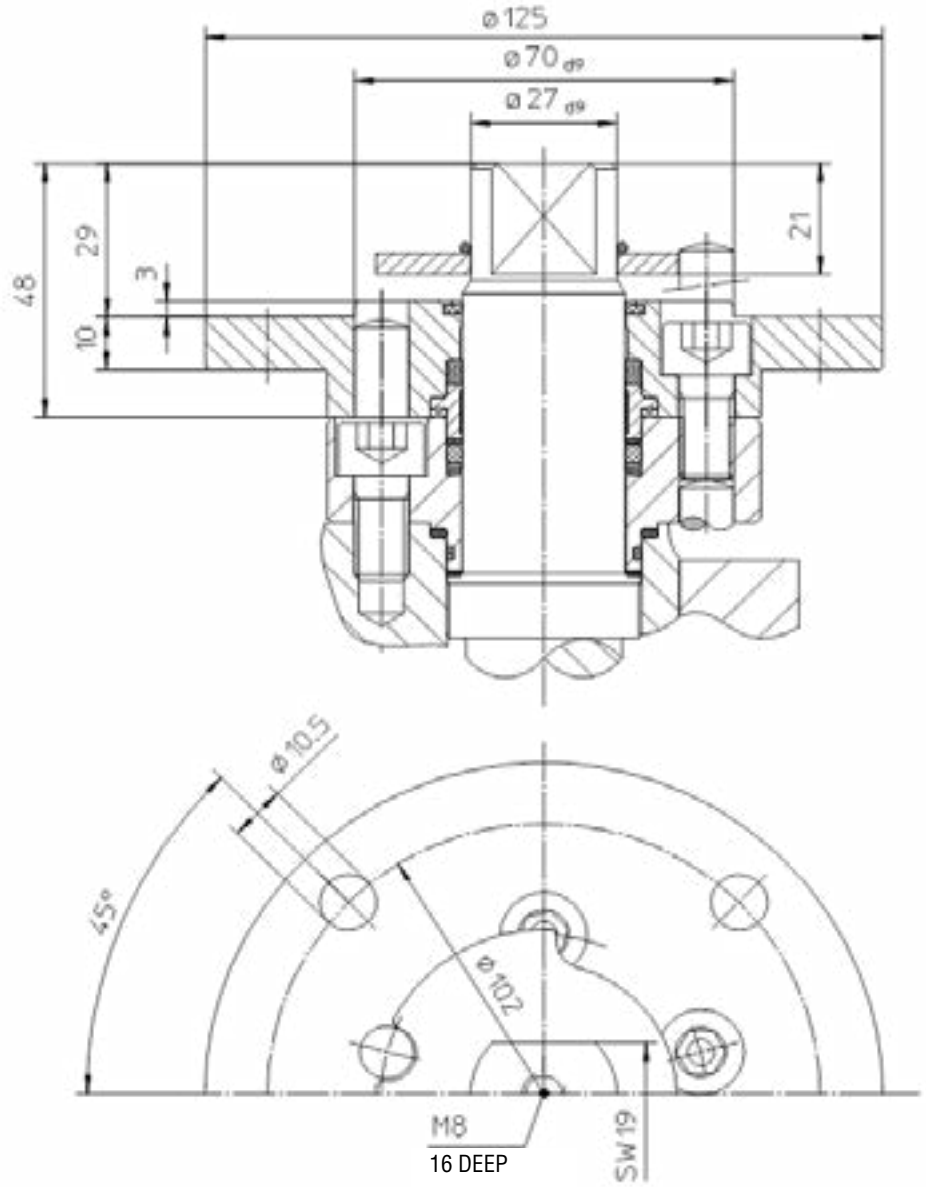
FK 76M	DN 80, 100, 150, 200, 250, 300
FK 76 (M)	DN 65, 125, 350, 400
FK 76M	DN 450, 500, 600, 750, 900

Design Options:

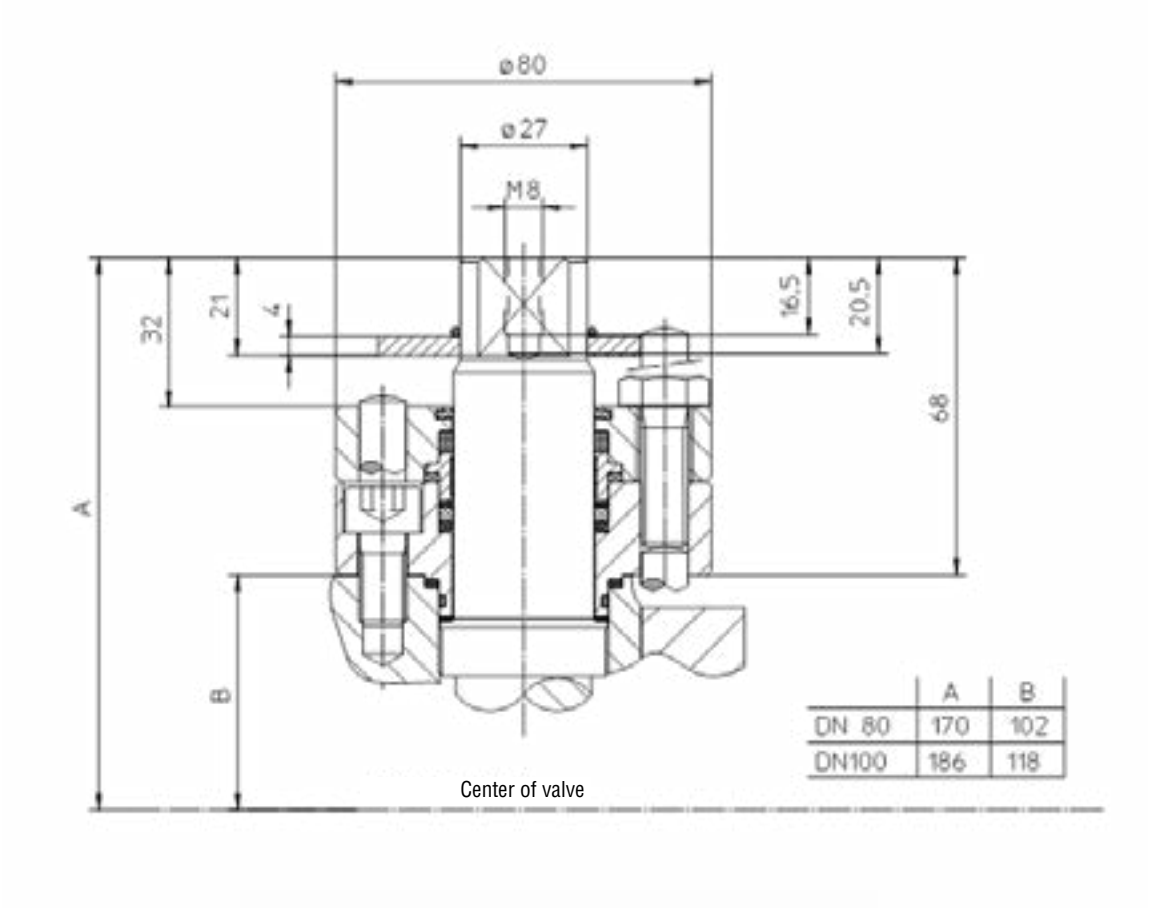
Heating jackets, double sided	**Wearing bushes (abrasive wear)**
	
Seat pocket design: Solids / Fines / Slurry (ball seat area)	
	

Ball valve topwork for automation (Standard):

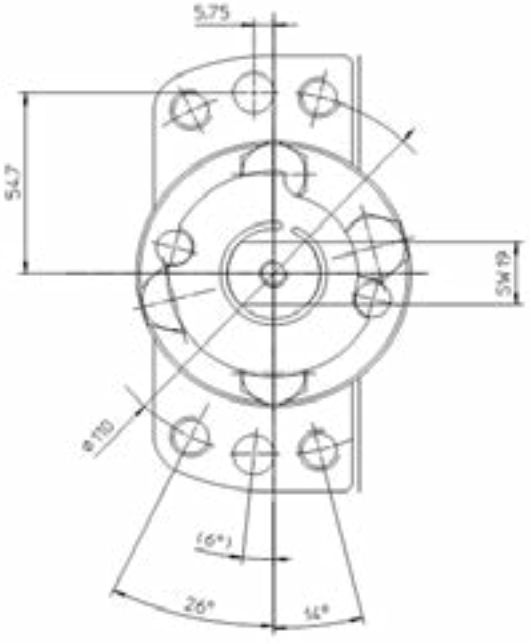
FK 76M DN 80 + DN 100 DIN ISO 5211 (F10/F12 – drawing F10)



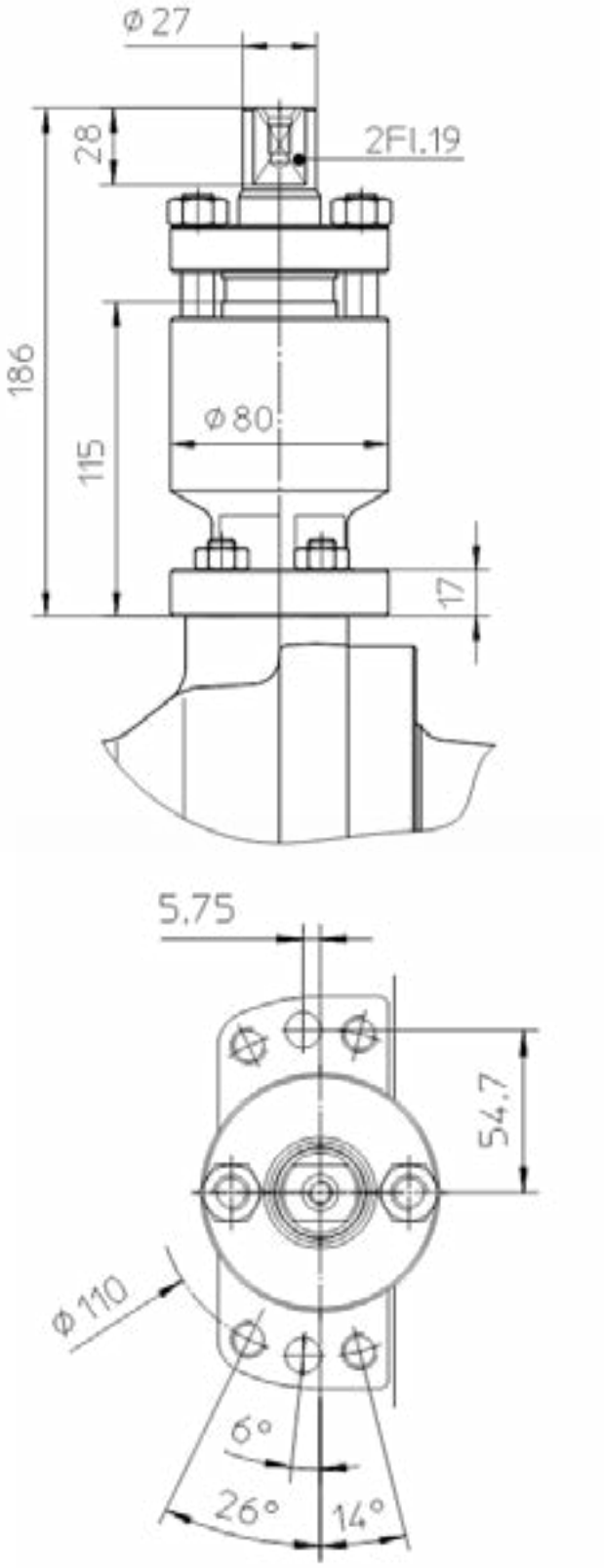
FK 76M DN 80 + DN 100 DIN ISO “419”



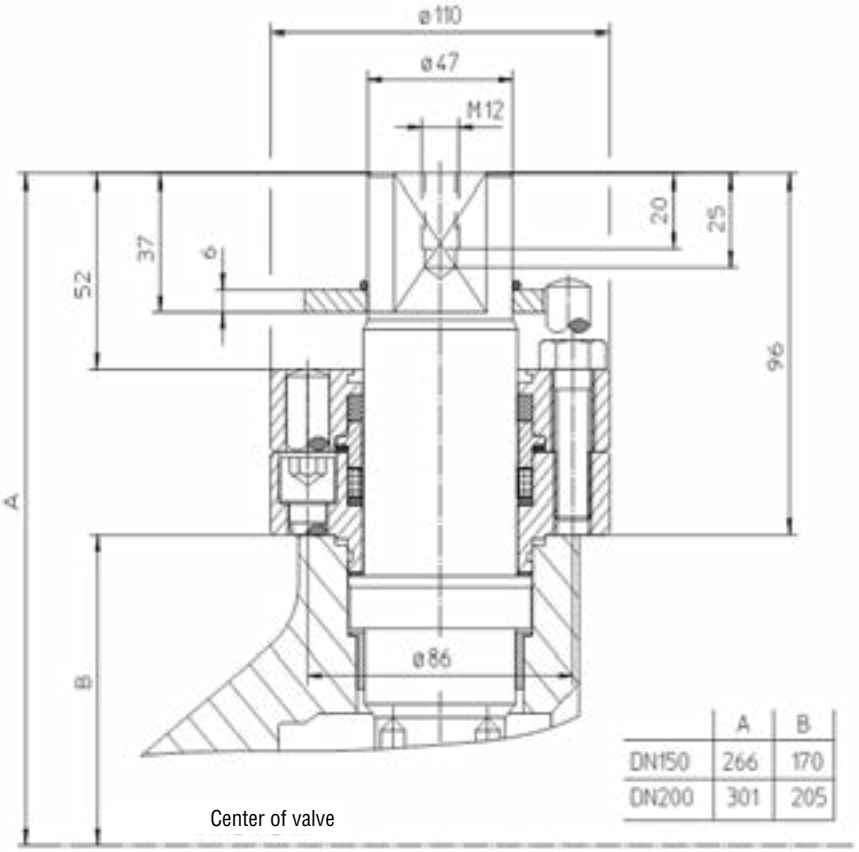
	A	B
DN 80	170	102
DN100	186	118



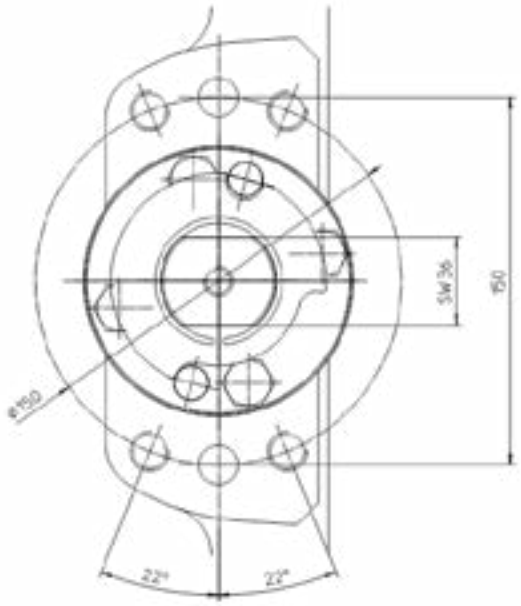
FK 76M DN 80 + DN 100 DIN ISO “419”
High temperature design:



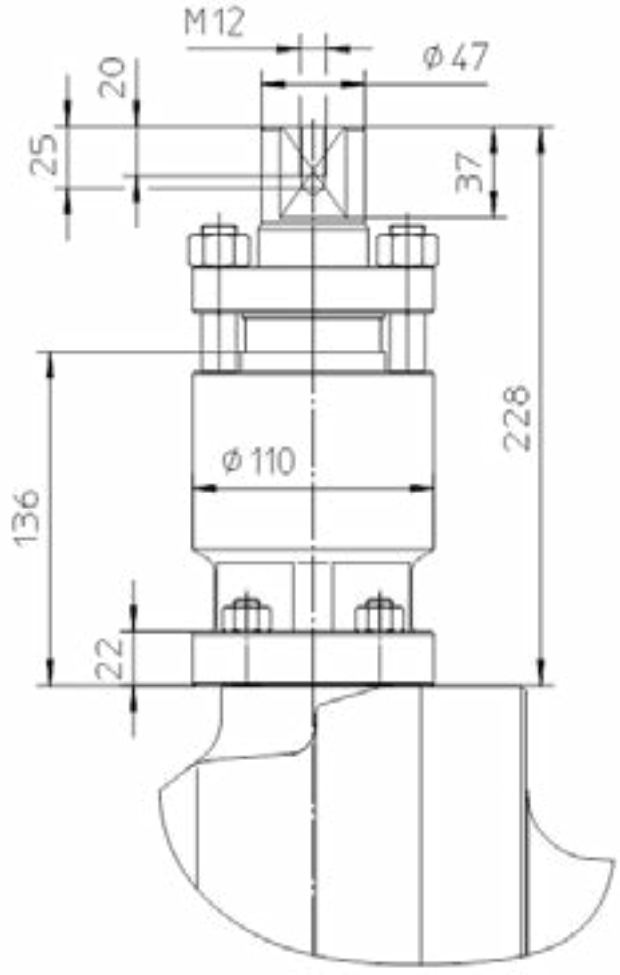
FK 76M DN 150 + DN 200 DIN ISO “419”

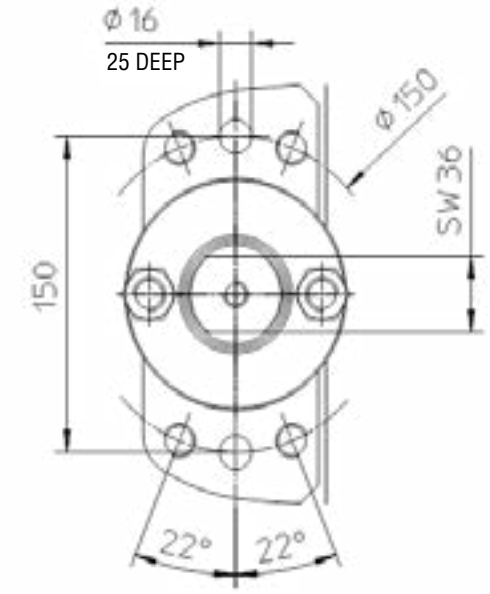


	A	B
DN150	266	170
DN200	301	205

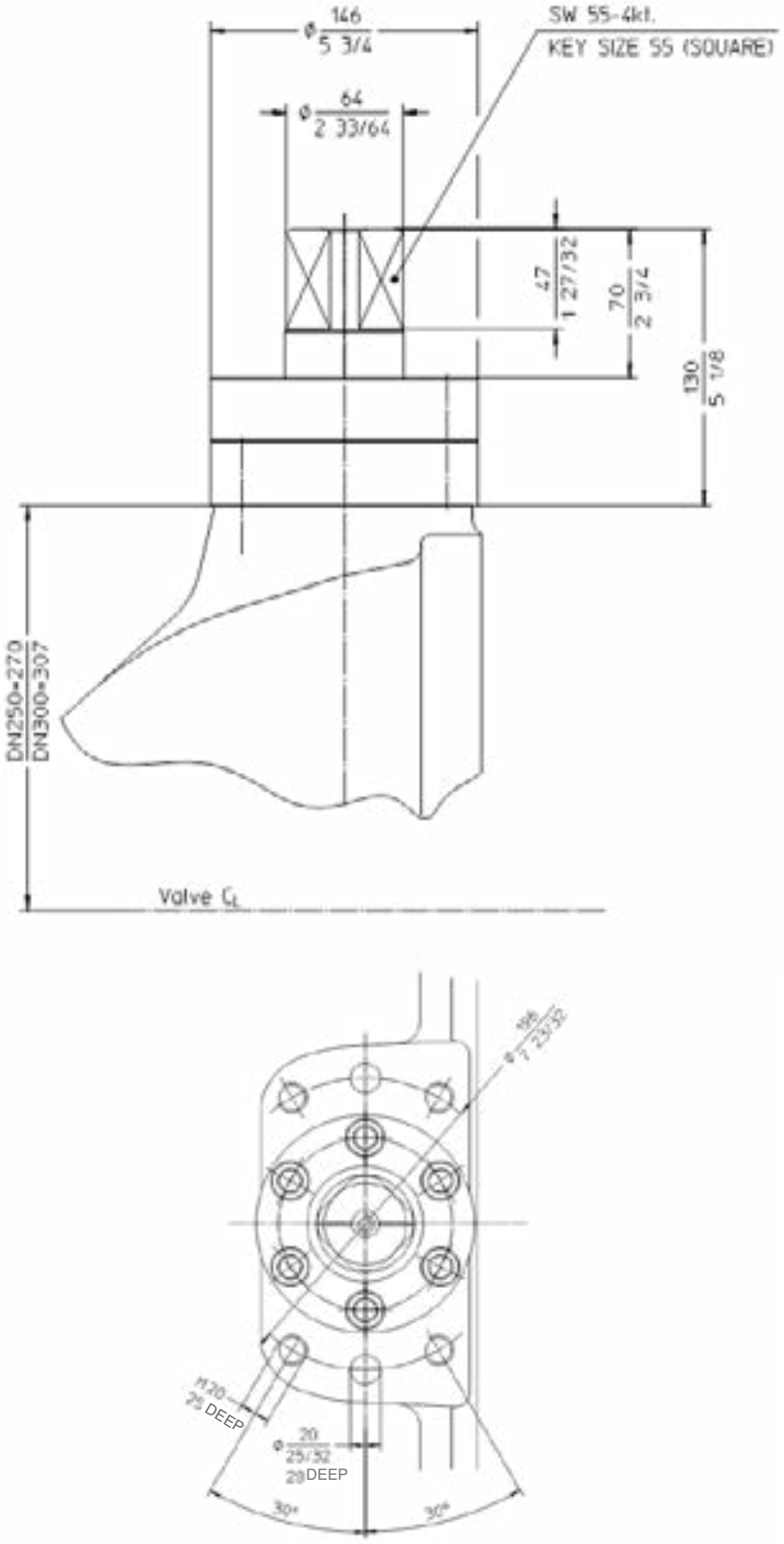


FK 76M DN 150 + DN 200 DIN ISO “419”
High temperature design:

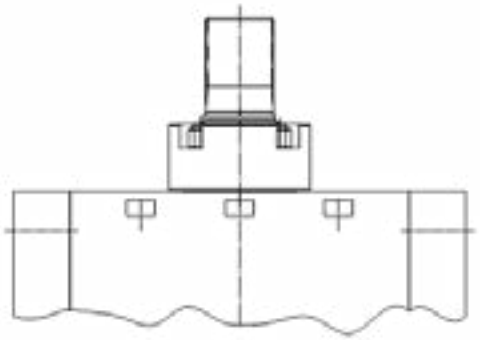


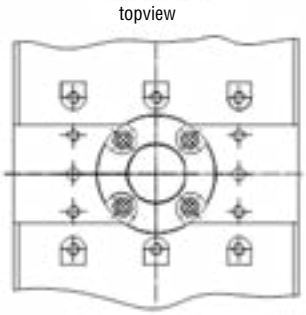


FK 76M DN 250 + DN 300 DIN ISO “419”

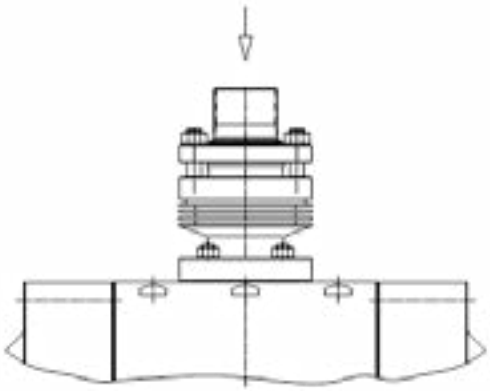


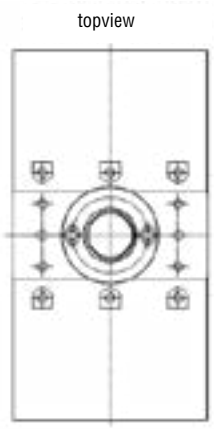
FK 76M DN 250-900 (3-pc design) Topwork ; “519”

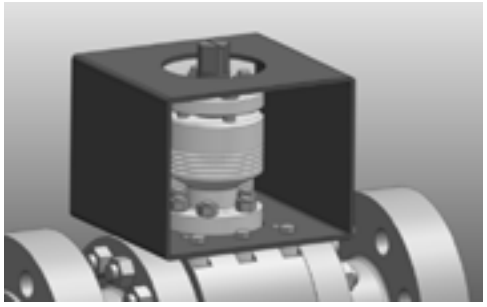




FK 76M DN 250 -900 (3-pc.- Design)
High temperature design







Dimension on request

Flowserve Flow Control GmbH
Rudolf-Plank-Straße 2
D-76275 Ettlingen
Germany,
T: +49 7243 103-0
F: +49 7243 103-222

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To find your local Flowserve representative
or for more information about Flowserve Corporation,
visit www.flowserve.com or call USA 1 800 225 6989