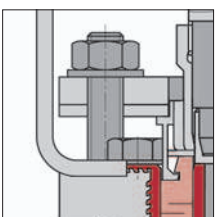
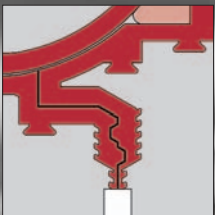
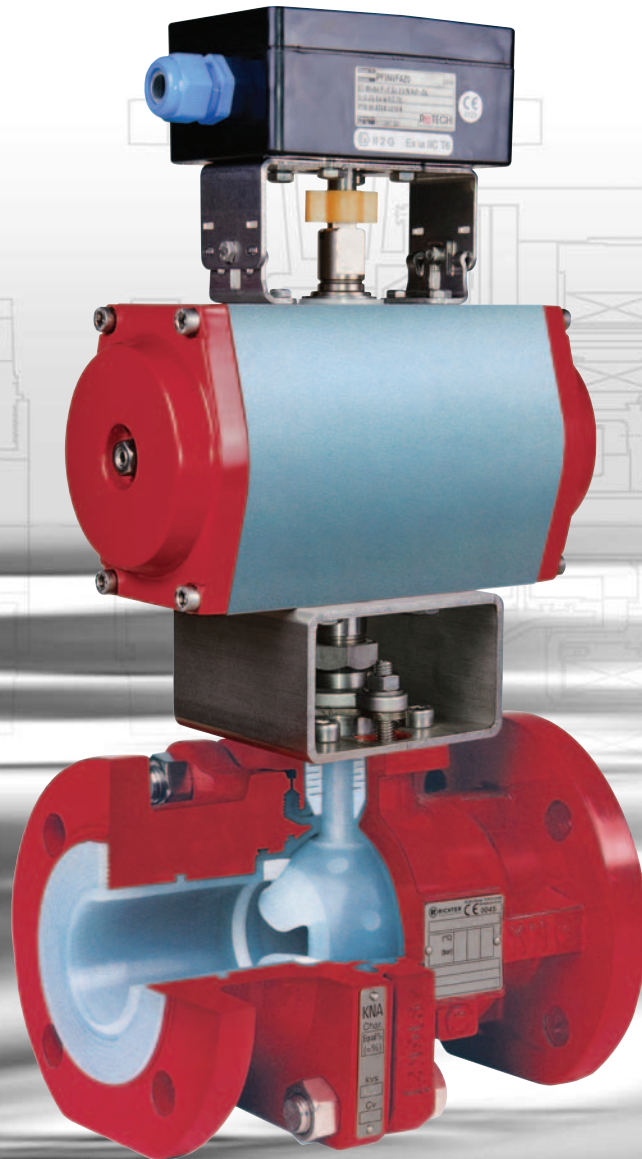


Richter Ball Control Valves

– Torque transmission free of play –



ASME/ANSI, ISO/DIN

Lining PFA, optionally PFA-P,
PFA-HP, PFA-L

Cv 0.12-470 (k_{vs} 0.1-400)

Maintenance-free ENVIPACK
stem sealing



RICHTER
Process Pumps & Valves



Heavy-duty ball control valves with ENVIPACK stem sealing

With the series KNAR, KNARP (ASME/ANSI) and KNR, KNRP (ISO/DIN), compact control valves with high flow control accuracy are available to plant operators. In many applications they are a very economical alternative to bellows-type sliding stem valves and rotary plug valves.

The ENVIPACK stem sealing, valve body and seat rings are identical to those of the shut-off ball valves KNA and KN, as are the selection of material and the pressure/temperature range. Advantages: minimum stocks of spare parts, subsequent conversion from a shut-off to a control valve.

Product features

- Depending on the size, 3 to 6 finely graduated Cv-values
- Equal percentage characteristics to DIN EN 60534, linear by means of positioner
- 1/2" to 8" (DN 15-200)
- -75 to +400 °F (-60 to +200 °C), see operating temperature diagram on page 3
- Face-to-face to
 - ASME/ANSI B 16.10-8, Cl.150
 - ISO 5752-1/DIN EN 558-1 (except from 8"/DN 200)
- Flanges to
 - ASME/ANSI B16.5 Cl.150
 - ISO/DIN 7005-2 PN 16 (DN 200: PN 10), 1"-3" (DN 25-80) optionally PN 25 with 232 psi (16 bar) operating pressure

Type codes

	manual actuation	remote actuation
• ASME/ANSI short	KNAR/...	KNARP/...
• ISO/DIN	KNR/...	KNRP/...

Lining

• PFA	.../F
• Antistatic PFA-L	.../F-L
• Highly permeation-resistant PFA-P	.../F-P
• Ultrapure (e.g. pharma applications) PFA-HP	.../F-HP

① 1/7" (3.5 mm) thick lining made of pure PFA

- Vacuum-proof anchoring
- Transparent, optimum quality assurance
- **Optional 1/5" (5 mm) wall thickness** (from 1"/DN 25)
- Optionally antistatic lining PFA-L, PFA-HP ultrapure or PFA-P particularly highly permeation-resistant

② Body made of ductile cast iron

ASTM A395/EN-JS 1049, absorbs the system and pipe forces

③ Permanently tight body connection

- Also with frequent temperature changes
- Sealing surface (3a) with full lining
- **Labyrinth-like sealing (3b):** Maximum surface pressure between the body halves
- Body halves center themselves exactly to each other owing to the fit (3c)
- **Almost metallic stop (3d)** absorbs pipe forces, see below

④ Resilient PTFE seat rings

permanent pre-tension of the ball, gas-tight seal

⑤ Richter ENVIPACK stem sealing with active stainless steel packing gland follower (5a)

- Proven over 100,000 times in operation
- Conformity with German Clean Air Code (TA Luft), self-adjusting
- Bellows-type packing insert (5b), gas-tight to EN 12266, leakage rate A
- Virtually maintenance-free even with frequent hot/cold cycles
- Visual inspection of the pre-loading action
- Controlled adjustment from outside (5c)

Why „Almost metallic stop“ instead of „metallic stop“?

Richter's „virtually metal-to-metal contact“, permanently tight:

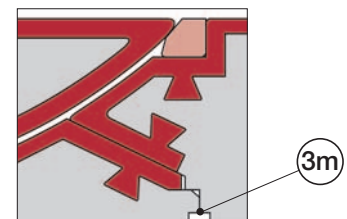
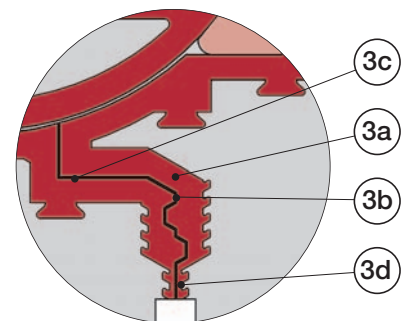
The body lining (3d) decreases to about 0.02" (0.5 mm) permitting the inner flange connection to be retightened in the event of a leak in the sealing area. However, leakage is most improbable thanks to the labyrinth-type design (3b) typical of Richter.

What are the disadvantages of lined valves with „metallic stop“?

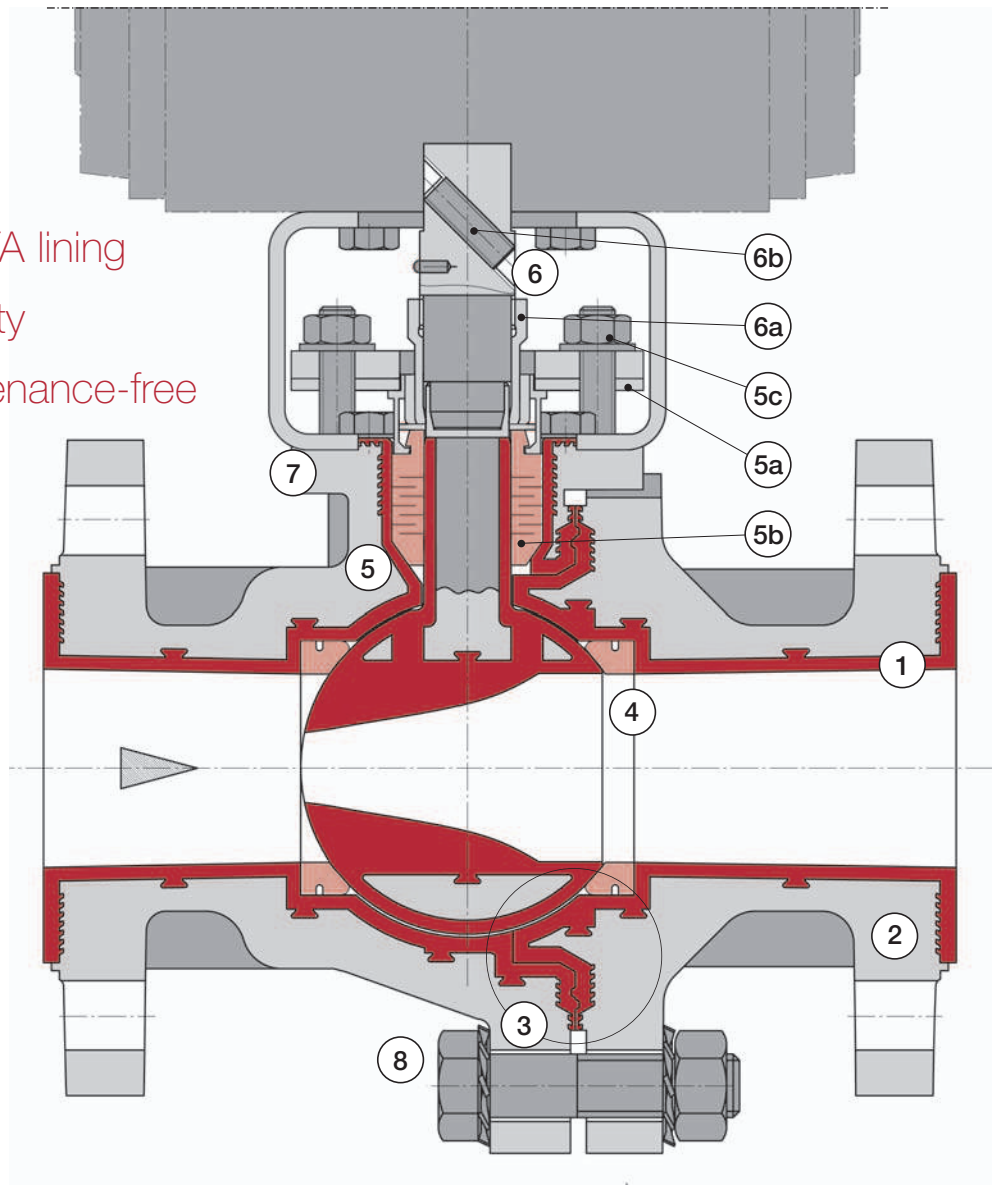
The body halves are bolted together with full metallic contact (3m).

Retightening is not possible, any leak that occurs cannot be stopped.

The cavity between the lining and the metallic contact also prevents the early detection of any leak.

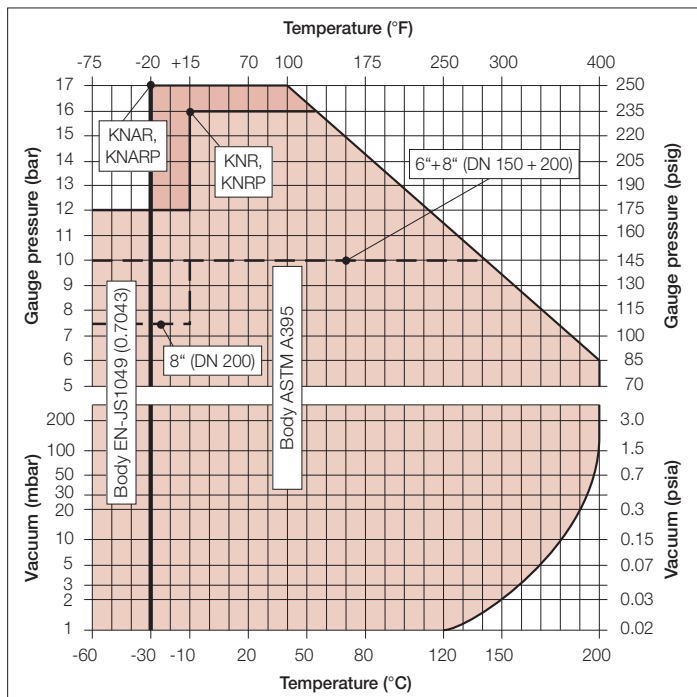


- Thick-walled PFA lining
- Particularly low cavity
- Maintenance-free



- ⑥ **Torque transmission free of play**
with sleeve nut (6a) and setscrew (6b)
- ⑦ **Universal ISO 5211 actuator connection**
- ⑧ **External corrosion protection**
Epoxy coating. Packing gland, lever, bolts/nuts made of stainless steel.

Pressure/temperature range



V-control ball

- PFA-lined
- high quality control performance
- free of play

Body EN-JS 1049 (0.7043)/PFA:

-75 °F (-60 °C) to 400 °F (+200 °C); max. 235 psi (16 bar) as per AD 2000

Body ASTM A395/PFA:

-20 °F (-30 °C) to 400 °F (+200 °C); max. 250 psi (17.2 bar) as per ASME B16.42

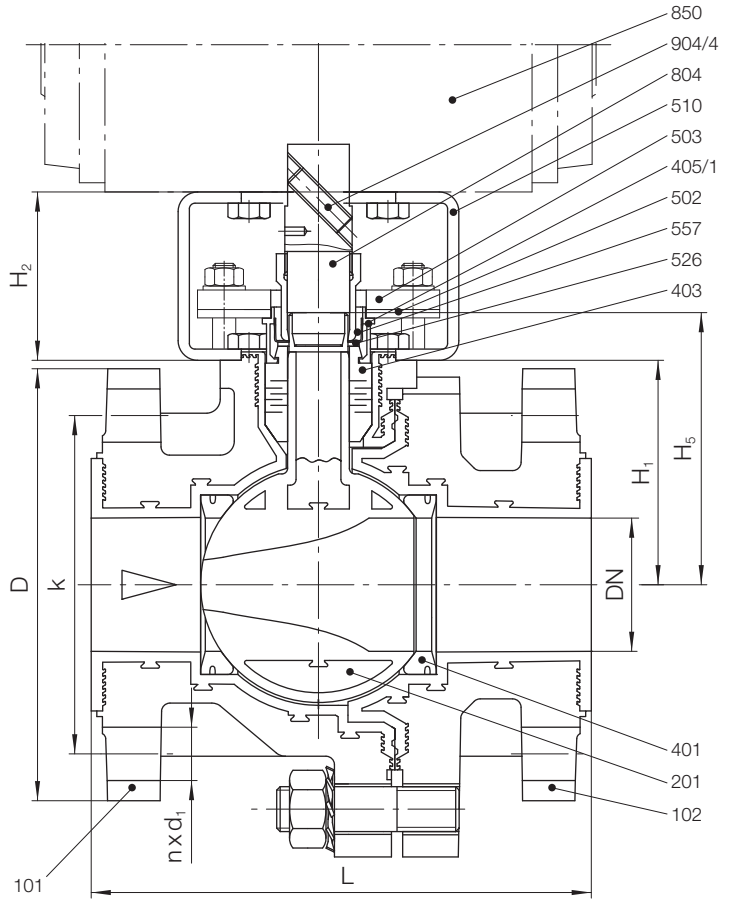
For low-temperature applications please observe the local regulations!

Operating temperatures below 15 °F (-10 °C): special material for ball/stem core

Components and materials

Item	Designation	Material
101	Main body	Ductile cast iron ASTM A395/EN-JS1049, (DN 1", 1 1/2", 2" ASME/ANSI optionally investment cast stainless steel
102	Body end piece	1.4408/CF8M), PFA-lined, optionally PFA-L antistatic, PFA-HP ultrapure or PFA-P highly permeation-resistant
201	Ball/stem unit	Stainless steel, PFA-lined, optionally PFA-L antistatic, PFA-HP ultrapure or PFA-P highly permeation-resistant
401	Seat rings	PTFE
403	Packing bellows	PTFE
405/1	Thrust ring	Stainless steel
502	Spring gland follower*	Stainless steel
503	Packing gland follower	Stainless steel
510	Bracket	Stainless steel
526	Retaining washer	Stainless steel
557	Grounding spring washer	Stainless steel
804	Coupling, play-free	Stainless steel
850	Actuator	to customer request
904/4	Setscrew	Stainless steel
w/o No.	Screws (A4-70) & nuts	Stainless steel

* two spring gland followers with 3", 4", 6", 8" (DN 80, 100, 150, 200)



Dimensions and weights

Series KNARP, KNAR (ASME/ANSI): Installation dimensions and approx. weights
 Face-to-face ASME/ANSI B16.10 short, flanges ASME/ANSI B16.5 Cl.150**

DN		L		D		k		nxd ₁		EN ISO 5211	H ₁		H ₅		H ₂		HL***		H****		Weights without actuator	
inch	mm	inch	mm	inch	mm	inch	mm	inch	mm		inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	lbs	kg
1/2"	15	5.12	130	3.5	89	2.38	60.5	4x5/8	4x16	F05	1.97	50	2.36	60	2.36	60	7.0	179	5.12	130	12.3	5.6
3/4"	20	5.91	150	3.88	98.5	2.76	70	4x5/8	4x16	F05	1.97	50	2.36	60	2.36	60	7.0	179	5.12	130	13.2	6
1"	25	5.0	127	4.25	108	3.13	79.5	4x5/8	4x16	F05	1.97	50	2.36	60	2.36	60	7.0	179	5.12	130	12.3	5.6
1 1/2"	40	6.5	165	5.0	127	3.88	98.5	4x5/8	4x16	F07	3.03	77	3.70	94	2.36	60	10.2	259	6.10	155	26.4	12
2"	50	7.0	178	6.0	152.5	4.75	120.5	4x3/4	4x19	F07	3.15	80	3.82	97	2.36	60	10.2	259	6.10	155	32	14.5
3"	80	8.0	203	7.5	190.5	6.0	152.5	4x3/4	4x19	F10	4.65	118	5.51	140	3.15	80	16.3	410	7.09	180	74	33.5
4"	100	9.0	229	9.02	229	7.5	190.5	8x3/4	8x19	F10	5.28	134	6.14	156	3.15	80	16.3	410	7.68	195	110	50
6"	150	10.5	267	11.0	279.5	9.51	241.5	8x7/8	8x23	F12	7.24	184	8.46	215	3.15	80	20.3*	513*	10.4	265	201	91
8"	200	18	457	13.5	343	11.75	298.5	8x7/8	8x23	F12	7.24	184	8.46	215	3.15	80	20.3*	513*	10.4	265	276	125

* 6" (DN 150) and 8" (DN 200) manual actuation: At Δp > approx. 29 psi (2 bar) a worm gear is recommended instead of the hand lever. Details on request.

** On request: drilled to JIS 10K, ISO 7005-2

*** Dimension HL not shown: length hand lever from centre of ball/stem unit (part 201)

**** Dimension H not shown: height from centre of ball to upper edge of lever

Series KNRP, KNR (ISO/DIN): Installation dimensions and approx. weights
 Face-to-face ISO 5752 series 1 (DIN 3202 F1), flanges ISO 7005-2**

DN		L		D		k		nxd ₁		EN ISO 5211	H ₁		H ₅		H ₂		HL***		H****		Weights without actuator	
inch	mm	inch	mm	inch	mm	inch	mm	inch	mm		inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	lbs	kg
1/2"	15	5.12	130	3.74	95	2.56	65	4x0.55	4x14	F05	1.97	50	2.36	60	2.36	60	7.0	179	5.12	130	12.3	5.6
3/4"	20	5.91	150	4.13	105	2.95	75	4x0.55	4x14	F05	1.97	50	2.36	60	2.36	60	7.0	179	5.12	130	13.2	6
1"	25	6.30	160	4.53	115	3.35	85	4x0.55	4x14	F05	1.97	50	2.36	60	2.36	60	7.0	179	5.12	130	13.2	6
1 1/2"	40	7.87	200	5.91	150	4.33	110	4x0.75	4x19	F07	3.03	77	3.70	94	2.36	60	10.2	259	6.10	155	30.9	14
2"	50	9.06	230	6.5	165	4.92	125	4x0.75	4x19	F07	3.15	80	3.82	97	2.36	60	10.2	259	6.10	155	35.3	16
3"	80	12.2	310	7.87	200	6.30	160	8x0.75	8x19	F10	4.65	118	5.51	140	3.1	80	16.3	410	7.09	180	77	35
4"	100	13.8	350	8.66	220	7.09	180	8x0.75	8x19	F10	5.28	134	6.14	156	3.15	80	16.3	410	7.68	195	121	55
6"	150	18.9	480	11.2	285	9.45	240	8x0.91	8x23	F12	7.24	184	8.46	215	3.94	100	20.3*	513*	10.4	265	229	104
8"	200	18	457	13.4	340	11.6	295.1	8x0.91	8x23	F12	7.24	184	8.46	215	3.94	100	20.3*	513*	10.4	265	276	125

* 6" (DN 150) and 8" (DN 200) manual actuation: At Δp > approx. 29 psi (2 bar) a worm gear is recommended instead of the hand lever. Details on request.

** On request: drilled to ASME/ANSI B16.5 Cl.150, JIS 10K

*** Dimension HL not shown: length hand lever from centre of ball/stem unit (part 201)

**** Dimension H not shown: height from centre of ball to upper edge of lever

High control accuracy, finely graduated Cv-values

Flow values Cv (%) depend on the control range, for equal percentage characteristics with a rangeability of 1:25

The medium flow starts at a defined degree of stem rotation, see „Start“.

DN		Cv or kv (%)			5.5	7.6	10.5	14.5	20.0	27.6	38.1	52.5	72.5	100
inch	mm	Control range (% open)	Shut	Start	10	20	30	40	50	60	70	80	90	100
1/2", 3/4", 1"	15, 20, 25	Stem angle of rotation (degrees)	0	25.0	31.5	38.0	44.5	51.0	57.5	64.0	70.5	77.0	83.5	90
1 1/2"	40		0	29.0	35.1	41.2	47.3	53.4	59.5	65.6	71.7	77.8	83.9	90
2"	50		0	21.0	27.9	34.8	41.7	48.6	55.5	62.4	69.3	76.2	83.1	90
3"	80		0	17.0	24.3	31.6	38.9	46.2	53.5	60.8	68.1	75.4	82.7	90
4"	100		0	16.5	23.8	31.2	38.5	45.9	53.2	60.6	67.9	75.3	82.6	90
6", 8"	150, 200		0	12.0	19.8	27.6	35.4	43.2	51.0	58.8	66.6	74.4	82.2	90

Note it is recommended to control in the range of approx. 20 to 90 % of the effective control range, so using approx. 7-75 % of the kv_s value.

Available Cv-values USgpm (m³/h)

DN		Cv USgpm (k _{vs})													
inch	mm	0.12	0.58	0.9	1.9	4.7	9.3	16.3	23.3						
1/2", 3/4", 1"	15, 20, 25	(0.1)	(0.5)	(0.8)	(1.6)	(4)	(8)	(14)	(20)						
1 1/2"	40							18.6 (16)	29.1 (25)	46.6 (40)					
2"	50							18.6 (16)	29.1 (25)	46.6 (40)	69.9 (60)				
3"	80									46.6 (40)	93.2 (80)	139.8 (120)	186.4 (160)		
4"	100										69.9 (60)	116.5 (100)	186.4 (160)	291.3 (250)	
6", 8" *	150, 200*												186.4 (160)	291.3 (250)	466 (400)

* 8" (DN 200) with reduced bore, control ball 6" (DN 150)

Formula for conversion: Cv (USgpm) = k_{vs} (m³/h) · 1.165, Cv (Impgpm) = k_{vs} (m³/h) · 0.971

z-values for 75 % duty (Cv/Cv_{max} = 0.75)

DN		z-values													
inch	mm	0.68	0.68	0.65	0.6	0.6	0.6	0.58	0.43						
1/2", 3/4", 1"	15, 20, 25														
1 1/2"	40							0.53	0.5	0.35					
2"	50							0.52	0.47	0.39	0.32				
3"	80									0.42	0.31	0.29	0.22		
4"	100										0.3	0.27	0.24	0.16	
6", 8" *	150, 200*												0.15	0.13	0.08

* 8" (DN 200) with reduced bore, control ball 6" (DN 150)

Operating torques

Operating torques (incl. breakaway torques)

DN		Operating torques									
inch	mm	Δp 45 psi/3 bar		Δp 85 psi/6 bar		Δp 145 psi/10 bar		Δp 235 psi/16 bar		max. admissible	
		in-lbs	Nm	in-lbs	Nm	in-lbs	Nm	in-lbs	Nm	in-lbs	Nm
1/2"	15	71	8	71	8	71	8	89	10	620	70
3/4"	20	71	8	71	8	71	8	89	10	620	70
1"	25	106	12	106	12	106	12	106	12	620	70
1 1/2"	40	221	20	221	20	221	20	266	25	1990	225
2"	50	266	25	266	25	266	25	310	30	1990	225
3"	80	531	60	531	60	575	65	708	80	4425	500
4"	100	708	80	708	80	797	90	1062	120	4425	500
6"	150	1770	200	2213	250	3098	350	-	-	19470	2200
8"	200	1770	200	2213	250	3098	350	-	-	19470	2200

All operating torques: test medium water 68 °F (20 °C), seat rings pure PTFE.

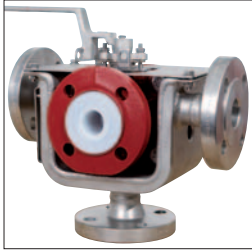
The operating and breakaway torques may differ depending on the medium (dry gases, crystallising media, oil contents etc.).

Richter's speciality: customised problem solutions

Ask Richter when you are looking for a solution to your problem! In addition to the selection of common special designs presented here, we also offer many other specialities.

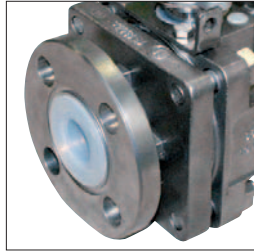
Stainless steel heating jacket

for all standard heat transfer media

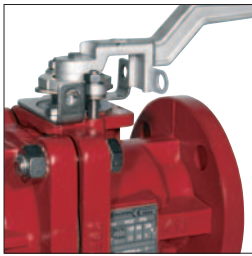


Stainless steel body with PFA lining

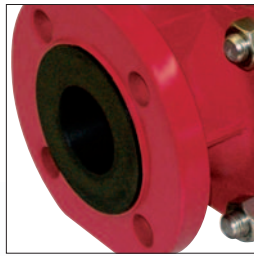
ASME/ANSI face-to-face 1"-2"



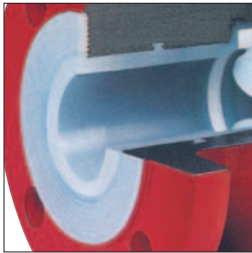
Standard with the manual actuation version: lockable stainless steel hand lever



Linings antistatic, highly permeation-resistant, FDA-compliant



Extra thick-walled lining 0.2 inch (5 mm) for highly permeating media

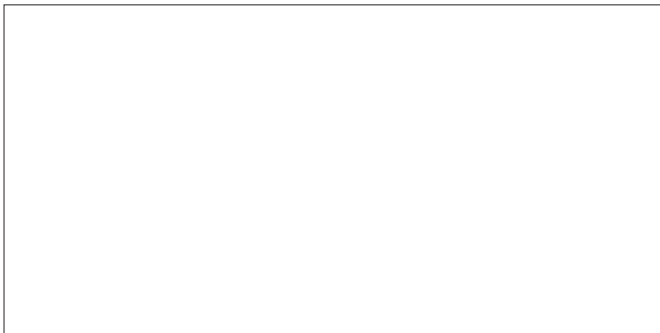


PFA-lined sliding stem control valves

- Cv 0.06-180 (k_v 0.05-155)
- bellows sealed
- single-piece valve body
- -75 to +400 °F (-60 to +200 °C)
- see separate publications RSS (remote actuation) and HVR (manual actuation)



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