KLINGER Fluid Control

KLINGER BALLOSTAR® KHA

3-piece ball valves
DN 15-125

ALPHA GROUP

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Scan LINE OA

KHA
BALLOSTAR®

KLINGER

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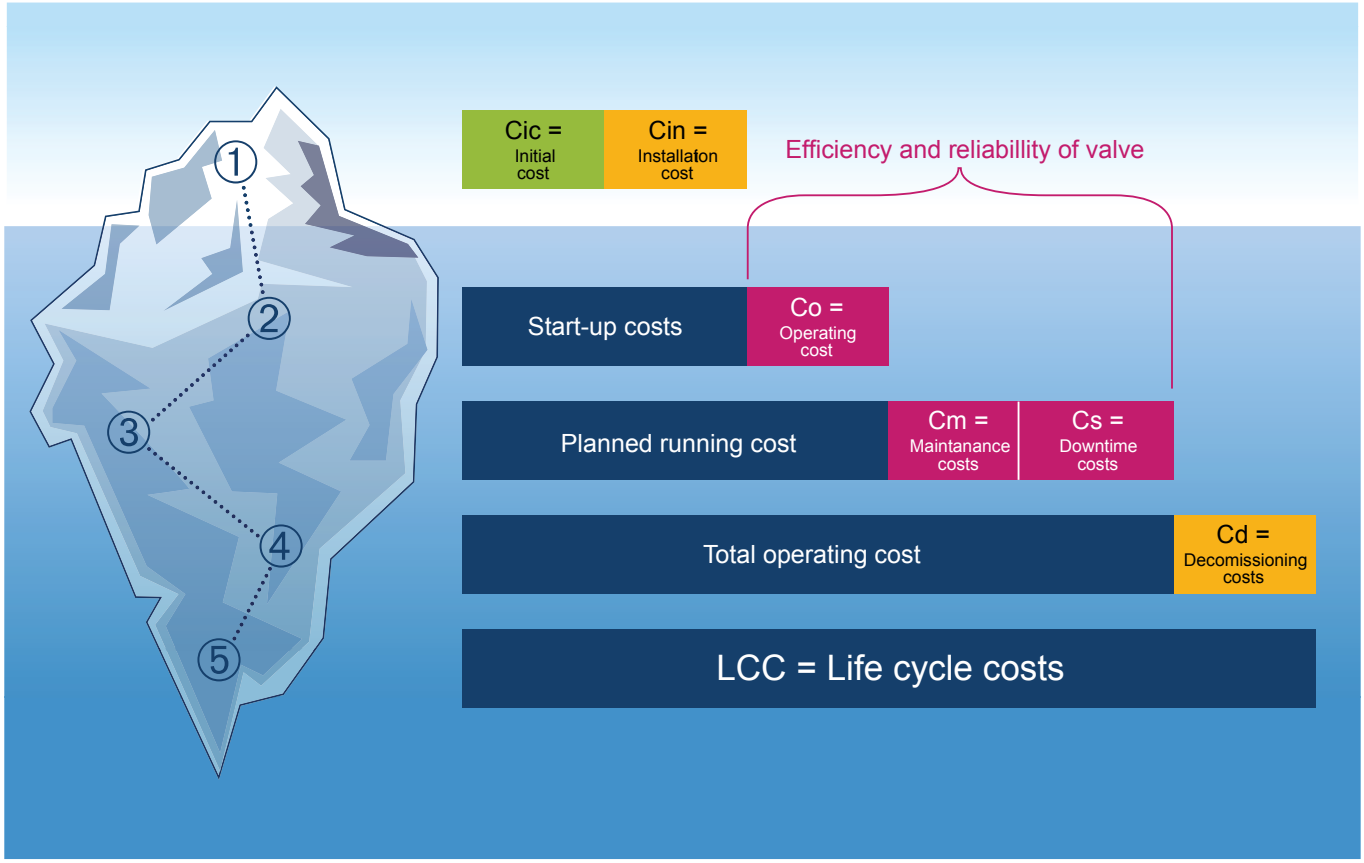
SUSTAINABLE EFFICIENCY

Cost efficiency and reliability at its best

The KLINGER Ballostar KHA is characterized by its low costs across the entire lifecycle of the valve (total cost of ownership – TCO) as well as by its extreme longevity. Due to its modular build, only affected components need to be replaced in the course of maintenance. This significantly increases the service life of the valve in the system. The plant operator therefore profits from lower costs during plant maintenance as well as from reduced storage and installation costs – while continuously retaining high levels of safety. With its unique design the KLINGER Ballostar KHA also offers plant operators the flexibility demanded by today's dynamic markets: Thanks to a broad selection of individually combinable modular system components, the ball valve can be equipped, refitted or even retrofitted for every possible application.



① Cic = Initial cost + Cin = Installation costs

② Start-up costs + Co (Operating costs (Co)) are costs associated with keeping the plant running (more specifical ly energy costs associated with pressure loss).

③ Planned running costs +Cm + Cs
Cm = Maintenance costs for KLINGER Fluid Control ball valves are very low due to the avoidance of the following:
Operating and checking the valve on a regular basis.
Dismantling the valve to change the sealing element.
Installation of the repaired or a new valve in the line.

Cs = Downtime costs can be very high. Emptying the pipe, repairing the valve as well as refilling and testing the network section can generate 20 to 30 % additional costs on top of the cost for the downtime.

④ Total operating Costs +Cd (Decommissioning cost, which is the cost incurred by companies in reversing the modifications made to landscape when a fixed asset is used up).

⑤ Life cycle costs, that incurred during the entire operating life of the valve

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THE MULTI-TALENTED KHA

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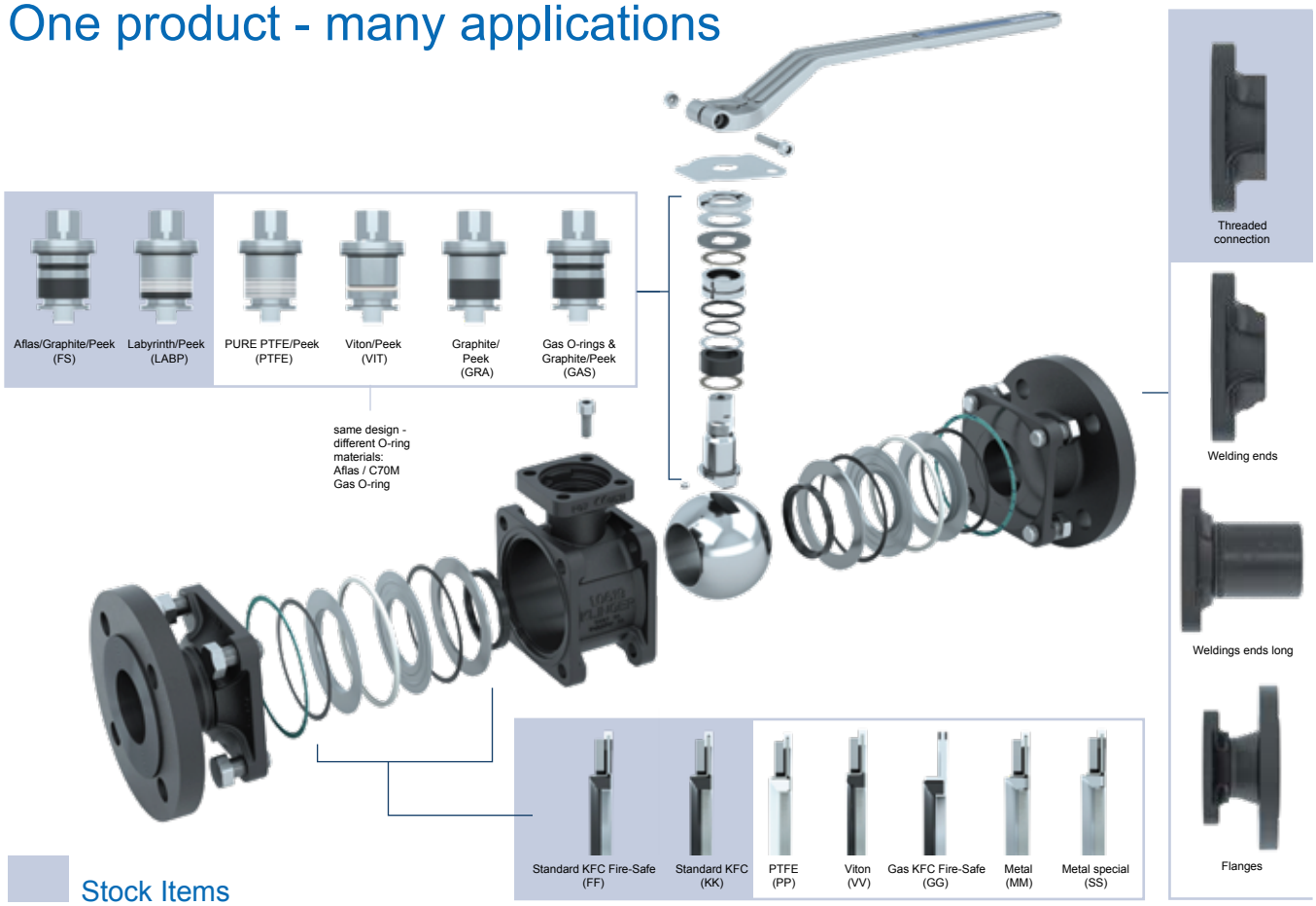
One product - many applications



Stock Items

Version	Common combinations in valve construction				Body material	Body gasket
	Sealing element type		Stuffingbox type			
Standard version Fire-Safe		"FF" Standard KFC Fire Safe Multi part design With support ring		"FS" Aflas / Graphite / Peek Stuffingbox	Carbon steel Stainless steel Duplex	With body gaskets C4430

Application	Approvals/certificates Approvals
Applications up to 300°C: Fire Safe, TA Luft and ISO15848 applications For clear liquids and gases without solids, acids and alkalis, for high switching operations, steam, water, hot water **Applications in almost all industries:** District Heating / Steel / Pulp&Paper / Power plant / Oil & Gas	Fire Safe acc. API607 & EN10497 TA Luft VDI2440 ISO15848 SIL 2

Version	Common combinations in valve construction				Body material	Body gasket
	Sealing element type		Stuffingbox type			
KFC-LABP		"KK" Standard KFC multi part design with support ring		"LABP" Labyrinth / Peek Stuffingbox	Carbon steel Stainless steel Duplex	With body gaskets C4430

Application	Approvals/certificates Approvals
Applications up to 300°C: TA Luft applications For clear liquids and gases without solids, acids and alkalis, hydrogen, for high switching operations, oxygen, water, hot water **Applications in almost all industries:** District Heating / Steel / Pulp&Paper / Power plant / Oil & Gas	TA Luft VDI2440 BAM approval when oil & grease free (KLN840) SIL2

TECHNICAL HIGHLIGHTS

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Absolute operational safety with certified quality

FIRE SAFETY

The ball valve can be used for fire safe applications at any given time as the basic design is already certified per default. In this context, the KLINGER Ballostar KHA offers a more stable bolting of the body with shorter bolts for greater mechanical stability with regard to thermal expansion. The type-testing fire safety requirements in accordance with API Standard 607, 7th Edition, and EN ISO 10497:2010 have been officially certified.

IMPROVED CORROSION PROTECTION

KLINGER Advanced Corrosion Protection is a newly developed, special coating procedure with galvanic coating ensuring improved protection against corrosion.
An impressive value of 400 h was determined in the course of a “neutral salt spray mist test” in accordance with ISO 9227. A comparison: Common phosphatization leads to 20 h, while standard finishing only results in 100 h of protection. This value corresponds to a salt spray test duration comparable with a C3 coating in accordance with ISO 12944-1.

SERIAL ANTISTATIC

The KLINGER Ballostar KHA features serial antistatic equipment in accordance with ISO 7121 and EN 1983 respectively. In this context, an antistatic ball, from DN 50 upwards, ensures the electrostatic discharge.

EMISSION-TIGHT

The standard stuffing box meets the requirements of TA Luft (VDI 2440:2000) and EN ISO 15848-1:2017. Double sealing at the body division by means of the KLINGERSIL® C-4430 soft gasket protects against external leakages and meets the highest helium emission testing requirements. The KLINGER Ballostar KHA is significantly below the requirements of emission limits to keep air clean.

OXYGEN DESIGN

Due to the fact that increased concentrations of oxygen lead to greater fire and explosion hazards, a valve must also meet certain pre-requirements in terms of oxygen.

STANDARDS-COMPLIANT MARKING

Standards-compliant marking in accordance with EN 19 is executed on the KLINGER Ballostar KHA by means of laser. The parameters DN, PN, year of manufacture, serial number, material, type and maximum temperature resistance are listed.

In-house test laboratory

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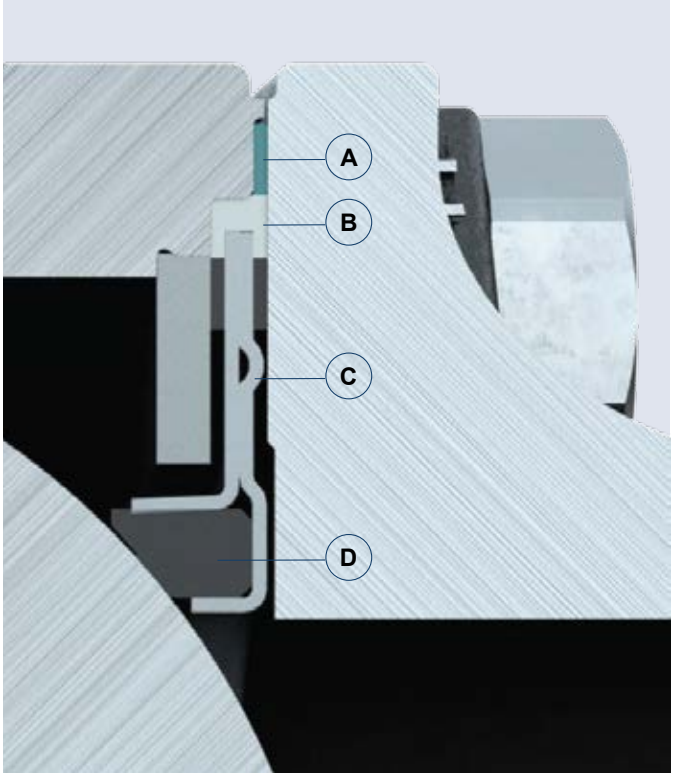
WHAT YOU CAN RELY ON

KLINGER

The unique KLINGER sealing system

The sealing element is the heart of every valve. The type of sealing defines under which conditions a valve can reliably execute its shut-off or regulating function. Leakages and the negative consequences resulting thereof are an immense challenge for plant operators. A seal that keeps its promises is therefore a must.
With the new Ballostar KHA KLINGER has created a ball valve that absolutely convinces with its unique sealing system!

THE OPTIMIZED SEALING SYSTEM



A KLINGERSIL® C-4430

The fire safety requirements have been integrated into the standard design of the Ballostar KHA. The soft material gasket KLINGERSIL® C-4430 protects against external leakages and meets the highest helium emission testing requirements.
The sleeve reliably holds the sealing element in the desired position. In the fire-safe version, a graphite ring additionally protects against excessive thermal stress.

B GRAPHITE GASKET

The graphite layer also protects against leakage to the atmosphere during high-temperature applications and, in combination with the KLINGERSIL® gasket, forms a double seal at the housing partition. This provides the highest degree of safety against external leakages.

C ELASTIC SEALING ELEMENT

The sealing element provides functionality across the entire lifecycle and simultaneously ensures the required contact pressure of the sealing ring.
The valve therefore remains continuously tight – independent of the pressure of the medium and the flow direction.

D SEALING RING

The sealing ring forms the basis of every functioning sealing system. It stands for the highest quality and reliability in accordance with the KLINGER standard! The fiber-reinforced sealing ring KLINGER KFC-25 consists of PTFE and graphite and is surrounded on three sides by the spring-loaded sealing element. It can thus absorb large amounts of contact force without deformation and is simultaneously protected against the medium.

As a globally leading manufacturer, KLINGER offers valves and sealing elements from one source. We pass on this synergetic benefit with more than 135 years of experience and a high degree of competence to our customers.

THE MULTITALENTED KHA

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FLEXIBLE LIKE A SWISS KNIFE

PRODUCT ADVANTAGES

» Maintenance-free
» Supports pressurization on both sides
» Bidirectional flow
» Ball with a cylindrical full bore
» Standard version Fire Safe certified (FF+FS)*
» Standard version TA Luft certified (FF+FS)*
» Standard version EN ISO 15848-1, ISO FE BH-CO2-SSA0-tRT (120°C) certified
» Greater mechanical robustness while exposed to thermal stress
» Unique pre-stressed and elastic sealing system
» Bidirectional sealing in accordance with EN 12266 – leakage rate A (soft seated)
» Modular selection of system components
» Serviceable without removal from the line
» Antistatic design in accordance with ISO 7121 / EN 1983
» Subsequent automation possible at any time (top flange in accordance with EN ISO 5211)

*Stock Items

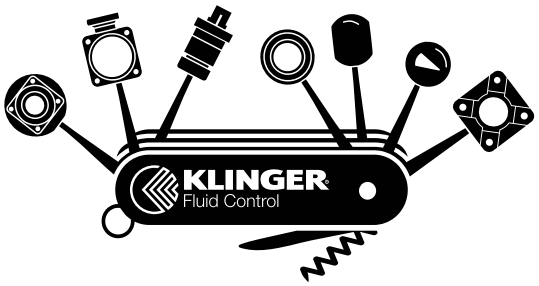
SPECIAL TYPES

» Metal seat (up to +400 °C) for abrasive media
» Operating stem sealed by O-rings
» Operating stem extension
» Oxygen version (oil, grease and silicone-free)
» Cryogenic version (down to -196 °C)
» Vacuum version (VV-VIT)
» Gas version
» Regulation design by means of V-port ball and actuator package
» Trunnion mounted
» Double Block & Bleed execution with drain valve

PRODUCT DETAILS

PN	16/25/40/63/100* and ASME CLASS150/300
DN	15-125 and 1/2“-5“
Housing	Cast steel*, rust and acid-proof cast iron, duplex
Ball	Special materials on demand
Operating	stem Rust and acid-proof steel
Temperature	-196 °C to +400 °C
Design	Flanges, threaded connection, welding ends
Type	Three-piece ball valve

*Stock Items



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BALLOSTAR
KHA-G/N

KLINGER

Threaded connection

GENERAL FEATURES
» 3-piece ball valve with full bore
» Floating ball, antistatic, lockable
» Double tightness in both directions
» Modular system components

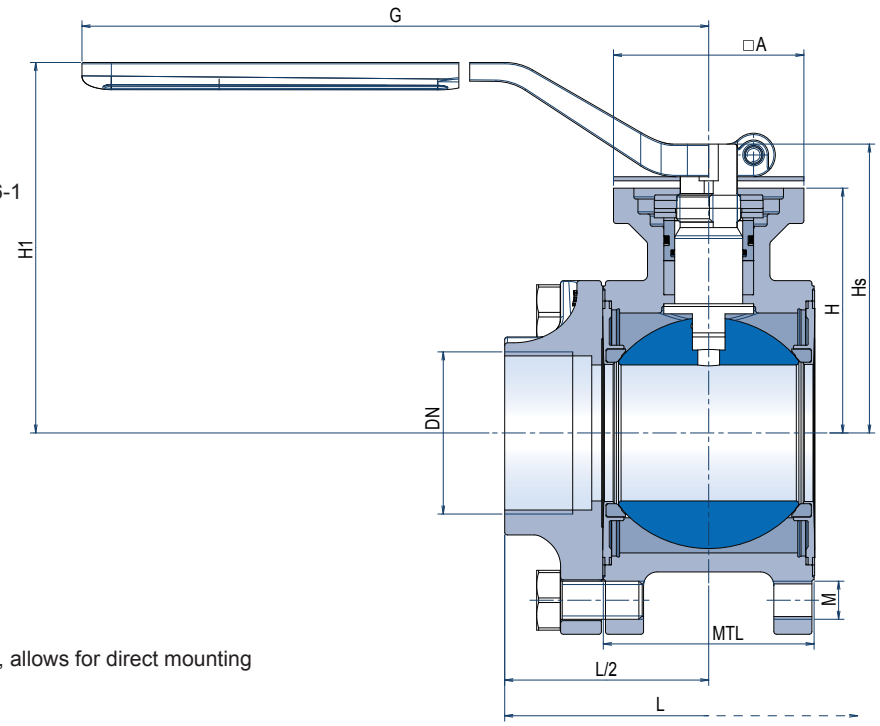
CONNECTIONS
» Internal thread Rp in accordance with EN 10226-1
» Internal thread in accordance with NPT ANSI B 1.20.1

DIMENSIONS
Face-to-face dimensions in accordance with EN 16722-114

ACCEPTANCE TESTING
» Seat leak tightness: EN 12266-1 , leakage rate A
» Tightness to atmosphere: EN 12266-1
» Strength: DIN EN 12266-1

AUTOMATION
» Flange connection in accordance with ISO 5211, allows for direct mounting of an actuator or by means of brackets.
» Pneumatic and electrical actuators utilizable.

TEMPERATURE
-196 °C to +400 °C (see pT diagram)



DN	Dimensions								Pressure level			Head flange size acc. to ISO 5211	Weight [kg]
	MTL	□A	H	Hs	H1	G	M	L	M1 (VIII)	M2 (Xc)	M3 (Xd)		
1/2“	26.4	42	35.0	43.5	83.0	130	M6	85	100	63	63	F04	0.90
3/4“	35.2	42	46.5	57.0	96.0	160	M8	95	100	63	63	F04	1.45
1“	41.5	42	50.0	60.5	100.0	160	M8	105	63	40	40	F04	1.80
1-1/4“	49.5	50	65.0	77.7	107.5	252	M10	120	63	40	40	F05	3.15
1-1/2“	63.0	50	72.5	85.2	114.7	252	M12	130	63	40	40	F05	4.75
2“	77.5	70	90.0	106.2	136.2	310	M14	150	40	40	40	F07	7.55

Material:
M1 (VIII) = Carbon steel*
M2 (Xc) = Stainless steel
M3 (d) = Duplex

*Stock Items

BALLOSTAR
KHA-F

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Flange design

GENERAL FEATURES
» 3-piece ball valve with full bore
» Floating ball, antistatic, lockable
» Double tightness in both directions
» Modular system components

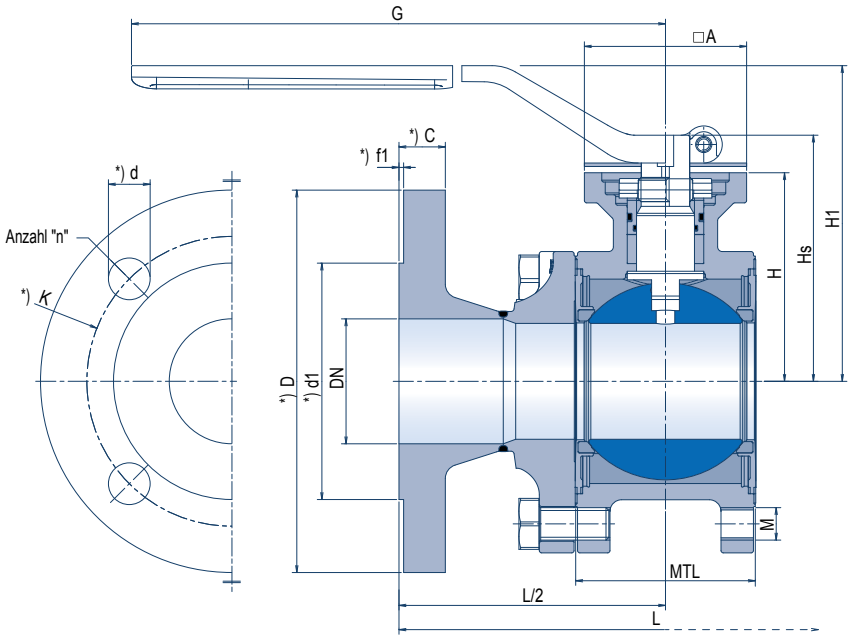
CONNECTIONS
» Flange in accordance with DIN EN 1092-1 or ASME B 16.5

DIMENSIONS
Face-to-face dimensions in accordance with EN 558-1, series 1 or dimensions in accordance with ANSI B16.10 CL 300

ACCEPTANCE TESTING
» Seat leak tightness: EN 12266-1 , leakage rate A
» Tightness to atmosphere: EN 12266-1
» Strength: EN 12266-1

AUTOMATION
» Flange connection in accordance with ISO 5211, allows for direct mounting of an actuator or by means of brackets. Pneumatic and electrical actuators utilizable.

TEMPERATURE
-196 °C to +400 °C (see pT diagram)



* Flange dimensions in accordance with DIN EN 1092-1 or ASME B 16.5

DN		Dimensions									Pressure level		Head flange size acc. to ISO 5211	Weight [kg]
		MTL	□A	H	Hs	H1	G	M	L (EN)	L (ASME)	M1 (VIII)	M2 (Xc)		
15	1/2“	26.4	42	35.0	43.5	83.0	130	M6	130	140	100	63	F04	2.3
20	3/4“	35.2	42	46.5	57.0	96.0	160	M8	150	152	100	63	F04	3.5
25	1“	41.5	42	50.0	60.5	100.0	160	M8	160	165	63	40	F04	4.3
32	1-1/4“	49.5	50	65.0	77.7	107.5	252	M10	180	178	63	40	F05	6.8
40	1-1/2“	63.0	50	72.5	85.2	114.7	252	M12	200	190	63	40	F05	9.0
50	2“	77.5	70	90.0	106.2	136.2	310	M14	230	216	40	40	F07	13.5
65	2-1/2“	93.5	70	100.0	116.2	146.2	310	M12	290	241	40	40	F07	18.0
80	3“	111.4	102	121.5	143.0	165.0	500	M16	310	282	40	40	F10	28.8
100	4“	131.6	102	135.0	156.5	178.5	500	M16	350	305	40	40	F10	40.6
125	5“	171.4	125	175.0	202.5	212.5	650	M16	400	381	40	40	F12	66.0

Material:
M1 (VIII) = Carbon steel
M2 (Xc) = Stainless steel

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NEW MODEL CODE:

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KHA	S-F	50	V1	P1	M2	FF	FS	IV		O2
Type	Conn	DN	Ball	PN	Body m.	Seats	Stuffingb.	Version	Special 1	Special 2
KHA	F	15	V0 –full b. (1)	P1 –PN16	M1-Viii (1.0619) (2)	FF-FS (Std)	FS-AF/graphite/Peek (FS)	FW-bare stem	AM- Ammonia KLN2414/8 (4)	BL-Blue RAL5015
	G	20	V1 –10°	P2 –PN25	M2-Xc (1.4408)	MM-Metal	LAB-ST/PTFE/(LAB)	HA-Lever	BO- Vent drilling KLN2414/8	C3-EN12944 C3 160µm (5)
	N	25	V3 –30°	P3 –PN40	M3-Xd (1.4462)	SS-MES	GRA-graphite	IV- Isol.ext.FW	DBB-trunnion w. drain (6)	C4-EN12944 C4 200µm
	S*	32	V6 –60°	P4 –PN63		PP-Pure PTFE	PTFE-pure PTFE	IH- Isol.ext.HA	GAS-ÖVGW/DVGW	C5I-EN12944 240-280µm
	S-F	40	VS -slot	P5 –PN100		VV- Viton	VIT- Viton	IG - Isol.+ Gear	PL-drain w. plug	C5M-EN12944 240-280µm
	F-S	50	C0 –full 30µm	P6 -CL150		HH-HACO (3)	HACO-ST/MS/Peek	IA- Isol. Actuator	TM-trunnion mounted	GE-Yellow RAL1023
	S-G	65	C1 –10°30µm	P7 –CL300		KK-KFC	C70M-C70M	KO- Console	TT-Low temperature	O2- Oxygen KLN840
	G-S	80	C3 –30°30µm	PX -Special		UU-UHWM	AF- Aflas O-Rings	GE-gear	VL- Sk pipe ext./special BL	OF- oil and grease free
	F-G	100	C6 –60°30µm				UHWM-PE-UHWM	AN- Actuator	AT-Air Torque	OFS- oil,grease,silicone free
	G-F	125	CS – slot 30µm						AU-AUMA (GS/SQ)	
	…	½“	D0 -full							
	MST	¾“	D1 –10°						K1- Customer des. (CPCU)	
		1“	D3 –30°						To – Customer Ebner	
		5/4“	D6 –60°						K99-Customer design	
		6/4“	DS -slot						Marine/Lloyds	
		2“							BASF	
		2.5“							EN161	
		3“								
		4“								
		5“								

* S: weld end, F: flange, G: threded end, S-F: weld end / flange, F-S: flange / weld end, S-G: weld end / threaded end, G-S: threaded end / weld end, F-G: flange / threded end, G-F: threaded end / flange

(1) V0 = solid stainless steel ball, V1 = v- port ball 10°, V3 = v- port ball 30°, V6 = v- port ball 60°, VS = slotted ball, CR = chrome coated ball 30µm

(2) M1 = former VIII carbon steel, M2 = former Xc stainless steel, M3 = former XD duplex

(3) HACO = Labrinth stuffingbox with brass pressure ring and peek friction washer

(4) AM – Ammonia version: KLN2414/8 with pressure relief drilling in upstream sealing element

(5) C3 = C3 coating acc. EN12944 middle µm160, C = C4 coating acc. EN12944 middle µm200, C5I = C5I coating acc. EN12944 middle 240-280µm, C5M = C5M coating acc. EN12944 middle 240-280µm

(6) DBB = double block and bleed with trunnion mounted ball and drain / test cock

FULL POWER

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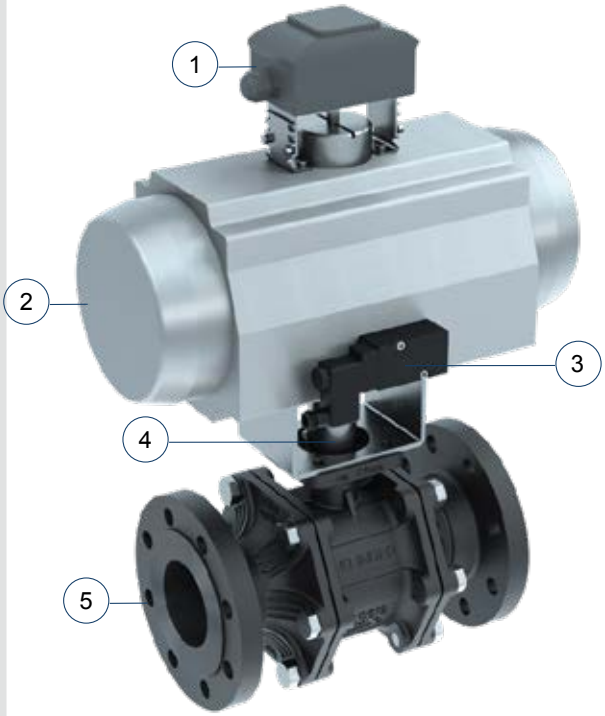
Switch on and get going!

Both pneumatic and electromechanical actuators can be used for the automation of the KLINGER Ballostar KHA ball valve. The exact determination of the torque saves investment and follow-up costs. The actuator should therefore not be selected in accordance with the maximum possible options in mind, but rather according to actual needs. In this context the necessary pressure differential determines the torque of the required actuator.

PNEUMATIC ACTUATOR

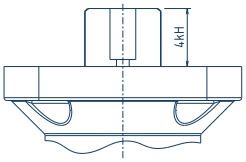
1. Limit switch box
2. Pneumatic actuator, single or double-acting
3. Solenoid valve
4. Bracket and coupling
5. KHA

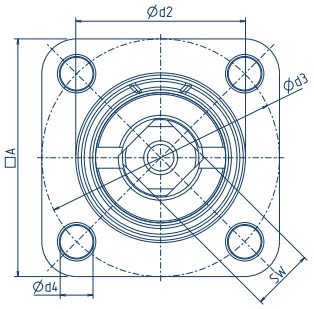


ELECTRIC ACTUATOR

1. Electric actuator
2. Actuator control
3. Bracket and coupling
4. KHA

Nennweite		ISO 5211	n A	SW	4kH	ød2	ød3	ød4
DN15	1/2"	F04	42	8	8,5	29	42	5,8
DN20	3/4"			11	10,5	30		
DN25	1"							
DN32	1 1/4"	F05	50	14	12,7	35	50	7
DN40	1 1/2"							
DN50	2"	F07	70	17	16,2	55	70	10
DN65	2 1/2"							
DN80	3"	F10	102	22	21,5	70	102	12
DN100	4"							
DN125	5"	F12	125	27	27,5	85	125	15





ACTUATOR SELECTION

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Operating moments for the different sealing rings with multi-part sealing elements

KLINGER recommends the factor of 1.5 for standard calculations, meaning plus 50 % should be used, to compensate for increased breakaway torques due to downtime. For valves featuring a reduced bore, the previous row (i.e. the one with the smaller nominal diameter) should be used.

KFC-25*

*Stock Items

Nominal diameter DN		Differential pressure (bar)										
		0	5	10	16	20	25	30	40	50	63	100
inch	mm	Torque (Nm)										
½"	15	6	6	6	7	7	7	7	8	8	9	10
¾"	20	12	12	13	13	13	14	14	15	16	16	19
1"	25	14	15	16	17	18	19	20	22	24	27	
1 ¼"	32	17	18	20	22	23	24	26	28	31	35	
1 ½"	40	25	28	31	34	36	39	42	47	53	60	
2"	50	37	41	44	49	52	55	59	66			
2 ½"	65	60	66	73	80	85	91	98	110			
3"	80	96	114	132	154	168	186	204	240			
4"	100	160	184	208	236	255	279	303	350			
5"	125	270	318	365	422	460	508	555	650			

VITON

Nominal diameter DN		Differential pressure (bar)			
		0	5	10	16
Inch	mm	Torque (Nm)			
1"	25	14	15.9	17.8	20
1 ¼"	32	18	20.2	22.4	25
1 ½"	40	25	29.7	34.4	40
2"	50	40	49.4	58.8	70
2 ½"	65	55	72.2	89.4	110
3"	80	100	150	200	260
4"	100	160	219.4	278.8	350

PTFE

½"	15	5	6	6	6	6	6	6	7	7	8	9
¾"	20	11	11	11	12	12	12	13	13	14	15	17
1"	25	13	14	14	16	16	17	18	20	22	24	
1 ¼"	32	15	17	18	19	20	22	23	26	28	32	
1 ½"	40	21	24	26	29	31	33	35	40	45	51	
2"	50	30	33	36	40	42	45	48	54			
2 ½"	65	51	56	62	68	72	78	83	94			
3"	80	72	86	99	115	126	140	153	180			
4"	100	120	138	156	177	191	209	227	263			
5"	125	203	238	274	317	345	381	416	488			

METAL/METAL SPECIAL

½"	15	8	8	8	9	9	9	9	10	11	12	14
¾"	20	15	16	16	17	18	19	19	21	22	24	29
1"	25	18	19	21	23	24	25	27	29	32	36	
1 ¼"	32	25	27	28	30	32	33	35	38	42	46	
1 ½"	40	40	45	50	55	59	64	69	78	88	100	
2"	50	55	64	74	85	93	102	111	130			
2 ½"	65	85	102	119	139	153	169	186	220			
3"	80	140	173	205	244	270	303	335	400			
4"	100	250	294	338	390	425	469	513	600			
5"	125	450	580	710	866	970	1100					

} Restriction stainless steel to 300°C

} Restriction stainless steel to 200°C

AREAS OF UTILIZATION

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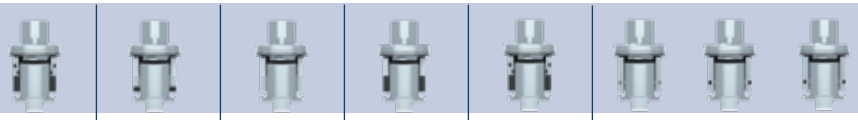
Recommended | Less suitable | Not recommended

Stuffing boxes



		FS**	LABP**	PTFE	GRA	GAS	VIT		
		Aflas/Graphite/ Peek	PTFE Labyrinth/ Peek	PURE PTFE/ Peek	Graphite/Peek	Gas O-rings & Graphite/Peek	Viton	Aflas	C70M
Media	Water / hot water								
	Mineral oil								
	Heat-transfer oil								
	Liquid gas / 1) cryogenic temperature								
	Saturated steam								
	Misc. gases								
	Vacuum / full vacuum								
	Hot steam (max. 300 °C)								
	Ammonia								
	Oxygen								
Operating conditions	Standard utilization								
	High number of cycles								
	Frequent temperature changes								
	Fire safety (Fire-Safe)								
	Chemical industry								
	Abrasive media								
	Temperature range (°C)	-20 * | +300	-196 | +300	-196 | +300	-85 | +400	-15 | +150	-15 | +150	-20*/+250	-35/+125
Certifications	VDI 2440 (TA-Luft)	+	+	+		+		+	
	ISO15848-1	+							
	ÖVGW					+			
	Fire-Safe	+				+			

Sealing elements

		FF**	PP	MM	SS	VV	KK**	GG
		Standard KFC Fire-Safe	PTFE	Metal	Metal special	Viton	Standard KFC	Gas KFC Fire-Safe
Media	Water / hot water							
	Mineral oil							
	Heat-transfer oil							
	Liquid gas / 1) cryogenic temperature							
	Saturated steam							
	Misc. gases							
	Vacuum / full vacuum							
	Hot steam (max. 300 °C)							
	Ammonia							
	Oxygen							
Operating conditions	Standard utilization							
	High number of cycles							
	Frequent temperature changes							
	Fire safety (Fire-Safe)							
	Chemical industry							
	Abrasive media							
	Temperature range (°C)	-60/+300	-196/+200	-60/+300	-60/+400	-15/+150	-60/+300	-60/+300
Certifications	VDI 2440 (TA-Luft)	+					+	+
	ISO15848-1	+						+
	ÖVGW							+
	Fire-Safe	+						+

1) Combined with cryogenic temperature extension and sealing element

* O-rings for less temperature optionally available.

**Stock Items

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AREAS OF UTILIZATION

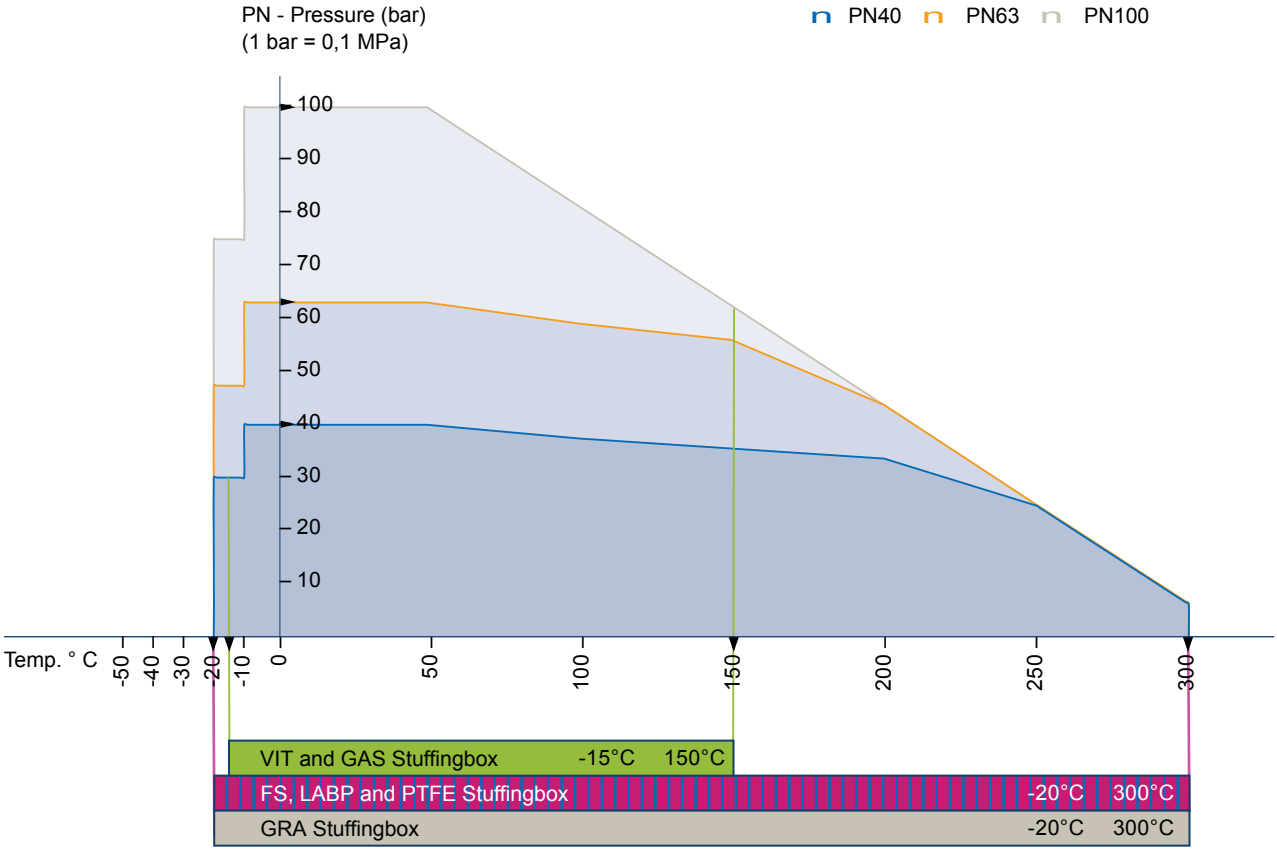
KLINGER

Pressure and temperature ranges

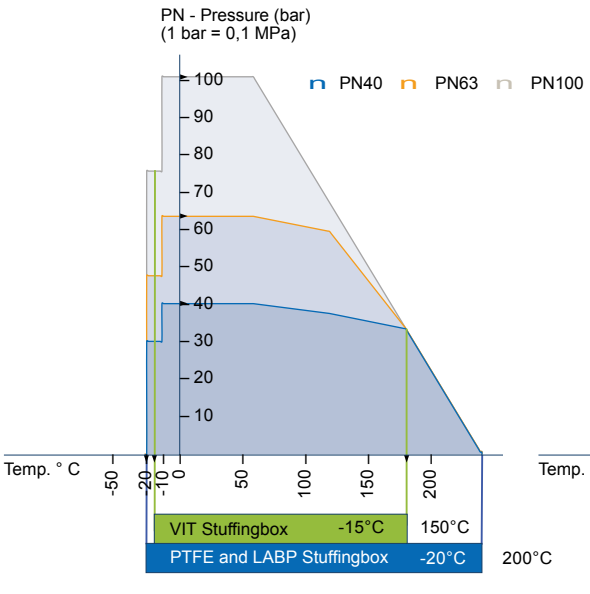
Carbon steel

Material index M1 (VIII)

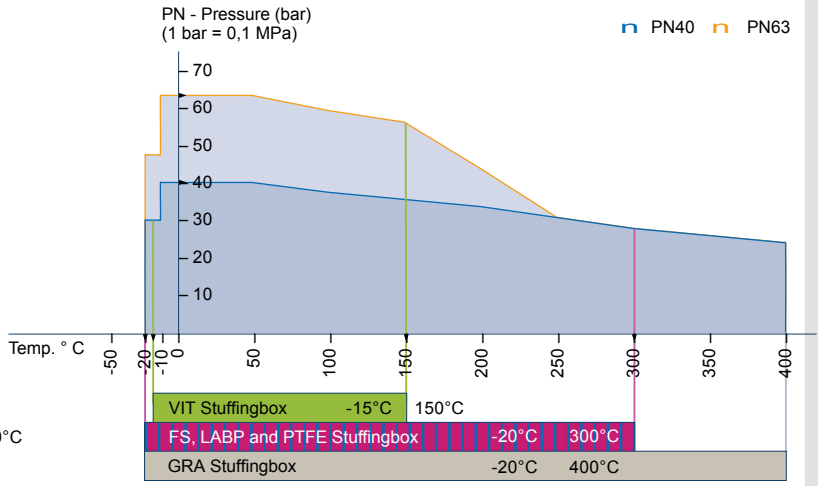
PT diagram for the sealing elements FF, KK, GG and MM



PT diagram for the sealing elements PP



PT diagram for the sealing elements SS



TECHNICAL DETAILS

KLINGER

ALPHA GROUP

Flow characteristics for the determination of the nominal diameter

SIZE OF BALL VALVE

Flow rate	Q	in m^3/h
Pressure loss	Δp	in bar
Density	ρ	in kg/m^3
Velocity	w	in m/s
Flow coefficient	K_v	in m^3/h
Pressure loss coefficient	ζ	

Allows for the calculation of:

$$K_v = Q * \sqrt{\frac{\rho}{1000 * \Delta p}}$$

The valve is to be selected in a manner that the K_v-value is greater, or the ζ-value less than the computed value.

or

$$\zeta = \frac{2 * \Delta p * 10^5}{\rho * w^2}$$

FLOW VALUES

DN (mm)	ζ	K_{vs}-value
15	0.24	18.3
20	0.21	35.2
25	0.19	56.7
32	0.22	88.1
40	0.14	173.0
50	0.09	329.0
65	0.09	560.5
80	0.08	910.0
100	0.07	1522.0
125	0.06	2537.0

PRESSURE LOSSES

$$\Delta p = \zeta ** \frac{\rho}{2} \quad w^2 * 10^{-5}$$

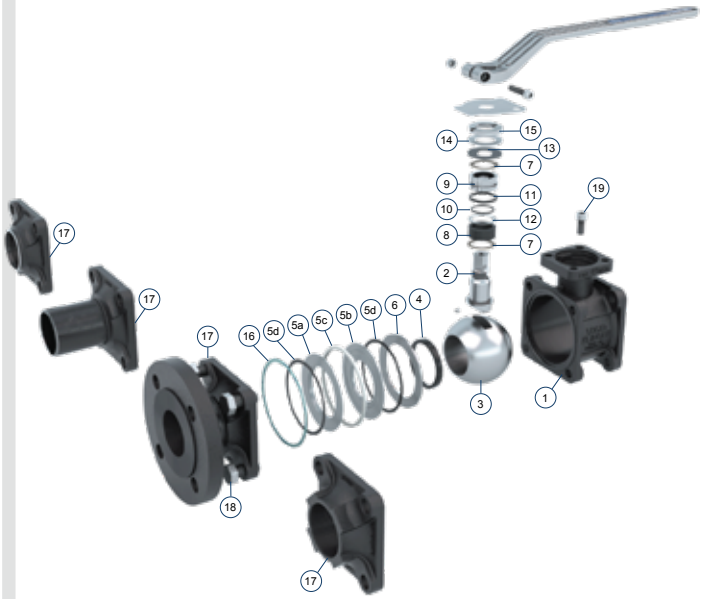
oder

$$\Delta p = \left(\frac{Q}{k_v}\right)^2 * \frac{\rho}{1000}$$

The characteristic unit for shut-off and control valves is the **K_v**-value. The values provided in the table apply to a H_2O flow medium with a temperature of 5 – 30 °C, a density of 1000 kg/ m^3 and a pressure loss of p = 1 bar at the valve.
In metric measurement systems the characteristic unit utilized is the **K_v**-value. In countries using inches, the characteristic unit is described by means of the cV-value. It provides how many US gal/min of water, at a temperature of 60 °F and with a pressure loss of 1 psi, flow through the valve.

Bill of materials

PARTS LIST



Pos.	Anz.	Name		M1 (VIII)	M2 (Xc)	M3 (Xd)
1	1	Housing		1.0619	1.4408	1.4470
2	1	Operating shaft		1.4104	1.4404	1.4462
3	1	Ball		V4A		1.4462 / 1.4470
4	2	Sealing ring		KFC-25		
5	2	Sealing element Fire Safe	a)support disc	1.4401		1.4462
			b)cover disc	1.4401		
			c)U-sleeve	PTFE		
			d)flat gasket	Graphite		
6	2	Support ring		1.4401		-
7	2	Bearing disc		1.038	1.4401	
8	1	Sealing bush		Graphite		
9	1	Sealing insert		1.4401		
10	1	O-Ring		FEPM A75H		
11	1	O-Ring				
12	1	Washer		1.4401		
13	1	Washer		1.4401		
14	1	Belleville washer		1.4310		
15	1	Gland nut		1.4404		
16	2	Gasket		KLINGERSIL C-4430		
17	2	Flange design		1.0619 / P235GH	1.4408 / 1.4404	1.4462 / 1.4470
	2	Welding ends long		1.0619	1.4408	–
		Welding ends				1.4462
	2	Threaded connection				
18	8/12/16	Hexagon nut		A4-70		
19	1	Socket screw		A4-70		