

PRE-VENT GmbH

Valves - Regulators - Actuators

PRODUCT OVERVIEW &
TECHNICAL DATASHEETS





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Product Overview & Technical Datasheets

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Index	Chapter	Page
Prologue	00	02
Specification Sheet	00	03
Overview of Control Valves	00	04
Globe Control Valve BR11	01	01...10
High-Performance Control Valve BR12a	02	01...12
High-Performance Control Valve BR12b	03	01...12
3-Way Control Valve BR13	04	01...06
Rotary Control Valve BR33	05	01...08
Pneumatic Actuator P/R	06	01...02
Pneumatic Actuator P1/R1	06	03...04
Self-Actuating Pressure Regulator ZSN	07	01...04
Special Executions	08	01...08
Suppliers & Partners (Supplements)	09	01...04

PRE-VENT GmbH Our company is specialized in the production of control valves for the industrial process automation and the distribution of industrial automation parts. For more than ten years, we have been producing our own brand of control valves: **PRE-VENT**

The safety and protection of health, employees, environment and goods has priority. Therefore, we are constantly striving to improve the safety of our products and also to support this. With our products you can improve the standard of safety of your plant and you can improve your safety-related systems up to **SIL 3** acc. to **IEC 61508**.

Our products are manufactured to the highest quality standards, which are required for the industrial processes of a wide range of different industries. It is important for us to meet the wishes of our customers in every detail and to find out the best solution.

You can trust on our advice and technical expertise!

In conjunction with our parent company, Finze & Wagner EMSR Ingenieurgesellschaft mbH, we can therefore offer you - our client - complete solutions for measuring and control technology. We support you from hardware and software engineering up to project engineering of complete electrical and ICA installations.

With **PRE-VENT** you make the right choice!

Set of Components/Component Safety Data (acc. IEC 61508 and IEC 61511)					
Set of Components	Control Valve (BR11) Diaphragm Multi-Spring Pneumatic Actuator (PIR & P1R1)				
Variants BR11	Standard / Extension / Bellow / Self-adjusting / TA-Air / balanced plug		B130398_V10		
Variants PIR & P1R1	Type PIR & P1R1 Single + Tandem (without handwheel) Spring Range 1..7		B130392_V10		
Manufacturer	PRE-VENT GmbH		Ref. IEC 61508-2		
Component Type	Type A				
Mode of Operation	Low demand operation				
Safety Function	SF1: Actuator closes valve in specified time SF2: Actuator opens valve in specified time				
Safe State	SS1: Actuator holds valve in closed position with specified leakage SS2: Actuator holds valve in opened position with specified mass flow				
Failure Rates (failure/10⁷ hrs = FIT) with diagnosis					
Failure Rate Distribution	Q _{DU}	Q _{DU}	Q _{DU,undetected}	SFF [%]	
Control Valve BR11 (all)	112	56	30	24	
Diaphragm Actuator PIR & P1R1 (all)	3.135	2.950	57	128*	
Diaphragm Actuator PIR & P1R1 with Control Valve BR11 (all variants)	3.247	3.008	87	152	
* Design of actuator components, one spring failure without affecting safety function					
Specification of component Architecture					
Architecture	1oo1				
Hardware Fault Tolerance HFT	0				
MTR [h]	32				
Diagnostic Coverage DC [%]	95%				
Verification of SIL Capability (examples with diagnosis)					
Proof Test Interval	6 months	1 year	2 years	3 years	5 years
PPD (acc. IEC 61508, 60.2.2.3, IEC 61511)	3.41 E-04	6.73 E-04	1.34 E-03	2.01 E-03	3.34 E-03
(1) quantitative achievable SIL (acc. IEC 61508, Tab. 3)	SIL 3	SIL 3	SIL 2	SIL 2	SIL 2
(2) qualitative achievable SIL (acc. IEC 61508, Tab. 3)	SIL 2 (for HFT 0, Type A; 60% d F; 9 0)				
Achievable SIL = Min ((1); (2))	SIL 2	SIL 2	SIL 2	SIL 2	SIL 2
Calculated (Component/Component)	INGENIEURBÜRO URBAN Amberg-Heide-Platz 24, D-92009 Pilsach		Pilsach, 2014/04/13		
© INGENIEURBÜRO URBAN, SIL-Consulting, UrbanRT, Actuator-PIR, Pre-vent					
SIL 3 von 2					
INGENIEURBÜRO URBAN – Dipl.-Ing. J. Urban Öffentl. Bestellung u. Vereidigung Zeichen für Sachverständigen Unabhängigkeit Imparzialità Publicly certified The mark of quality in the expert profession Independence Imparzialità Certification pubblica Señal de competencia Independencia Imparcialidad					

Sheet

blue
not orange

and component designator
7.4.4.1.3)
508-1)
4

ulation of the set of components/component and the be used for further quantitative analysis of the set of analysis, and due to this for a quantitative evaluation of attribution the Safe Failure Fraction (SFF) is

to rates of each component of this set of components.

parameters:
pot1, pot2, Zuo3, etc.)
of dispatch on the safety function of the set of component in case of failure
diagnostic structure/diagnostic measures for the set of 8.3.2. parallel stroke test). The diagnostic coverage is (see failure rates)

the user. Therefore with respect to default values and present a verification of the product capability for use in deviation of the application specific values from the

ation of the pfs-value depending from the defined id on the architectural information of the set of
(2): MN ((1) - (2)).
is given by the min. SIL value of a single com-
personal measure to this quantitative analysis: impoents/component). For pre-vent use

Certificate

ISO 9001:2008
ISO 14001:2004

PRE-VENT GmbH
Pilsach, Germany

CERTIFICATE

The Certification Body of TÜV SÜD Industrie Service GmbH, a Member Group of the Pressure Equipment Services (PES), certifies that

PRE-VENT GmbH
Township & L. of A. B. 92009 Pilsach, Germany

maintains a certified and conforms to safety standards and is authorized by the PES (PES 00000001) of the TÜV SÜD Group.

is responsible for the design, construction and assembly of control and safety valves with accessories and control engineering.

The authority has issued this certificate in accordance with the PES (PES 00000001) of the TÜV SÜD Group.

The certificate is submitted by the product manager (responsible for the safety-related aspects) to the PES (PES 00000001) of the TÜV SÜD Group.

CE 0036

Certificate No.: ZSP/00000001/00000001

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INGENIEURBÜRO URBAN – Dipl.-Ing. J. Urban
Öffentl. Bestellung u. Vereidigung | Zeichen für Sachverständigen | Unabhängigkeit | Imparzialità
Publicly certified | The mark of quality in the expert profession | Independence | Imparzialità
Certification pubblica | Señal de competencia | Independencia | Imparcialidad

Customer: _____	Reference: _____
TAG-number: _____	Date: _____

Hazardous Area: <input type="checkbox"/> YES <input type="checkbox"/> NO	SIL - Classification: <input type="checkbox"/> YES <input type="checkbox"/> NO
Ambient Temperature: _____ °C	Corrosive Environment: <input type="checkbox"/> YES <input type="checkbox"/> NO

VALVE DATA			
Type: _____	Nominal Diameter: _____	<input type="checkbox"/> DN <input type="checkbox"/> ASME	
Body Material: _____	Nominal Pressure: _____	<input type="checkbox"/> PN <input type="checkbox"/> Class	
Connection: _____	Form: _____		
Trim Material: _____	Bonnet: _____		
Leakage Class: _____	Stuffing box: _____		
KVs-value: _____ m³/h	Characteristic: _____		

OPERATING DATA			
Fluid: _____	State: <input type="checkbox"/> liquid <input type="checkbox"/> gaseous <input type="checkbox"/> vaporous		
Density: _____ kg/m³	Molecular weight: _____ kg/kmol		
	min.	norm.	max.
Temperature (T)	_____	_____	_____
Inlet pressure (p1)	_____	_____	_____
Outlet pressure (p2)	_____	_____	_____
Flow rate (Q):	_____	_____	_____
Viscosity:	_____	_____	_____

ASSEMBLING PARTS			
<input type="checkbox"/> Actuator	Manufacturer: _____	Type: _____	
Version:	<input type="checkbox"/> pneumatic <input type="checkbox"/> electric	<input type="checkbox"/> electro-hydraulic <input type="checkbox"/> manual	
Supply:	_____ <input type="checkbox"/> bar <input type="checkbox"/> V AC <input type="checkbox"/> V DC	Fail-Safe: <input type="checkbox"/> CLOSE <input type="checkbox"/> OPEN <input type="checkbox"/> STOP	
Actuating time	_____ / Seconds	<input type="checkbox"/> Explosion Protection:	
<input type="checkbox"/> Positioner	Manufacturer: _____	Type: _____	
Version:	<input type="checkbox"/> electro-pneumatic <input type="checkbox"/> pneumatic	<input type="checkbox"/> electric <input type="checkbox"/> HART <input type="checkbox"/> fieldbus <input type="checkbox"/> Profibus	
Operating:	OPEN at: _____	CLOSE at: _____	<input type="checkbox"/> mA <input type="checkbox"/> bar <input type="checkbox"/> fieldbus <input type="checkbox"/> Position Feedback
Explosion Protection:	<input type="checkbox"/> w/o <input type="checkbox"/> ATEX EEx i	<input type="checkbox"/> ATEX EEx d <input type="checkbox"/>	
<input type="checkbox"/> Solenoid Valve	Manufacturer: _____	Type: _____	
Version:	<input type="checkbox"/> 3/2 Way <input type="checkbox"/> 5/2 Way	<input type="checkbox"/> Redundancy	Voltage: _____ <input type="checkbox"/> V AC <input type="checkbox"/> V DC
Explosion Protection:	<input type="checkbox"/> w/o <input type="checkbox"/> ATEX EEx i	<input type="checkbox"/> ATEX EEx d <input type="checkbox"/> ATEX EEx m	<input type="checkbox"/>
<input type="checkbox"/> Limit Switch	Manufacturer: _____	Type: _____	
Version:	<input type="checkbox"/> Inductive <input type="checkbox"/> mech. Switches	Position: <input type="checkbox"/> CLOSE <input type="checkbox"/> OPEN	
Explosion Protection:	<input type="checkbox"/> w/o <input type="checkbox"/> ATEX EEx i	<input type="checkbox"/> ATEX EEx d <input type="checkbox"/>	
<input type="checkbox"/> Filter Regulator	Manufacturer: _____	Type: _____	
<input type="checkbox"/> Booster	<input type="checkbox"/> Lock-up Valve	<input type="checkbox"/> Quick-exhaust valve	<input type="checkbox"/>
Fitting:	<input type="checkbox"/> ERMETO <input type="checkbox"/> Swagelok	<input type="checkbox"/>	
Tubing:	<input type="checkbox"/> Steel <input type="checkbox"/> Stainless Steel	Diameter: _____	

NOTE:

Overview of Control Valves

Version	BR11	BR12a	BR12b	BR13	BR33
2-Way Valve					
3-Way Valve					
Nominal Diameter / Nominal Pressure					
DN / ANSI	DN15...DN250 ½"...10"	DN15...DN400 ½"...16"	DN25...DN400 1"...16"	DN15...DN250 ½"...10"	DN25...DN450 1"...18"
PN / Class	PN 10...40 Class 150...300	PN 10...400 Class 150...2500	PN 10...400 Class 150...2500	PN 10...40 Class 150...300	PN 10...100 Class 150...600
Connection					
Flange					
Wafer (Sandwich)					
Welding Ends					
Stem- / Shaft Sealing					
adjustable stuffing box					
spring-loaded stuffing box					
TA-Luft stuffing box					
bellows seal					
Body Materials					
Cast Iron EN-JL1040					
Ductile Iron EN-JS1025					
Carbon Steel 1.0619					
Carbon Steel ASTM A216 WCB					
Carbon Steel 1.6220					
Alloy Steel 1.7379					
Alloy Steel ASTM A217 WC9					
Stainless Steel 1.4408					
Stainless Steel ASTM A351 CF8M					
Stainless Steel 1.4404					
Stainless Steel ASTM A351 CF3M					
Leakage Classification (Seat sealing)					
metal-to-metal seat Class IV					
metal-to-metal seat Class V					
soft seat Class VI					
Special Executions					
Balanced Plug					
Perforated Plug / Cage					
Control Cage					
Multi-Stage Plug					
Certifications / Declarations, etc...					
Conformity CE & EAC					
PED 2014/68/EU					
ATEX 2014/34/EU					
GOST-R (TR)					
NACE MR-0175					
SIL Certification as per IEC 61508		in progress	in progress	in progress	

Application

The globe control valve BR11 is used in automated, industrial installations to control the flow of gases and liquids. Design and production meets the requirements of Quality Management System ISO 9001. The wide range of materials and the various configuration options make this valve very popular in the chemical and petrochemical industry.

Features

- » Nominal Diameters from DN15 up to DN250
- » Nominal Pressure from PN10 up to CL300
- » Face-to-Face length as per DIN EN 60534-3-1 or ANSI B16.10
- » Temperature range -196°C up to +450°C
- » Leakage Class IV and VI according to DIN EN 60534-4
- » Characteristic: Linear (L); Equal-percentage (P); ON/OFF [quick-opening] (S)
- » Rangeability 50:1
- » Design with Flange ends, TA-Luft, Bellows seal bonnet possible
- » Optional using of balanced plug (>DN40) allows the reduction of actuation forces
- » Better control characteristic through larger stroke
- » Higher maximum KVs-values
- » Exact spindle guide, in diameters DN15 - DN100 by using of long guide, including hardened guiding sleeve
- » Stem guided in diameters DN125 - DN250
- » Design as per Pressure Equipment Directive 2014/68/EU
- » Conformity CE and EAC
- » Optional certification/confirmation according to ATEX 2014/34/EU, GOST-R (TR), SIL2 (IEC 61508) and AD2000 Merkblatt



Design and technical Specification

Diameters: DN15; 20; 25; 32; 40; 50; 65; 80; 100; 125*; 150; 200; 250
* possible in body material EN-GJL250 and EN-GJS400-18 LT. Other materials on request.

Pressure: PN10; 16; 25; 40 as per DIN EN 1092-1:2013 and DIN EN 1092-2:1999
ANSI CL150; 300 and DIN EN 1759-1:2005

Flanges as per DIN EN 1759-1:2005 can be assembled with flanges execution per standards ANSI / ASME B16.5 and MSS SP44. They correspond to the standard DIN EN 7005-1:2002 following pressure ranges: CL150 \cong PN20 and CL300 \cong PN50

Table 1 Flange Versions

Material	Nominal Pressure	Raised Face	Flange Facing		
			Groove	Recess	Ring-Joint
Identification					
Cast Iron	PN10; 16	B ²⁾	-	-	-
Ductile Iron	PN10; 16; 25; 40		-	-	-
Carbon Steel Stainless Steel	PN10; 16; 25; 40		D	F	-
	CL150		-	-	J (RTJ)
	CL300		DL (D1 ¹⁾)	F (F1)	
¹⁾ only for CL300; ²⁾ B1 - (Ra = 12,5 mm, concentric surface structure "C"), B2 - (Ra as agreed with the customer); () - as per ASME B16.5					

Table 2 Packing and Bonnet Versions

Packing	PN / CL	Temperature [°C]		
		Standard	Valve Bonnet Extended	Bellows Seal
PTFE V-Ring	PN10...CL300	-46...+200	-196...-46 +200...+300	-100...+200
PTFE+Graphite				
PTFE V-Ring / TA-Luft				
Graphite		+200...+300	+300...+450	+200...+400
Graphite / TA-Luft				

Table 3 Temperature Range depending on Execution

Execution	Operating Temperature [°C]		Max. Operating Pressure [bar]
	Min.	Max.	
Balanced Plug	- 50	+250	40
Soft seated (PTFE inlay)	-100	+260	35
Bellows Seal Bonnet	-100	+400	35

Body (1); Bonnet (2); Valve Plug (3); Valve Seat (4); Valve Stem (5); Drain Plug (6); Body Gasket (7)

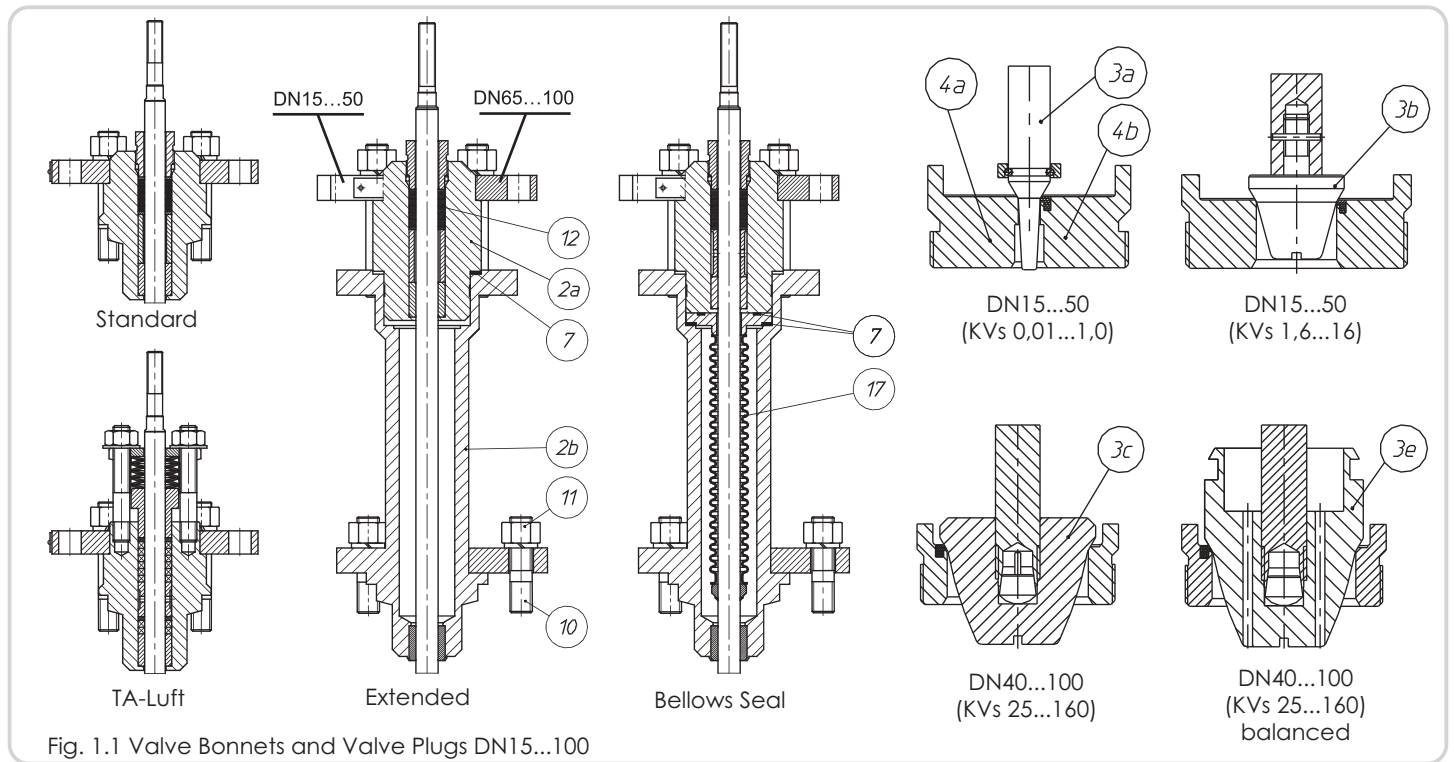


Fig. 1.1 Valve Bonnets and Valve Plugs DN15...100

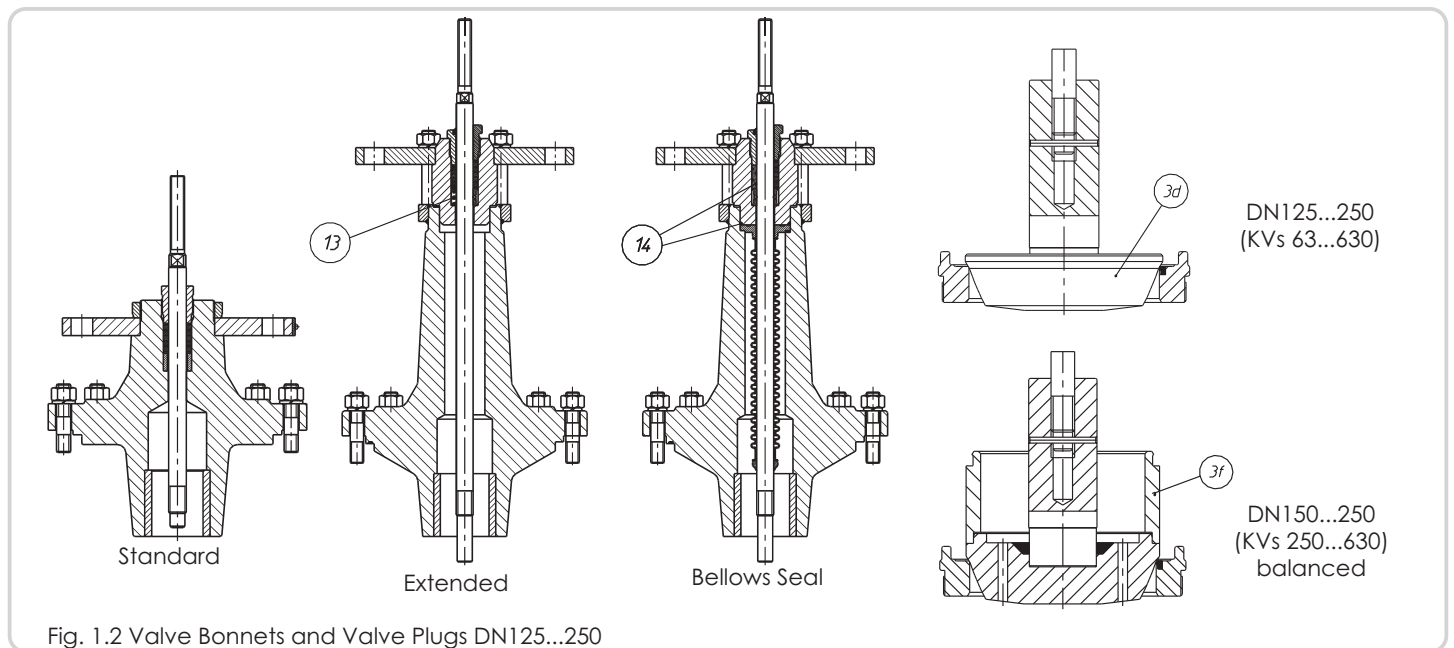
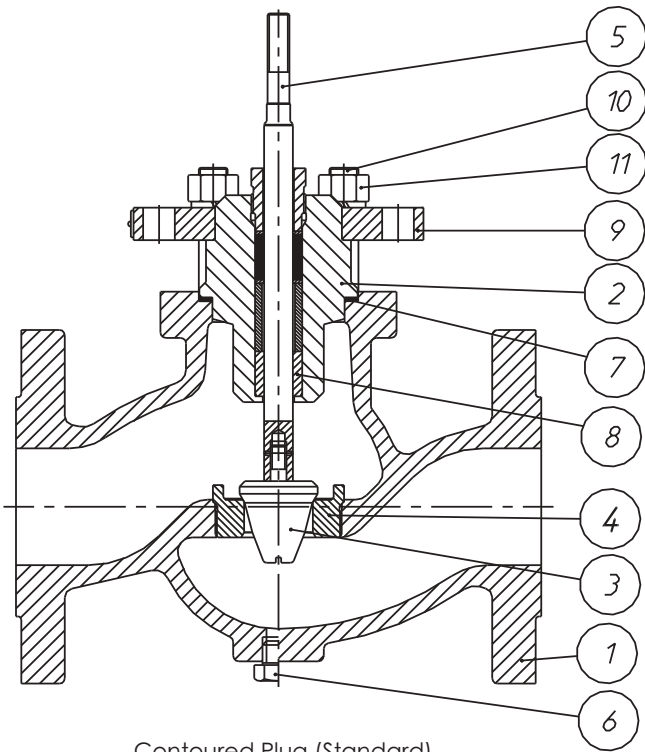


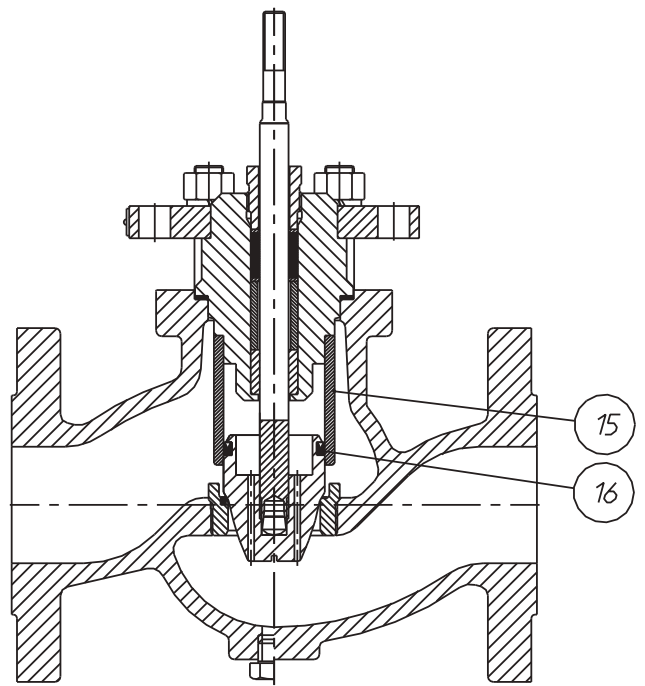
Fig. 1.2 Valve Bonnets and Valve Plugs DN125...250

NOTE:

PRE-VENT control valves are supplied with an adjustable stuffing box as standard. Using a spring-loaded packing box the max. operating temperature is +300°C.

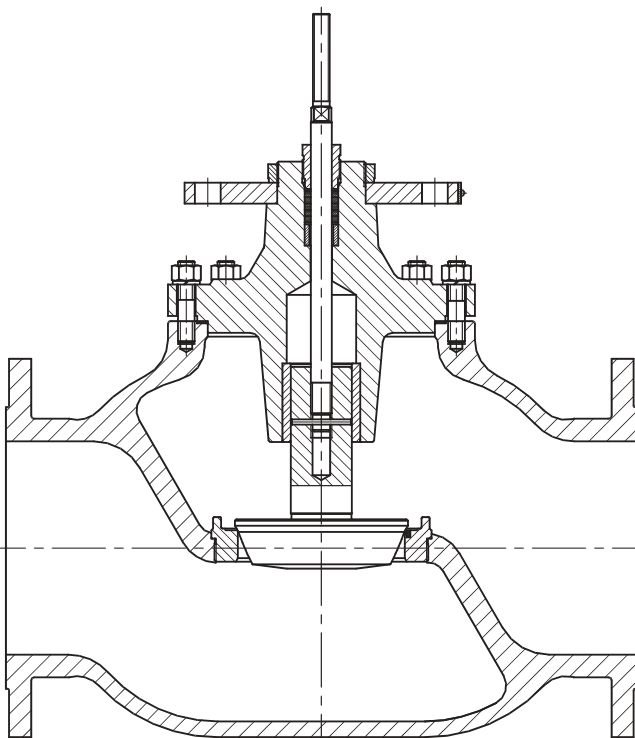


Contoured Plug (Standard)

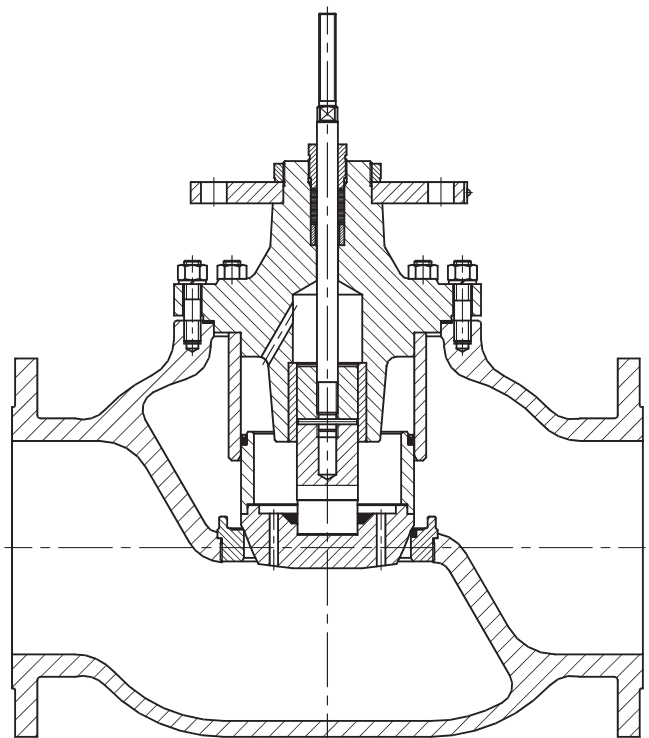


Balanced Plug

Fig. 2.1 Execution for DN15...100



Contoured Plug (Standard)



Balanced Plug

Fig. 2.2 Execution for DN125...250

Table 4 Components and Materials

No.	Component		Material					
1	Body		EN-GJL250 (EN-JL1040)	EN-GJS400-18LT (EN-JS1025)	GP240GH (1.0619) WCB	G20Mn5 (1.6220)	G17CrMo9-10 (1.7379) WC9	GX5CrNiMo19-11-2 (1.4408) CF8M
2	Bonnet	DN15...100	S 355 J2G3 (1.0570)				13CrMo4-4 (1.7335)	X6CrNiMoTi17-12-2 (1.4571)
		DN125...250	EN-GJL250 (EN-JL1040)	EN-GJS400-18LT (EN-JS1025)	GP240GH (1.0619) WCB	G20Mn5 (1.6220)	G17CrMo9-10 (1.7379) WC9	GX5CrNiMo19-11-2 (1.4408) CF8M
3	Plug		X6CrNiMoTi17-12-2 (1.4571) X6CrNiMoTi17-12-2 (1.4571) + Stellite + Chrom(III)-nitride X17CrNi16-2 (1.4057) + heat treatment					
4	Seat		X6CrNiMoTi17-12-2 (1.4571) X6CrNiMoTi17-12-2 (1.4571) + Stellite X6CrNiMoTi17-12-2 (1.4571) + PTFE X17CrNi16-2 (1.4057) + heat treatment					
5	Stem		X6CrNiMoTi17-12-2 (1.4571) X6CrNiMoTi17-12-2 (1.4571) + Stellite + Chrom(III)-nitride X17CrNi16-2 (1.4057) + heat treatment					
6	Drain Plug		S 355J2G3 (1.0570)			X6CrNiMoTi17-12-2 (1.4571)		
7	Body Gasket		X6CrNiMoTi17-12-2 (1.4571), NOVATEC PREMIUM SIGRAFLEX HOCHDRUCK, MWK-50 SPETOMET					
8	Guiding Sleeve		X6CrNiMoTi17-12-2 (1.4571)					
9	Compression plate		C45 (1.0503), X30Cr13 (1.4028), X6CrNiMoTi17-12-2 (1.4571)					
10	Bolt		8.8			A4 - 70		
11	Nut		8			A4 - 70		
12	Packing		PTFE+Graphite, PTFE-V, Graphite					
13	Spring		12R10 (SANDVIK)					
14	O-Ring		FKM					
15	Guiding Sleeve		X6CrNiMoTi17-12-2 (1.4571) X6CrNiMoTi17-12-2 (1.4571) + Stellite + Chrom(III)-nitrid X17CrNi16-2 (1.4057) + heat treatment					
16	Sael Ring		PTFE + X6CrNiMoTi17-12-2 (1.4571), TURCON + X6CrNiMoTi17-12-2 (1.4571)					
17	Bellows Seal		X6CrNiMoTi17-12-2 (1.4571)					
•	Rec. Spare Parts							

Material	Standard
EN-GJL250 (EN-JL1040)	DIN EN 1561
EN-GJS400-18 LT (EN-JS 1025)	DIN EN 1563
GP240GH (1.0619)	DIN EN 10213-2
WCB	ASTM A 216
G20Mn5 (1.6220)	EIN EN 10213-3
G17CrMo9-10 (1.7379)	DIN EN 10213-2
WC9	ASTM A217
13CrMo4-4 (1.7335)	DIN EN 10028
GX5CrNiMo19-11-2 (1.4408)	DIN EN 10213-4
CF8M	ASTM A351
S355J2G3 (1.0570)	DIN EN 10025
X6CrNiMoTi17-12-2 (1.4571)	DIN EN 10088
X17CrNi16-2 (1.4057)	DIN EN 10088
C45 (1.0503)	DIN EN 10083-1
X30Cr13 (1.4028)	DIN EN 10088

NOTE:

- » Padding of Surface with Stellite: ~ 40HRC
- » Chrom(III)-nitride Coating (~ 0,1 mm): ~ 950HV
- » Heat treatment (quenched & tempered): Plug ~ 45HRC; Seat ~ 35HRC; Stem ~ 35HRC; Guiding Sleeve~ 45HRC

For acid Fluids it is recommend to use trim materials made from 1.4404 or 316L. For H2S-applications it is possible to provide NACE MR-0175. NACE is only possible with ASME/ASTM Materials.

Table 5a...5f Allowable Operating Pressure (DIN)

Table 5a		Material: EN-GJL250 (EN-JL1040) as per DIN EN 1561								
PN	Standard	Temperature [°C]								
		-10...+50	100	150	200	250	300	350	400	450
Max. Operating Pressure [bar]										
PN10	DIN EN 1092-2	10	10	9	8	7	6	-	-	-
PN16		16	16	14,4	12,8	11,2	9,6	-	-	-

Table 5b		Material: EN-GJS400-18 LT (EN-JS1025) as per DIN EN 1563								
PN	Standard	Temperature [°C]								
		-10...+50	100	150	200	250	300	350	400	450
Max. Operating Pressure [bar]										
PN10	DIN EN 1092-2	10	10	9,7	9,2	8,7	8	7	-	-
PN16		16	16	15,5	14,7	13,9	12,8	11,2	-	-
PN25		25	25	24,3	23	21,8	20	17	-	-
PN40		40	40	38,8	36,8	34,8	32	28	-	-

Table 5c		Material: GP240GH (1.0619) as per DIN EN 10213-2								
PN / CL	Standard	Temperature [°C]								
		-10...+50	100	150	200	250	300	350	400	450
Max. Operating Pressure [bar]										
PN10	DIN EN 1092-1	10	9,2	8,8	8,3	7,6	6,9	6,4	5,9	-
PN16		16	14,8	14	13,3	12,1	11	10,2	9,5	-
CL150	DIN EN 1759-1	17,3	15,4	14,6	13,8	12,1	10,2	8,4	6,5	-
PN25	DIN EN 1092-1	25	23,2	22	20,8	19	17,2	16	14,8	-
PN40		40	37,1	35,2	33,3	30,4	27,6	25,7	23,8	-
CL300	DIN EN 1759-1	45,3	40,1	38,1	36	32,9	29,8	27,8	25,7	-

Table 5d		Material: G20Mn5 (1.6220) as per DIN EN 10213-3								
PN	Standard	Temperature [°C]								
		-40	100	150	200	250	300	350	400	450
Max. Operating Pressure [bar]										
PN10	-	6	6	3,8	3,6	3,48	3,4	-	-	-
PN16		16	16	10,1	9,6	9,28	9,07	-	-	-
PN25		25	25	15,8	15	14,5	14,2	-	-	-
PN40		40	28	28	27	26	25	-	-	-

Table 5e		Material: G17CrMo9-10 (1.7379) as per DIN EN 10213-2								
PN / CL	Standard	Temperature [°C]								
		-10...+50	100	150	200	250	300	350	400	450
Max. Operating Pressure [bar]										
PN10	-	10	10	10	10	10	10	9,7	9,2	8,8
PN16		16	16	16	16	16	16	15,6	14,8	14
CL150	DIN EN 1759-1	19,5	17,7	15,8	14	12,1	10,2	8,4	6,5	4,7
PN25	DIN EN 1092-1	25	25	25	25	25	25	24,4	23,2	22
PN40		40	40	40	40	40	40	39	37,1	35,2
CL300	DIN EN 1759-1	51,7	51,5	50,2	48,3	46,3	42,8	40,2	36,6	33,8

Table 5f		Material: GX5CrNiMo19-11-2 (1.4408) as per DIN EN 10213-4								
PN / CL	Standard	Temperature [°C]								
		-10...+50	100	150	200	250	300	350	400	450
Max. Operating Pressure [bar]										
PN10	DIN EN 1092-1	10	10	9	8,4	7,9	7,4	7,1	6,8	6,7
PN16		16	16	14,5	13,4	12,7	11,8	11,4	10,9	10,7
CL150	DIN EN 1759-1	17,9	16,3	14,9	13,5	12,1	10,2	8,4	6,5	4,7
PN25	DIN EN 1092-1	25	25	22,7	21	19,8	18,5	17,8	17,1	16,8
PN40		40	40	36,3	33,7	31,8	29,7	28,5	27,4	26,9
CL300	DIN EN 1759-1	46,7	42,5	38,9	35,3	32,9	30,5	28,8	27,6	26,9

Table 5g...5i Allowable Operating Pressure (ASTM)

Table 5g		Material: WCB as per ASTM A216								
PN / CL	Standard	Temperature [°C]								
		-10...+50	100	150	200	250	300	350	400	450
Max. Operating Pressure [bar]										
PN10	DIN EN 1092-1	10	10	9,7	9,4	9	8,3	7,9	6,7	-
PN16		16	16	15,6	15,1	14,4	13,4	12,8	10,8	-
CL150	DIN EN 1759-1	19,3	17,7	15,8	14	12,1	10,2	8,4	6,5	-
PN25	DIN EN 1092-1	25	25	24,4	23,7	22,5	20,9	20	16,9	-
PN40		40	40	39,1	37,9	36	33,5	31,9	27	-
CL300	DIN EN 1759-1	50	46,4	45,1	43,9	41,8	38,9	36,9	34,6	-

Table 5h		Material: WC9 as per ASTM A217								
PN / CL	Standard	Temperature [°C]								
		-10...+50	100	150	200	250	300	350	400	450
Max. Operating Pressure [bar]										
PN10	DIN EN 1092-1	10	10	10	10	10	10	10	9,9	9,5
PN16		16	16	16	16	16	16	16	16	15,9
CL150	DIN EN 1759-1	19,5	17,7	15,8	14	12,1	10,2	8,4	6,5	4,6
PN25	DIN EN 1092-1	25	25	25	25	25	25	25	24,8	23,9
PN40		40	40	40	40	40	40	40	40	39,7
CL300	DIN EN 1759-1	51,7	51,5	50,3	48,7	46,3	42,9	40,4	36,5	33,7

Table 5i		Material: CF8M as per ASTM A351								
PN / CL	Standard	Temperature [°C]								
		-10...+50	100	150	200	250	300	350	400	450
Max. Operating Pressure [bar]										
PN10	DIN EN 1092-1	8,9	7,8	7,1	6,6	6,1	5,8	5,6	5,4	5,3
PN16		14,3	12,5	11,4	10,6	9,8	9,3	9	8,7	8,5
CL150	DIN EN 1759-1	18,4	16	14,8	13,6	12	10,2	8,4	6,5	4,6
PN25	DIN EN 1092-1	22,3	19,5	17,8	16,5	15,5	14,6	14,1	13,6	13,4
PN40		35,6	31,3	28,5	26,4	24,7	23,4	22,6	21,8	21,4
CL300	DIN EN 1759-1	48,1	42,3	38,6	35,8	33,5	31,6	30,4	29,3	29

NOTE:

At operating temperatures below -10 °C * a notch impact test must be performed according to **AD2000 Merkblatt W10 ****, in which the lowest temperatures are mentioned in three categories (**I, II, III**) for the respective usage cases.

Category **I** (allowed Temperature **Ts** at 100% of allowed Operating Pressure **Ps**)

Category **II** (allowed Temperature **Ts** at 75% of allowed Operating Pressure **Ps**)

Category **III** (allowed Temperature **Ts** at 25% of allowed Operating Pressure **Ps**)

Body Material	I	II	III
Cast Iron EN-JL1040	-10°C	-	-
Ductile Iron EN-JS1025	-10°C	-40°C	-
Carbon Steel 1.0619 (ASTM A216 WCB)	-10°C	-60°C	-85°C
Alloy Steel 1.7379 (ASTM A217 WC9)	-10°C	-60°C	-85°C
Carbon Steel 1.6220 (A352 LCB)	-40°C	-90°C	-120°C
Stainless Steel 1.4408 (ASTM A351 CF8M)	-200°C	-255°C	-270°C

* For low temperature usage a technical review of the manufacturer is required!

** The temperature limits mentioned in AD2000 Merkblatt W10 are purely theoretical values and relate only to the indicated material. Due to the multiplicity of used components - of a control valve - it also requires a separate review of the manufacturer!

Table 6a Flow Ratios [KVs]

KVs [m³/h]			Stroke [mm]	Ø Seat D [mm]	F _D [kN]		Nominal Diameter DN																
L	P	S			Class IV	Class VI	15	20	25	32	40	50	65	80	100	125	150	200	250				
0,010			20	6,35	0,1	0,16																	
0,016																							
0,025																							
0,040																							
0,063																							
0,10																							
0,16																							
0,25																							
0,40																							
0,63																							
1,0																							
1,6																							
2,5					9,52	0,15	0,25																
4,0					12,7	0,2	0,3																
6,3				19,05	0,3	0,5																	
10				20,64	0,35	0,5																	
16				25,25	0,4	0,6																	
25				31,72	0,5	0,8																	
40				41,25	0,7	1,0																	
63			38	50,8	0,8	1,3																	
94				66,7	1,1	1,7																	
125				88,9	1,4	2,2																	
160																							
250			50	107,92	1,7	2,7																	
320				126,95	2,0	3,2																	
500			63	158,72	2,5	4,0																	
630				195	3,1	4,9																	
Coefficients:			F _L = 0,9; X _T = 0,72; F _D = 0,46; xF _Z = 0,65																				

Table 6b Flow Ratios [KVs] for balanced Plug

KVs [m³/h]			Stroke [mm]	Ø Seat D [mm]	F _D [kN]		Nominal Diameter DN													
L	P	S			Class IV	Class VI	40	50	65	80	100	125 *)	150	200	250					
25			20	31,72	0,5	0,8														
40				41,25	0,7	1,0														
63			38	50,8	0,8	1,3														
94				66,7	1,1	1,7														
125				88,9	1,4	2,2														
160																				
250			50	126,95	1,7	2,7														
320				126,95	2,0	3,2														
500			63	158,72	2,5	4,0														
630				195	3,1	4,9														

NOTE: In Table 7 indicated pressure drops are based on closed control valve position and should not exceed 70% of allowable operating pressure for given nominal pressure, material execution and operating temperature as per Table 5.

Theoretical acceptable pressure drops are included. Actual pressure drops with consideration of tolerance of spring manufacture and friction of internal parts of the actuator are lower than those given by 20%.

Formula for calculation of ...

... allowable pressure drop:

$$\Delta p = \frac{F_s + F_D}{0,785 * 10^{-4} * D^2}$$

... needed force[kN]:

$$F_s = 0,785 * 10^{-4} * D^2 * \Delta p + F_D$$

For balanced valve plugs available force F_s at least equal to F_D value for soft valve seats in Table 6a should be adopted.

= possible

Table 7 Allowable Pressure Drops

KV _s [m ² /h]	DN	Stroke [mm]	Actuator Size [cm ²]	Metal Seated Class IV					Soft Seated Class VI						
				NO, Stem retract Spring Range 0,2...1,0 bar			NC, Stem extends		NO, Stem retract Spring Range 0,2...1,0 bar			NC, Stem extends			
				Δp [bar]			Spring Range		Δp [bar]			Spring Range			
1,4	2,5	4,0	Spring Range	Δp [bar]	1,4	2,5	4,0	Spring Range	Δp [bar]						
bis 4,0	15...50	20	250	40	-	-	0,2...1,0 0,4...1,2	23 40	35	-	-	0,2...1,0 0,4...1,2	15 35		
6,3	20...50			24	40	-	0,2...1,0 0,4...1,2 0,6...1,4	7 24 40	17	35	-	0,2...1,0 0,4...1,2 0,6...1,4	4 17 35		
10	25...50			20	40	-	0,2...1,0 0,4...1,2 0,6...1,4 0,8...2,4	5 20 34 40	12	35	-	0,2...1,0 0,4...1,2 0,6...1,4 0,8...2,4	3 12 26 35		
16	32...50			12	40	-	0,2...1,0 0,4...1,2 0,6...1,4 0,8...2,4 1,2...2,8	2 12 22 32 40	6	35	-	0,2...1,0 0,4...1,2 0,6...1,4 0,8...2,4 1,2...2,8	1 6 16 26 35		
	65			24	40	-	0,2...1,0 0,4...1,2 0,6...1,4	8 24 40	18	35	-	0,2...1,0 0,4...1,2 0,6...1,4	18 34 35		
25	40...80			400	14	40	-	0,2...1,0 0,4...1,2 0,6...1,4 0,8...2,4 1,2...2,8	4 14 24 34 40	10	35	-	0,2...1,0 0,4...1,2 0,6...1,4 0,8...2,4 1,2...2,8	2 10 20 30 35	
40	50...100							6,5	38	40	0,4...1,2 0,6...1,4 0,8...2,4 1,2...2,8	6 12 18 29	3,5	35	-
63	65...125			630	8,5	40	-	0,4...1,2 0,6...1,4 0,8...2,4 1,2...2,8 1,8...3,8	9 15 21 34 40	6	35	-	0,4...1,2 0,6...1,4 0,8...2,4 1,2...2,8 1,8...3,8	6 12 19 31 35	
	125; 150							1000	16	40	-	0,4...2,0 0,8...2,4 1,2...2,8	16 36 40	13	35
94	80...125			38	630	4	24	40	0,4...1,2 0,6...1,4 0,8...2,4 1,2...2,8 1,8...3,8	4 8 11 18 29	3	23	35	0,4...1,2 0,6...1,4 0,8...2,4 1,2...2,8 1,8...3,8	3 7 10 18 28
	125...200								1000	8	32	40	0,4...2,0 0,8...2,4 1,2...2,8 1,8...3,8	8 20 31 40	7
125; 160	100; 125			630	2	13	28	-	0,4...1,2 0,6...1,4 0,8...2,4 1,2...2,8 1,8...3,8	2 4 6 10 16	-	11	26	0,4...1,2 0,6...1,4 0,8...2,4 1,2...2,8 1,8...3,8	- 2 4 8 14
	125...250	1000	4						22	40	0,4...2,0 0,8...2,4 1,2...2,8 1,8...3,8	4 10 17 26	2,5	20	35
250	125...250		50	2,5	14	30	-	0,4...2,0 0,8...2,4 1,2...2,8 1,8...3,8	2,5 6,5 11 17,5	1,2	13	29	0,4...2,0 0,8...2,4 1,2...2,8 1,8...3,8	1 5 10 16	
320	150...250	1,5						10	22	0,4...2,0 0,8...2,4 1,2...2,8 1,8...3,8	1,5 4,5 8 12,5	-	9	21	0,4...2,0 0,8...2,4 1,2...2,8 1,8...3,8
500	200; 250	63	-	4	14	-	0,8...2,4 1,2...2,8 1,8...3,8	2,5 5 7,5	-	5	8	0,8...2,4 1,2...2,8 1,8...3,8	- 2 4 7		
630	250						-	4	9	0,8...2,4 1,2...2,8 1,8...3,8	1,5 3 5	-	3	8	0,8...2,4 1,2...2,8 1,8...3,8

NOTE:
For actuators with NO function (Stem retract, spring range 0,2...1,0 bar), the supply pressure is indicated in table 7. Supply pressure must be min. 1,4 bar. For actuators with NC function (Stem extends) the supply pressure should be min. 0,4 bar higher than the upper spring range. E.g. supply pressure 2,8 bar at spring range 0,8...2,4 bar.

Pneumatic Actuator Type P/R (optional with top mounted handwheel type -N)

Features

completely reversibility - changing of operating mode P [NO] and R [NC] without any additional parts.

- » pneumatic connection ¼" NPT and ½" NPT
- » pipe diameter: Ø 6x1; Ø 8x1; Ø 10x1; Ø 12x1
- » ambient temperature: -30...+80°C
- » Spring range / no. of springs
 0,2...1,0 bar; 0,4...1,2 bar; 0,6...1,4 bar: 3 springs
 0,4...2,0 bar; 0,8...2,4 bar; 1,2...2,8 bar: 6 springs
 1,8...3,8 bar: 12 springs

No.	Component
1	actuator housing (pressure chamber)
2	
3	diaphragm (Neopren with Polyester inlay)
4	diaphragm plate
5	actuator stem
6	bearing and connection block
7	spring
8	distance bushing
9	distance spacer
10	warning label

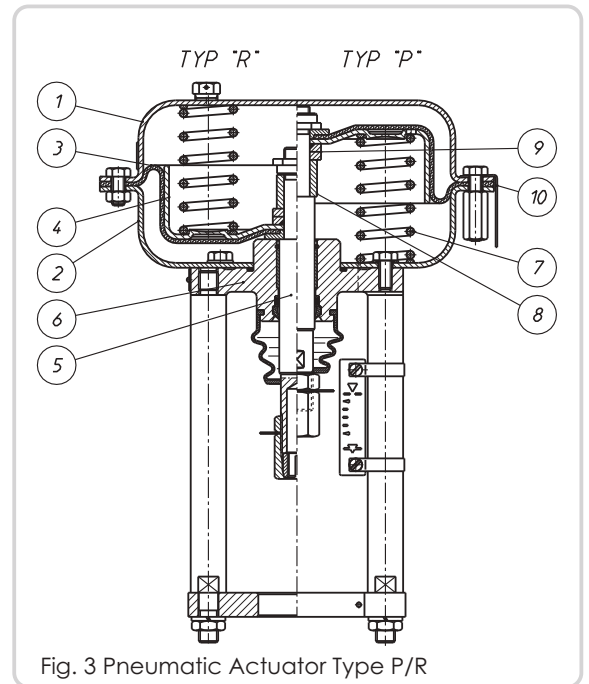


Fig. 3 Pneumatic Actuator Type P/R

Table 8 Actuator forces F_s [kN]

Size [cm ²]	max. allowable Supply Pressure [bar]	Type P (NO, Stem retract)			Type R (NC, Stem extends)						
		Supply Pressure [bar]			Spring Range [bar]						
		1,4	2,5	4,0	0,2...1,0	0,4...1,2	0,4...2,0	0,6...1,4	0,8...2,4	1,2...2,8	1,8...3,8
250	6,0	1,0	3,8	7,5	0,5	1,0	1,5	2,0	3,0	-	
400		1,6	6,0	12	0,8	1,6	2,4	3,2	4,8	-	
630		2,5	9,5	18,9	1,3	2,5	3,8	5,0	7,6	11,3	
1000	5,0	4,0	15	30	2,0	4,0	6,0	8,0	12	18	

Table 9 Technical data for type P/R & PN/RN

Size	Diaphragm eff. area [cm ²]	Stroke [mm]	Weight [kg] (P/R)	Revolutions per Stroke (P/R-N)	Weight [kg] (P/R-N)
250	250	20	10	5	14,5
400	400		16		20,5
630	630	38	30	9	37
1000	1000	38; 50; 63	74	8; 10; 13	100

Table 10 Technical data for manual actuator type NN

Size	Stroke [mm]	Revolutions per Stroke	Weight [kg]
250	20	5	5,5
400			6,5
630	38	9	8,5
1000	38; 50; 63	8; 10; 13	40

Table 11 Valve Dimensions incl. Actuator [mm] and Weights excl. Actuator [kg]

DN	A			G				F								D								H
	CL 150	CL 300	PN 10...40	Standard [mm]	Extended Bellows Seal [kg]	P/R 250	P/R 400	P/R 630	P/R 1000	NN 250	NN 400	NN 630	NN 1000	P/R 250	P/R 400	P/R 630	P/R 1000	NN 250	NN 400	NN 630	NN 1000			
15		190	130		6																			
20	184	194	150	107	7	241																		
25		197	160		7,5																			
32	200	213	180	114	9,5	243																		
40	222	235	200	118	11,5	253																		
50	254	267	230	122	14,5	257																		
65	276	292	290		20																			
80	298	317	310	166	28,5	410																		
100	352	368	350	173	42	417																		
125	-		400	255	80	450																		
150	451	473	480	305	120	510																		
200	543	568	600	458	180																			
250	673	708	730	475	320	623																		

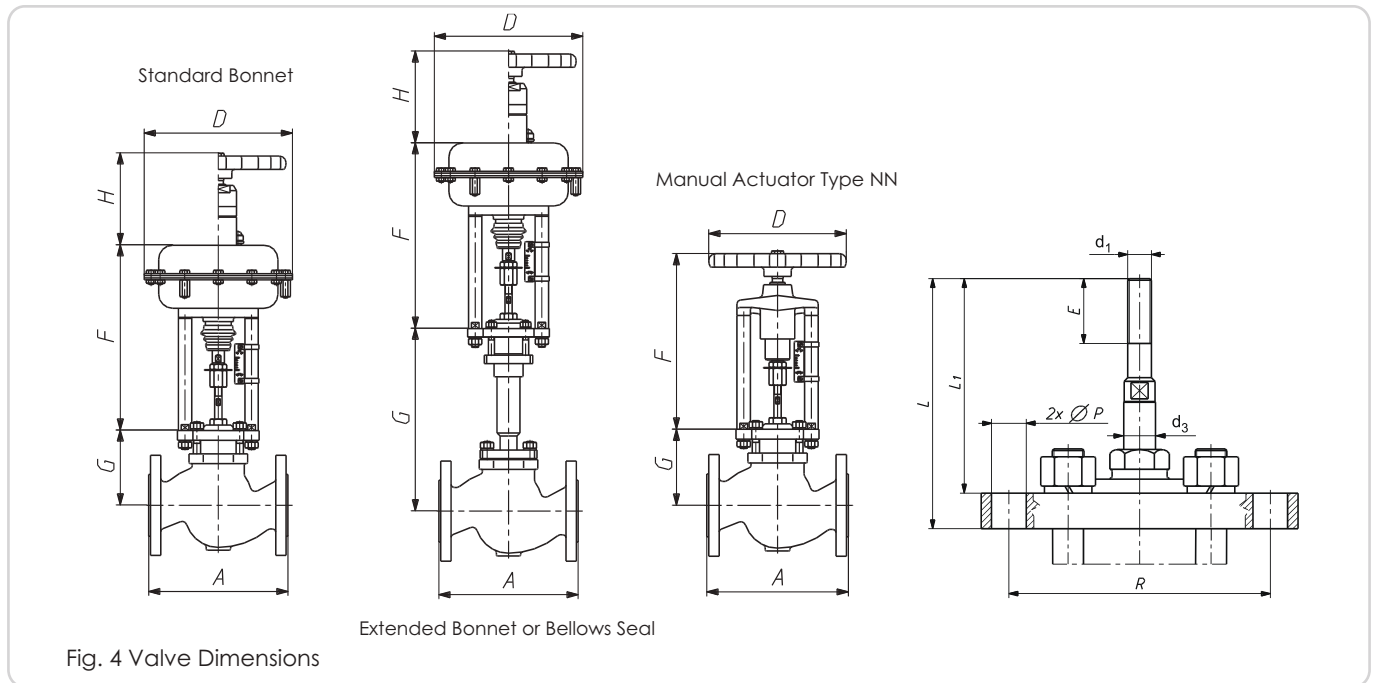


Table 12 Different F-t-F length due to flange facing

Body / Flange	Identification			A ₁
	DIN	ANSI		
Groove CL300	D1	GF		A ₁ = A + 5 * 2
Recess CL300	F1	FF		A ₁ = A + 5,5 * 2
Ring-Joint CL300 DN15	J	RTJ		A ₁ = A + 6,5 * 2
Ring-Joint CL150				
Ring-Joint CL300 DN20...40				
Ring-Joint CL300 DN50...250				

Table 13 Valve Connection

DN	d ₁	d ₃	E	L	L ₁	ØP	R	kN*			
15...25	M12x1,25	12	44	125	111	12,5	110	13,5			
32...50				118	102						
65...100				16	50	122	104		16,5	132	23
125...250				M16x1,5	20	80	138		118	24,5	216

NOTE:

- » R and ØP are customizable
- » Dimensions L and L₁ for Valve Position CLOSE

* To avoid buckling of the valve stem, the specified maximum forces should not be exceeded.

Application

The High Performance Control Valves BR12a are used in automatic and remote control installations as flow control elements to adjust flow of liquids, steam and gases. Wide range of materials and design variants makes the valve applicable in most demanding working conditions in power generation, petroleum chemistry, heating, chemical industry, metallurgy and so on. The valve is to be used even under the most difficult operating conditions. Design and production meets the requirements of Quality Management System ISO 9001.

Features

- » Nominal Diameters from DN15 up to DN400
- » Nominal Pressure PN10 up to CL2500
- » Face-to-Face length as per DIN EN 60534-3-1 or ANSI B16.10
- » Temperature range -196°C up to +650°C
- » Leakage Class IV and V according to DIN EN 60534-4
- » Charakteristik: Linear (L); Equal-percentage (P); ON/OFF [quick-opening] (S)
- » Rangeability 50:1
- » Design with Flange or Welding ends, TA-Luft, Bellows seal bonnet possible
- » Design as per Pressure Equipment Directive 2014/68/EU
- » Conformity CE and EAC
- » Optional certification/confirmation according to ATEX 2014/34/EU, GOST-R (TR), SIL2 (IEC 61508) and AD2000 Merkblatt



Design and technical Specification

Diameters: DN15; 20; 25; 40; 50; 80; 100; 150; 200; 250; 300*; 400*
 *Special execution on request.

Pressure: PN10; 16; 25; 40 as per DIN EN 1092-1:2013 and DIN EN 1092-2:1999
 PN63; 100; 160; 250; 320; 400 as per DIN EN 1092-1:2013
 ANSI CL150; 300; 600; 900; 1500; 2500 as per DIN EN 1759-1:2005

Flanges as per DIN EN 1759-1:2005 can be assembled with flanges execution per standards ANSI / ASME B16.5 and MSS SP44. They correspond to the standard DIN EN 7005-1:2002 following pressure ranges:
 CL150 ≙ PN20; CL300 ≙ PN50; CL600 ≙ PN110; CL900 ≙ PN150; CL1500 ≙ PN260 und CL2500 ≙ PN420

Table 1 Flange Versions

Nominal Pressure	Flange Facing				Ring-Joint
	Raised Face	Groove	Recess		
Identification					
PN10...400	B ³⁾	D1 ¹⁾	F ¹⁾	-	
CL150...300		DL (D1 ²⁾)	F (F1 ¹⁾)		
CL600...2500	B ³⁾ (RF)	DL (GF)	F (FF)	J (RTJ)	

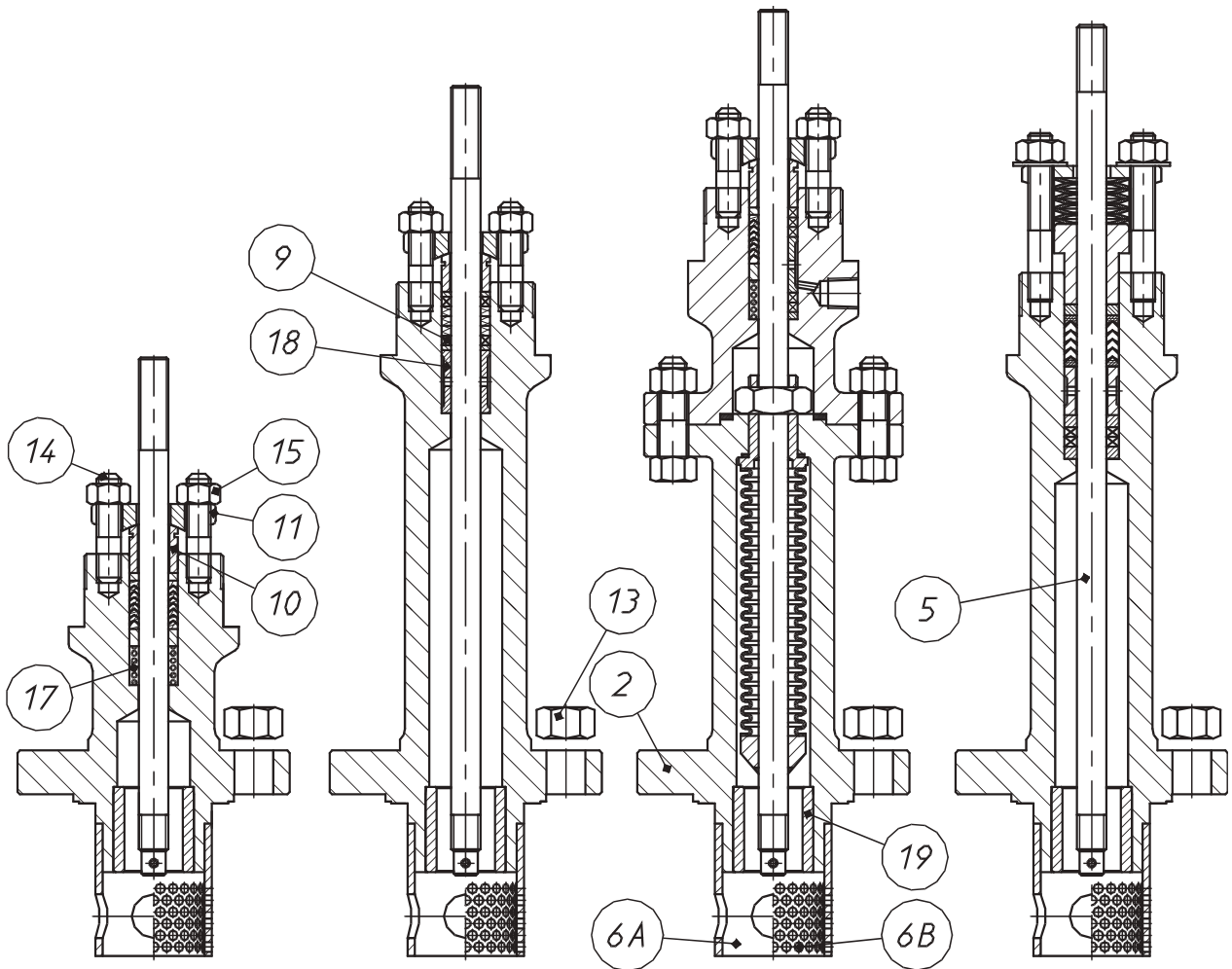
¹⁾ up to PN160; ²⁾ only CL300; ³⁾ B1 - (Ra = 12,5 mm, concentric surface structure "C"), B2 - (Ra as agreed with the customer); (J) - as per ASME B16.5

Table 2 Packing and Bonnet Versions

Packing	PN / CL	Temperature [°C]		
		Standard	Valve Bonnet Extended	Bellows Seal *
PTFE V-Ring	PN10 up to CL600	-46...+200	-196...-46 +200...+300	-100...+200
PTFE+Graphite				
PTFE V-Ring / TA-Luft	PN10 up to CL2500	+200...+300	+300...+537 (+650**)	+200...+400
Graphite				
Graphite / TA-Luft				

* Standard execution up to max. 35 bar, ** only with welding ends

**Body (1); Bonnet (2); Valve Plug (3); Valve Seat (4); Valve Stem (5);
 Compression Sleeve (6A); Choke Cage (6B); Body Gasket (7); Seat Gasket (8); Packing (9)**

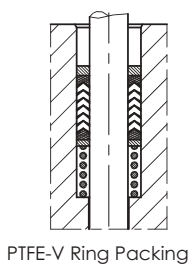


Standard Bonnet
PTFE-V Ring Packing

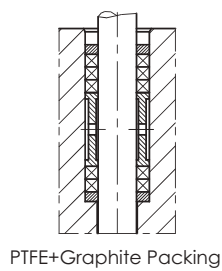
Extended Bonnet
Graphite Packing

Bellows Seal Bonnet
PTFE+Graphite Packing

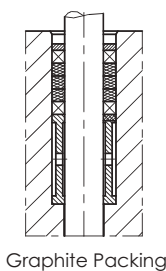
Extended Bonnet
TA-Luft (PTFE-V-Ring) Packing



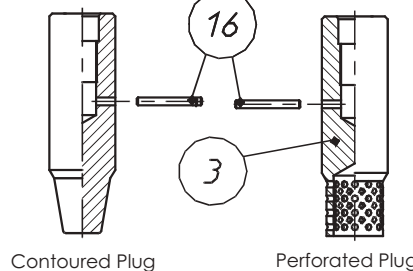
PTFE-V Ring Packing



PTFE+Graphite Packing

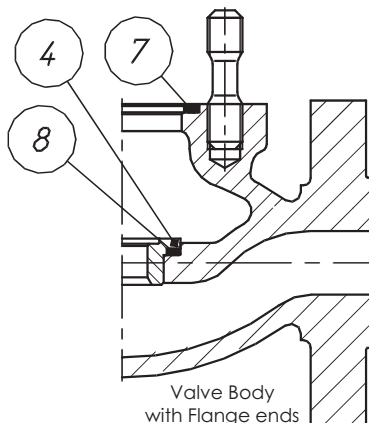


Graphite Packing

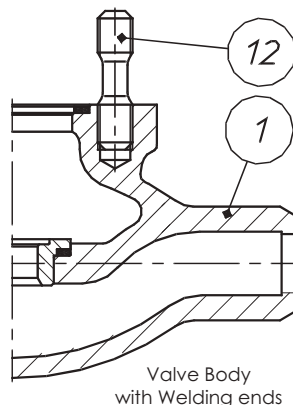


Contoured Plug

Perforated Plug



Valve Body
with Flange ends



Valve Body
with Welding ends

Fig. 1 Executions

NOTE: Design and material options are to be selected to suit working conditions. Contoured plug with compression sleeve (Fig. 1.a) is the basic design for normal working conditions. Perforated plugs are to be applied in cases of noise emissions exceeding the level accepted by customer, which are exchangeable with contoured plugs and allow noise reduction by approx. 10 dB with respect to the basic design. Further noise reduction (~ 5 dB) can be achieved by application of choke cage, which causes reduction in pressure drop between plug and seat. Such design is also recommended in case of choked flow, cavitation and flashing.

For acid Fluids it is recommend to use trim materials made from 1.4404 or 316L. For H₂S-applications it is possible to provide NACE MR-0175. NACE is only possible with ASME/ASTM Materials.

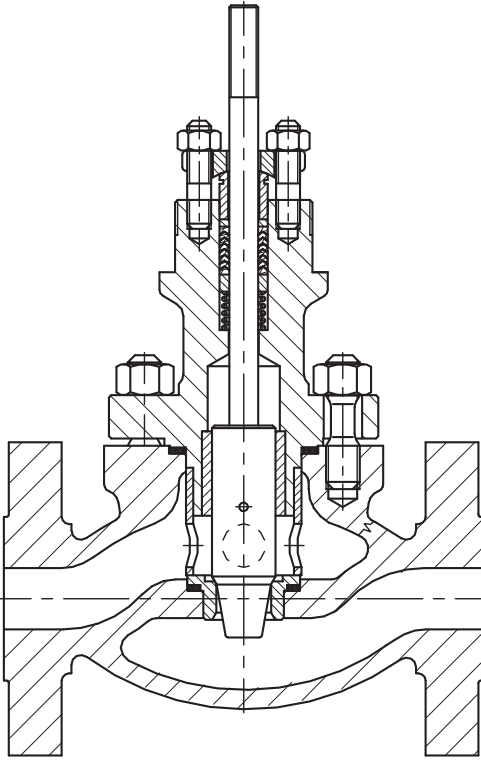


Fig. 1.a Contoured plug with Compression sleeve

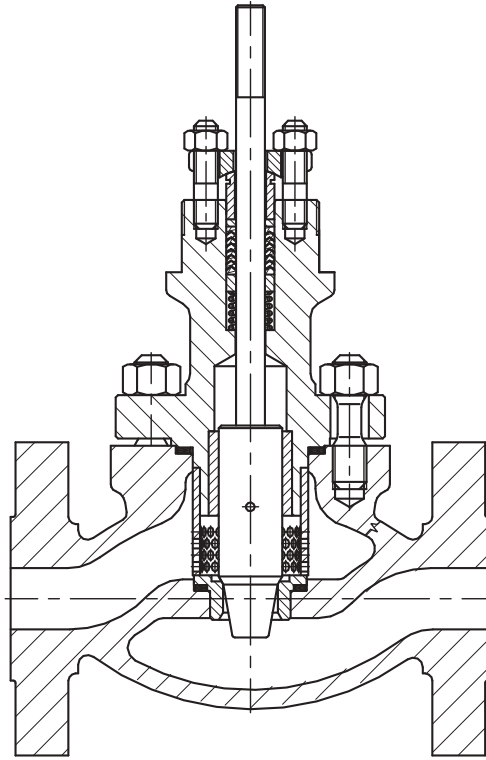


Fig. 1.b Contoured plug with Choke cage

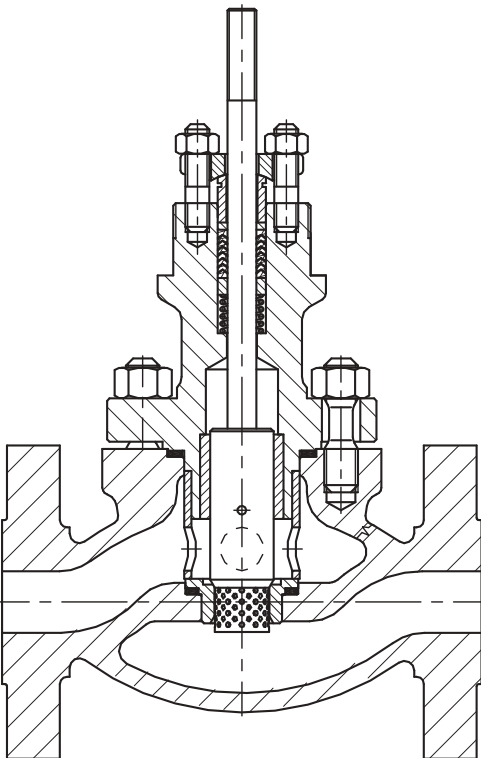


Fig. 1.c Perforated plug with Compression sleeve

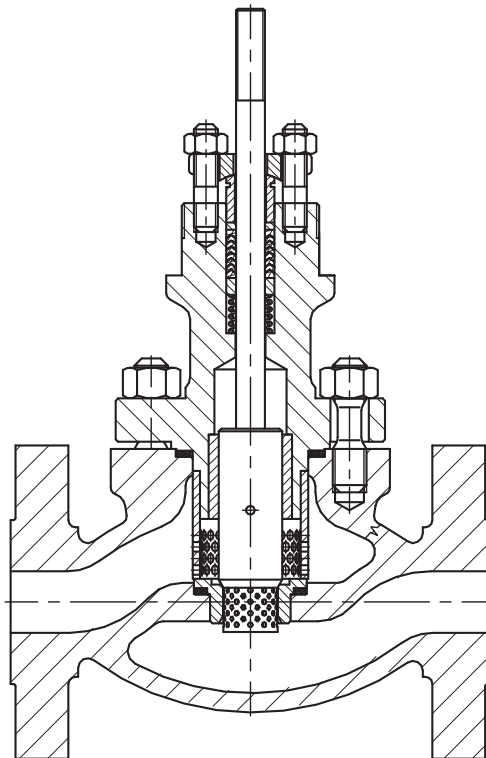


Fig. 1.d Perforated plug with Choke cage

Table 3 Components and Materials

No.	Component		Material			
1	Body		GP240GH (1.0619) WCB	G20Mn5 (1.6220)	G17CrMo9-10 (1.7379) WC9	GX5CrNiMo19-11-2 (1.4408) CF8M
2	Bonnet	DN15...50	S355J2G3 (1.0570)		13CrMo 4-4 (1.7335)	X6CrNiMoTi17-12-2 (1.4571)
		DN80...400	GP240GH (1.0619) WCB	G20Mn5 (1.6220)	G17CrMo9-10 (1.7379) WC9	
3	Plug		X6CrNiMoTi17-12-2 (1.4571) X6CrNiMoTi17-12-2 (1.4571) + Stellite + Chrom(III)-nitride X17CrNi 16-2 (1.4057) + heat treatment			
4	Seat		X6CrNiMoTi17-12-2 (1.4571) X6CrNiMoTi17-12-2 (1.4571) + Stellite X17CrNi16-2 (1.4057) + heat treatment			
5	Stem		X6CrNiMoTi17-12-2 (1.4571) X6CrNiMoTi17-12-2 (1.4571) + Stellite + Chrom(III)-nitride X17CrNi16-2 (1.4057) + heat treatment			
6A	Compression sleeve		X6CrNiMoTi17-12-2 (1.4571) X17CrNi16-2 (1.4057) + heat treatment			
6B	Choke cage					
7	Body gasket		Graphite (98%) + 1.4404 (Spiral)			
8	Seat gasket					
9	Packing		PTFE+Graphite PTFE-V Ring Graphite			
10	Press sleeve		X6CrNiMoTi17-12-2 (1.4571)			
11	Press lever		S 355JSG3 (1.0570)			
12	Body bolt	PN10...CL300	8.8		A4 – 70 *	
		PN63...CL2500	42CrMo4 (1.7225)	21CrMoV5-7 (1.7709)	X6NiCrTiMoVB25-15-2 (1.4980)	
13	Body nut	PN10...CL300	8.8		A4 – 70 *	
		PN63...CL2500	42CrMo4 (1.7225)	21CrMoV5-7 (1.7709)	X6NiCrTiMoVB25-15-2 (1.4980)	
14	Bonnet bolt		8.8		A4 – 70 *	
15	Bonnet nut		8.8		A4 – 70 *	
16	Notched peg		X6CrNiMoTi17-12-2 (1.4571)			
17	Spring		12R10 (SANDVIK)			
18	Spacer sleeve		X6CrNiMoTi17-12-2 (1.4571)			
19	Guide sleeve		X6CrNiMoTi17-12-2 (1.4571) + Stellite + Chrom(III)-nitride X17CrNi16-2 (1.4057) + heat treatment			
•	Rec. Spare parts					

Material	Standard
GP240GH (1.0619)	DIN EN 10213-2
WCB	ASTM A 216
G20Mn5 (1.6220)	DIN EN 10213-3
G17CrMo9-10 (1.7379)	DIN EN 10213-2
WC9	ASTM A217
GX5CrNiMo19-11-2 (1.4408)	DIN EN 10213-4
CF8M	ASTM A351
S355J2G3 (1.0570)	DIN EN 10025
13CrMo4-4 (1.7335)	DIN EN 10028
X6CrNiMoTi17-12-2 (1.4571)	DIN EN 10088
X17CrNi16-2 (1.4057)	DIN EN 10088
C45 (1.0503)	DIN EN 10083-1
X30Cr13 (1.4028)	DIN EN 10088
8.8	EN 20898-1
A4-70 *	EN ISO 3506-2
42CrMo4 (1.7225)	EN 10269
21CrMoV5-7 (1.7709)	EN 10269
X6NiCrTiMoVB25-15-2 (1.4980)	EN 10269

* for Nominal Pressure PN10...CL600

NOTE:

- » Padding of Surface with Stellite: ~ 40HRC
- » Chrom(III)-nitride Coating (~ 0,1 mm): ~ 950HV
- » Heat treatment (quenched & tempered): Plug ~ 45HRC; Seat ~ 35HRC; Stem ~ 35HRC; Guiding Sleeve ~ 45HRC

Table 4a...4d Allowable Operating Pressure (DIN)

Table 4a		Material: GP240GH (1.0619) as per DIN EN 10213-2												
PN / CL	Standard	Temperature [°C]												
		-10...+50	100	150	200	250	300	350	400	450	500	550	600	650
		Max. Operating Pressure [bar]												
PN10	DIN EN 1092-1	10	9,2	8,8	8,3	7,6	6,9	6,4	5,9	-	-	-	-	-
PN16		16	14,8	14	13,3	12,1	11	10,2	9,5	-	-	-	-	-
CL150	DIN EN 1759-1	17,3	15,4	14,6	13,8	12,1	10,2	8,4	6,5	-	-	-	-	-
PN25	DIN EN 1092-1	25	23,2	22	20,8	19	17,2	16	14,8	-	-	-	-	-
PN40		40	37,1	35,2	33,3	30,4	27,6	25,7	23,8	-	-	-	-	-
CL300	DIN EN 1759-1	45,3	40,1	38,1	36	32,9	29,8	27,8	25,7	-	-	-	-	-
PN63	DIN EN 1092-1	63	58,5	55,5	52,5	48	43,5	40,5	37,5	-	-	-	-	-
PN100		100	92,8	88	83,3	76,1	69	64,2	59,5	-	-	-	-	-
CL600	DIN EN 1759-1	90,5	80,2	76,1	72	65,8	59,7	55,5	51,4	-	-	-	-	-
CL900		136	120	114	108	98,7	89,5	83,3	77,1	-	-	-	-	-
PN160	DIN EN 1092-1	160	148,5	140,9	133,3	121,9	110,4	102,8	95,2	-	-	-	-	-
PN250		250	232,1	220,2	208,3	190,4	172,6	160,7	148,8	-	-	-	-	-
CL1500	DIN EN 1759-1	226	201	190	180	165	149	139	129	-	-	-	-	-
PN320	DIN EN 1092-1	320	297,1	281,9	266,6	243,8	220,9	205,7	190,4	-	-	-	-	-
PN400		400	371,4	352,3	333,3	304,7	276,1	257,1	238	-	-	-	-	-
CL2500	DIN EN 1759-1	377	334	317	300	274	249	231	214	-	-	-	-	-

Table 4b		Material: G20Mn5 (1.6220) as per DIN EN 10213-3												
PN / CL	Standard	Temperature [°C]												
		-40	100	150	200	250	300	350	400	450	500	550	600	650
		Max. Operating Pressure [bar]												
PN10	-	6	6	3,8	3,6	3,48	3,4	-	-	-	-	-	-	-
PN16		16	16	10,1	9,6	9,28	9,07	-	-	-	-	-	-	-
PN25		25	25	15,8	15	14,5	14,2	-	-	-	-	-	-	-
PN40		40	28	28	27	26	25	-	-	-	-	-	-	-
PN63		63	59	58	55	53	51	-	-	-	-	-	-	-
PN100		100	95	92	87	85	82	-	-	-	-	-	-	-
PN160		160	152	148	140	136	132	-	-	-	-	-	-	-

Table 4c		Material: G17CrMo9-10 (1.7379) as per DIN EN 10213-2												
PN / CL	Standard	Temperature [°C]												
		-10...+50	100	150	200	250	300	350	400	450	500	550	600	650
		Max. Operating Pressure [bar]												
PN10	DIN EN 1092-1	10	10	10	10	10	10	9,7	9,2	8,8	6,4	3,2	-	-
PN16		16	16	16	16	16	16	16	15,6	14,8	14	10,2	5,1	-
CL150	DIN EN 1759-1	19,5	17,7	15,8	14	12,1	10,2	8,4	6,5	4,7	2,8	-	-	-
PN25	DIN EN 1092-1	25	25	25	25	25	25	24,4	23,2	22	16	8	-	-
PN40		40	40	40	40	40	40	39	37,1	35,2	25,7	12,9	-	-
CL300	DIN EN 1759-1	51,7	51,5	50,2	48,3	46,3	42,8	40,2	36,6	33,8	28,2	15,5	-	-
PN63	DIN EN 1092-1	63	63	63	63	63	63	61,5	58,5	55,5	40,5	20,4	-	-
PN100		100	100	100	100	100	100	97,6	92,8	88	64,2	32,3	-	-
CL600	DIN EN 1759-1	103	103	100	96,7	92,6	85,7	80,4	73,1	67,6	56,4	31,1	-	-
CL900		155	155	151	145	139	129	121	110	101	84,6	46,6	-	-
PN160	DIN EN 1092-1	160	160	160	160	160	160	156,1	148,5	140,9	102,8	51,8	-	-
PN250		250	250	250	250	250	250	244	232,1	220,2	160,7	80,9	-	-
CL1500	DIN EN 1759-1	259	258	251	242	232	214	201	183	169	141	77,7	-	-
PN320	DIN EN 1092-1	320	320	320	320	320	320	312,3	297,1	281,9	205,7	103,6	-	-
PN400		400	400	400	400	400	400	390,4	371,4	352,3	257,1	129,5	-	-
CL2500	DIN EN 1759-1	431	429	418	403	386	357	335	305	282	235	130	-	-

Table 4d		Material: GX5CrNiMo19-11-2 (1.4408) as per DIN EN 10213-4												
PN / CL	Standard	Temperature [°C]												
		-10...+50	100	150	200	250	300	350	400	450	500	550	600	650
		Max. Operating Pressure [bar]												
PN10	DIN EN 1092-1	10	10	9	8,4	7,9	7,4	7,1	6,8	6,7	6,6	6,5	5,6	-
PN16		16	16	14,5	13,4	12,7	11,8	11,4	10,9	10,7	10,5	10,4	8,9	-
CL150	DIN EN 1759-1	17,9	16,3	14,9	13,5	12,1	10,2	8,4	6,5	4,7	2,8	-	-	-
PN25	DIN EN 1092-1	25	25	22,7	21	19,8	18,5	17,8	17,1	16,8	16,5	16,3	14	-
PN40		40	40	36,3	33,7	31,8	29,7	28,5	27,4	26,9	26,4	26	22,4	-
CL300	DIN EN 1759-1	46,7	42,5	38,9	35,3	32,9	30,5	28,8	27,6	26,9	26,4	22,2	-	-
PN63	DIN EN 1092-1	63	63	57,3	53,1	50,1	46,8	45	43,2	42,4	41,7	41,1	35,4	-
PN100		100	100	90,9	84,2	79,5	74,2	71,4	68,5	67,3	66,1	65,2	56,1	-
CL600	DIN EN 1759-1	93,4	85	77,8	70,6	65,8	61	57,6	55,2	53,8	52,8	44,4	-	-
CL900		140	127	117	106	98,6	91,4	86,4	82,8	80,6	79,2	66,7	-	-
PN160	DIN EN 1092-1	160	160	145,5	134,8	127,2	118,8	114,2	109,7	107,8	105,9	104,3	89,9	-
PN250		250	250	227,3	210,7	198,8	185,7	178,5	171,4	168,4	165,4	163	140,4	-
CL1500	DIN EN 1759-1	233	212	194	176	164	152	144	138	134	132	111	-	-
PN320	DIN EN 1092-1	320	320	291	269,7	254,4	237,7	228,5	219,4	215,6	211,8	208,7	179,8	-
PN400		400	400	363,8	337,1	318	297,1	285,7	274,2	269,5	264,7	260,9	224,7	-
CL2500	DIN EN 1759-1	389	354	324	294	274	254	240	230	224	220	185	-	-

High-Performance Control Valve

BR12a

Table 4e...4g Allowable Operating Pressure (ASTM)

Table 4e		Material: WCB as per ASTM A216													
PN / CL	Standard	Temperature [°C]													
		-10...+50	100	150	200	250	300	350	400	450	500	550	600	650	
		Max. Operating Pressure [bar]													
PN10	DIN EN 1092-1	10	10	9,7	9,4	9	8,3	7,9	6,7	-	-	-	-	-	
PN16		16	16	15,6	15,1	14,4	13,4	12,8	10,8	-	-	-	-	-	
CL150	DIN EN 1759-1	19,3	17,7	15,8	14	12,1	10,2	8,4	6,5	-	-	-	-	-	
PN25	DIN EN 1092-1	25	25	24,4	23,7	22,5	20,9	20	16,9	-	-	-	-	-	
PN40		40	40	39,1	37,9	36	33,5	31,9	27	-	-	-	-	-	
CL300	DIN EN 1759-1	50	46,4	45,1	43,9	41,8	38,9	36,9	34,6	-	-	-	-	-	
PN63	DIN EN 1092-1	63	63	61,5	59,6	56,8	52,7	50,3	42,5	-	-	-	-	-	
PN100		100	100	97,7	94,7	90,1	83,6	79,8	67,5	-	-	-	-	-	
CL600	DIN EN 1759-1	100,1	92,8	90,6	87,8	83,6	77,5	74	69,1	-	-	-	-	-	
CL900		150,1	139,2	135,7	131,4	125,1	116,1	110,8	103,4	-	-	-	-	-	
PN160	DIN EN 1092-1	159,2	147,6	143,9	139,4	132,7	123,1	117,5	109,7	-	-	-	-	-	
PN250		241,4	223,5	217,8	211,2	201,1	186,6	178,1	166,2	-	-	-	-	-	
CL1500	DIN EN 1759-1	250,5	231,9	226	219,2	208,7	193,6	184,8	172,5	-	-	-	-	-	
PN320	DIN EN 1092-1	313	289,9	282,6	273,9	260,8	242	231	215,6	-	-	-	-	-	
PN400		396,4	367,3	358	346,9	330,3	306,6	292,6	273,1	-	-	-	-	-	
CL2500	DIN EN 1759-1	417,2	386,6	376,9	365,1	347,7	322,7	308	287,5	-	-	-	-	-	

Table 4f		Material: WC9 as per ASTM A217													
PN / CL	Standard	Temperature [°C]													
		-10...+50	100	150	200	250	300	350	400	450	500	550	600	650	
		Max. Operating Pressure [bar]													
PN10	DIN EN 1092-1	10	10	10	10	10	10	10	9,9	9,5	5,5	2,9	-	-	
PN16		16	16	16	16	16	16	16	15,9	15,3	8,9	4,7	-	-	
CL150	DIN EN 1759-1	19,5	17,7	15,8	14	12,1	10,2	8,4	6,5	4,6	2,8	-	-	-	
PN25	DIN EN 1092-1	25	25	25	25	25	25	25	24,8	23,9	14	7,4	-	-	
PN40		40	40	40	40	40	40	40	39,7	38,3	22,3	12	-	-	
CL300	DIN EN 1759-1	51,7	51,5	50,3	48,7	46,3	42,9	40,4	36,5	33,7	27,7	15,3	-	-	
PN63	DIN EN 1092-1	63	63	63	63	63	63	63	62,5	60,3	35,2	18,8	-	-	
PN100		100	100	100	100	100	100	100	99,2	95,6	55,9	29,9	-	-	
CL600	DIN EN 1759-1	103,4	103,1	100,3	97,5	92,7	85,7	80,4	73,3	67,7	55,7	30,7	-	-	
CL900		155,1	154,6	150,6	146,2	139	128,6	120,7	109,8	101,4	83,4	46	-	-	
PN160	DIN EN 1092-1	164,5	163,9	159,5	154,7	147,4	136,4	128	116,5	107,6	87,3	48,8	-	-	
PN250		249,2	248,1	239,8	231,2	222,6	206,6	193,8	176,4	162,9	122,2	74,1	-	-	
CL1500	DIN EN 1759-1	258,6	257,7	250,8	244	231,8	214,4	201,1	183,1	169,1	138,9	76,9	-	-	
PN320	DIN EN 1092-1	323,2	321,9	312,3	302,3	289,2	268	251,4	228,8	211,4	165,7	96	-	-	
PN400		409,4	408	397,1	385,7	366,8	339,4	318,5	389,7	267,7	218,5	121,5	-	-	
CL2500	DIN EN 1759-1	430,9	429,5	418,3	406,5	386,2	357,2	335,3	304,9	281,8	231,7	127,9	-	-	

Table 4g		Material: CF8M as per ASTM A351													
PN / CL	Standard	Temperature [°C]													
		-10...+50	100	150	200	250	300	350	400	450	500	550	600	650	
		Max. Operating Pressure [bar]													
PN10	DIN EN 1092-1	8,9	7,8	7,1	6,6	6,1	5,8	5,6	5,4	5,3	5,2	5,1	3,8	-	
PN16		14,3	12,5	11,4	10,6	9,8	9,3	9	8,7	8,5	8,4	8,2	6,1	-	
CL150	DIN EN 1759-1	18,4	16	14,8	13,6	12	10,2	8,4	6,5	4,6	2,8	-	-	-	
PN25	DIN EN 1092-1	22,3	19,5	17,8	16,5	15,5	14,6	14,1	13,6	13,4	13,2	12,9	9,6	-	
PN40		35,6	31,3	28,5	26,4	24,7	23,4	22,6	21,8	21,4	21	20,7	15,5	-	
CL300	DIN EN 1759-1	48,1	42,3	38,6	35,8	33,5	31,6	30,4	29,3	29	27,3	24	19,9	11,8	
PN63	DIN EN 1092-1	56,1	49,2	44,9	41,6	38,9	36,9	35,5	34,4	33,7	33,2	32,6	24,4	-	
PN100		89,1	78,1	71,3	66	61,8	58,5	56,4	54,5	53,4	52,6	51,7	38,7	-	
CL600	DIN EN 1759-1	96,3	84,5	77,1	71,2	66,7	63,1	61	58,9	57,7	54,8	47,8	39,8	24,5	
CL900		144,4	126,8	115,6	107	100,2	95	91,3	88,2	86,6	82,1	71,8	59,7	37,3	
PN160	DIN EN 1092-1	153,1	134,4	122,6	113,5	106,3	100,7	96,8	93,6	91,8	87,1	76,2	63,3	39,3	
PN250		231,9	203,3	185,4	171,9	160,9	152,4	146,7	141,7	139,1	131,7	115,4	95,9	60	
CL1500	DIN EN 1759-1	240,6	210,9	192,4	178,4	167	158,1	152,2	147,1	144,3	136,7	119,8	99,5	62,8	
PN320	DIN EN 1092-1	300,8	263,7	240,6	223	208,7	197,6	190,3	184	180,3	170,9	149,7	124,4	78,2	
PN400		381	334,1	304,8	282,4	264,2	250,3	241,1	233,1	228,4	216,6	189,5	157,7	99,4	
CL2500	DIN EN 1759-1	401	351,7	320,8	297,2	278,1	263,5	253,8	245,4	240,4	228	199,5	166	105,5	

NOTE:

At operating temperatures below -10°C* a notch impact test must be performed according to **AD2000 Merkblatt W10 ****, in which the lowest temperatures are mentioned in three categories (I, II, III) for the respective usage cases.

- Category I (allowed Temperature **Ts** at 100% of allow Operating Pressure **Ps**)
- Category II (allowed Temperature **Ts** at 75% of allow Operating Pressure **Ps**)
- Category III (allowed Temperature **Ts** at 25% of allow Operating Pressure **Ps**)

* For low temperature usage a technical review of the manufacturer is required!
 ** The temperature limits mentioned in AD2000 Merkblatt W10 are purely theoretical values and relate only to the indicated material. Due to the multiplicity of used components - of a control valve - it also require a separate review of the manufacturer!

Table 5 Flow Ratios [KV_v]

KV _v [m ³ /h]					Nominal Diameter DN																			
Contoured		Perforated		Stroke	Ø Seat D [mm]	F ₀ [kN]																		
L	P	S	L	P		[mm]	Class IV	Class V	15	20	25	40	50	80	100	150	200	250						
0,10	-	-	-	-	20	6,35	0,1	0,65																
0,16	-	-	-	-																				
0,25	-	-	-	-																				
0,40	-	-	-	-																				
0,63	-	-	-	-																				
1,0	-	-	-	-																				
1,6	-	-	-	-																				
2,5	-	-	-	-																				
4,0	4,8	-	-	-																				
6,3	7,6	-	-	-																				
10	12	6,3	-	-																				
16	20	10	-	-																				
25	30	16	-	-																				
40	48	25	-	-																				
63	-	40	-	-	38	50,8	0,8	5,2																
94	115	63	-	-																				
125	-	125	94	-																				
160	192	-	-	-																				
250	-	180	125	-	50	107,92	1,7	11																
320	384	260	200	-																				
500	600	425	320	-	63	158,72	2,5	16																
630	-	630	400	-																				
800	960	720	500	-	80	203,2	3,2	21																
Coefficients:					Contoured Plug F _L =0,9; X _I =0,72; F _d =0,46; xF _z =0,65				no Version for PN250...CL2500															
					Perforated Plug F _L =0,95; X _I =0,78; F _d =0,1; xF _z =0,75				! Valves with On/Off Plug are only possible with max. KV_v!															

NOTE: In Table 7 indicated pressure drops are based on closed control valve position and should not exceed 70% of allowable operating pressure for given nominal pressure, material execution and operating temperature as per Table 4.

Theoretical acceptable pressure drops are included. Actual pressure drops with consideration of tolerance of spring manufacture and friction of internal parts of the actuator are lower than those given by 20%.

Formula for calculation of ...

... allowable pressure drop:

$$\Delta p = \frac{F_s + F_D}{0,785 * 10^{-4} * D^2}$$

= possible

... needed force [kN]:

$$F_s = 0,785 * 10^{-4} * D^2 * \Delta p + F_D$$

Table 6 Actuator forces F_s [kN]

Size [cm ²]	max. allowable Supply Pressure [cm ²]	Type P; P1 (NO, Stem retract) Supply Pressure [bar]			Type R; R1 (NC, Stem extends) Spring Range [bar]					
		1,4	2,5	4,0	0,2...1,0	0,4...1,2	0,4...2,0	0,6...1,4	0,8...2,4	1,2...2,8
250	6,0	1,0	3,8	7,5	0,5	1,0	1,5	2,0	3,0	-
400		1,6	6,0	12	0,8	1,6	2,4	3,2	4,8	-
630		2,5	9,5	18,9	1,3	2,5	3,8	5,0	7,6	11,3
R-630T	5,0	-	-	-	2,6	5,0	7,6	10	15,2	22,6
1000		4,0	15	30	2,0	4,0	6,0	8,0	12	18
1500		6,0	22,5	45	3,0	6,0	9,0	12	18	27
1500T		12	45	90	6,0	12	18	24	36	54

NOTE: For actuators with NO function (Stem retract, spring range 0,2...1,0 bar), the supply pressure is indicated in table 7. Supply pressure must be min. 1,4 bar. For actuators with NC function (Stem extends) the supply pressure should be min. 0,4 bar higher than the upper spring range. E.g. supply pressure 2,8 bar at spring range 0,8...2,4 bar.

High-Performance Control Valve

BR12a

Table 7 Allowable Pressure Drops

Ø Seat D [mm]	Size [cm ²]	NO, Stem retract						NC, Stem extends											
		Class IV			Class V			Class IV						Class V					
		Supply Pressure [bar]						Supply Pressure [bar]											
		1,4	2,5	4,0	1,4	2,5	4,0	0,2...1,0	0,4...1,2	0,6...1,4	0,8...2,4	1,2...2,8	1,8...3,8	0,2...1,0	0,4...1,2	0,6...1,4	0,8...2,4	1,2...2,8	1,8...3,8
		(Spring Range 0,2...1,0 bar)						Δp [bar]											
bis 12,7	250	61	273	280	-	188	280	23	61	100	138	215	-	-	-	15	54	130	-
	400	107	280	-	23	280	-	47	110	173	236	280	-	-	22	85	148	274	-
19,05	250	24	118	240	-	62	190	7	24	41	58	93	-	-	-	-	-	36	-
	400	45	196	280	-	14	280	17	45	72	100	155	-	-	-	15	43	98	-
20,64	250	20	100	210	-	48	159	5	20	34	49	78	-	-	-	-	-	26	-
	400	37	166	280	-	115	280	14	37	60	84	131	-	-	-	9	32	79	-
	630	65	272	280	11	218	280	27	65	103	140	216	280	-	11	49	86	162	274
	R-630T	-	-	-	-	-	-	65	140	216	280	280	280	11	86	162	237	280	280
25,25	250	12	67	142	-	23	98	2	12	22	32	52	-	-	-	-	-	8	-
	400	24	112	232	-	68	188	8	24	40	56	88	-	-	-	-	12	44	-
	630	42	180	280	-	136	280	17	42	67	92	143	218	-	-	23	48	98	174
	R-630T	-	-	-	-	-	-	42	92	143	193	280	280	-	48	98	149	249	280
31,72	250	6	41	88	-	5	53	-	6	12	19	31	-	-	-	-	-	-	-
	400	14	70	145	-	34	110	4	14	24	34	54	-	-	-	-	-	19	-
	630	25	113	232	-	78	197	10	25	41	57	90	137	-	-	6	21	54	101
	R-630T	-	-	-	-	-	-	25	57	89	121	185	280	-	22	54	85	149	245
41,25	250	2	23	51	-	-	24	-	2	6	10	17	-	-	-	-	-	-	-
	400	7	40	84	-	12	57	-	7	13	19	31	-	-	-	-	-	3	-
	630	13	63	130	-	35	102	4	13	22	31	49	75	-	-	-	3	21	48
	R-630T	-	-	-	-	-	-	14	32	51	70	108	164	-	5	24	43	81	137
50,8	630	9	43	90	-	21	69	2,5	9	15	21	34	53	-	-	-	-	12	30
	1000	16	71	146	-	49	124	6	16	26	36	56	86	-	-	4	14	34	64
	1500	25	107	218	3	85	196	10	25	40	55	84	129	-	3	18	33	62	107
66,7	630	4	24	50	-	6	33	-	4	8	11	18	29	-	-	-	-	-	11
	1000	8	40	83	-	22	65	3	8	14	20	31	48	-	-	-	2	14	30
	1500	14	61	125	-	44	108	5	14	23	31	48	74	-	-	5	14	30	56
88,9	630	1,5	12	28	-	-	15	-	-	3	5	9	16	-	-	-	-	-	3
	1000	4	22	46	-	10	34	-	4	7	11	17	27	-	-	-	-	5	14
	1500	7	34	70	-	21	58	3	7	12	17	27	41	-	-	-	5	14	29
107,92	1000	3	14	30	-	4	20	-	3	5	7	11	18	-	-	-	-	-	8
	1500	5	23	47	-	13	37	-	5	8	11	18	28	-	-	-	-	8	17
	1500T	11	48	96	-	37	86	5	11	18	24	37	57	-	-	8	14	27	47
126,95	1000	1,5	10	22	-	-	13	-	-	3	4	7	12	-	-	-	-	-	3
	1500	3	16	34	-	8	25	-	3	6	8	13	20	-	-	-	-	4	11
	1500T	8	34	70	-	25	61	3	8	13	17	27	41	-	-	4	9	18	33
158,72	1000	-	6	13	-	-	6	-	-	-	2	4	7	-	-	-	-	-	-
	1500	2	10	21	-	3	14	-	2	3	5	8	12	-	-	-	-	-	6
	1500T	5	21	44	-	14	37	2	5	8	10	17	26	-	-	-	4	10	19
195	1500	-	7	14	-	-	8	-	-	2	3	5	8	-	-	-	-	-	2
	1500T	3	14	29	-	8	23	-	3	5	7	11	17	-	-	-	-	5	11
203,2	1500	-	6	13	-	-	7	-	-	2	3	4,5	7	-	-	-	-	-	2
	1500T	3	13	27	-	7	21	-	3	4,5	6	10	16	-	-	-	-	5	10

Table 8 Valve Connection

DN	KVs	Stroke [mm]	d ₁	d ₂	d ₃	kN *
15...50	0,1...16	20	M12x1,25	57,15	12	13,5
40...50	25...40					
80...100	63; 94	38	M16x1,5	84,15	16	23
100	125; 160					
150	63...160	50	M20x1,5	95,25	20	38
200	250; 320					
200; 250	94	38	M16x1,5	95,25	24	64
	125; 160					
	250	250; 320	63	M20x1,5	95,25	24
500						
250	630	80	M24x1,5	95,25	24	64
	800					

NOTE: Specified KVs-values are in version with Contoured plug. For Nominal Diameter DN80 and DN100 with TA-Luft bonnet d₂ = 84,15
 * To avoid buckling of the valve stem, the specified maximum forces should not be exceeded.

Table 9 Valve Dimensions [mm] and Weights [kg]

DN	PN/CL	B max	C		Bellows Seal	Weight [kg]
			Standard	Extended		
15 20 25	PN10...CL300	63	135	306	254	8
	PN63...CL600	70				
	CL900...PN160	75	149	320	-	8,5
	PN250...CL1500	80	193	364		9,5
	PN320	90				
40	PN10...CL300	75	145	316	254	15,5
	PN63...CL600	85				
	CL900...PN160	93	172	348	-	17,5
	PN250...CL1500	98	214	385		20
	PN320	110				
50	PN10...CL300	83	155	326	270	22
	PN63...CL600	98				
	CL900...PN160	108	175	345	-	25
	PN250...CL1500	105	237	402		31
	PN320	118				
80	PN10...CL300	105	206	375	405	40
	PN63...CL600	145				
	CL900...PN160	120	233	402	-	43
	PN250...CL1500	133	257	447		50
	PN320	138				
100	PN10...CL300	128	217	407	405	65
	PN63...CL600	138				
	CL900...PN160	145	252	442	-	72
	PN250...CL1500	155	329	498		86
	PN320	168				
150	PN10...CL300	160	287	426	470	132
	PN63...CL600	178				
	CL900...PN160	190	365	483	-	147
200	PN10...CL300	190	439	539	580	195
	PN63...CL600	235				
250	PN10...CL300	258	458	558	580	320
	CL300 (KV's 800)	255				
	PN63...CL600	255	-	360		

NOTE: Valve weights with standard bonnet, exclusive actuator!

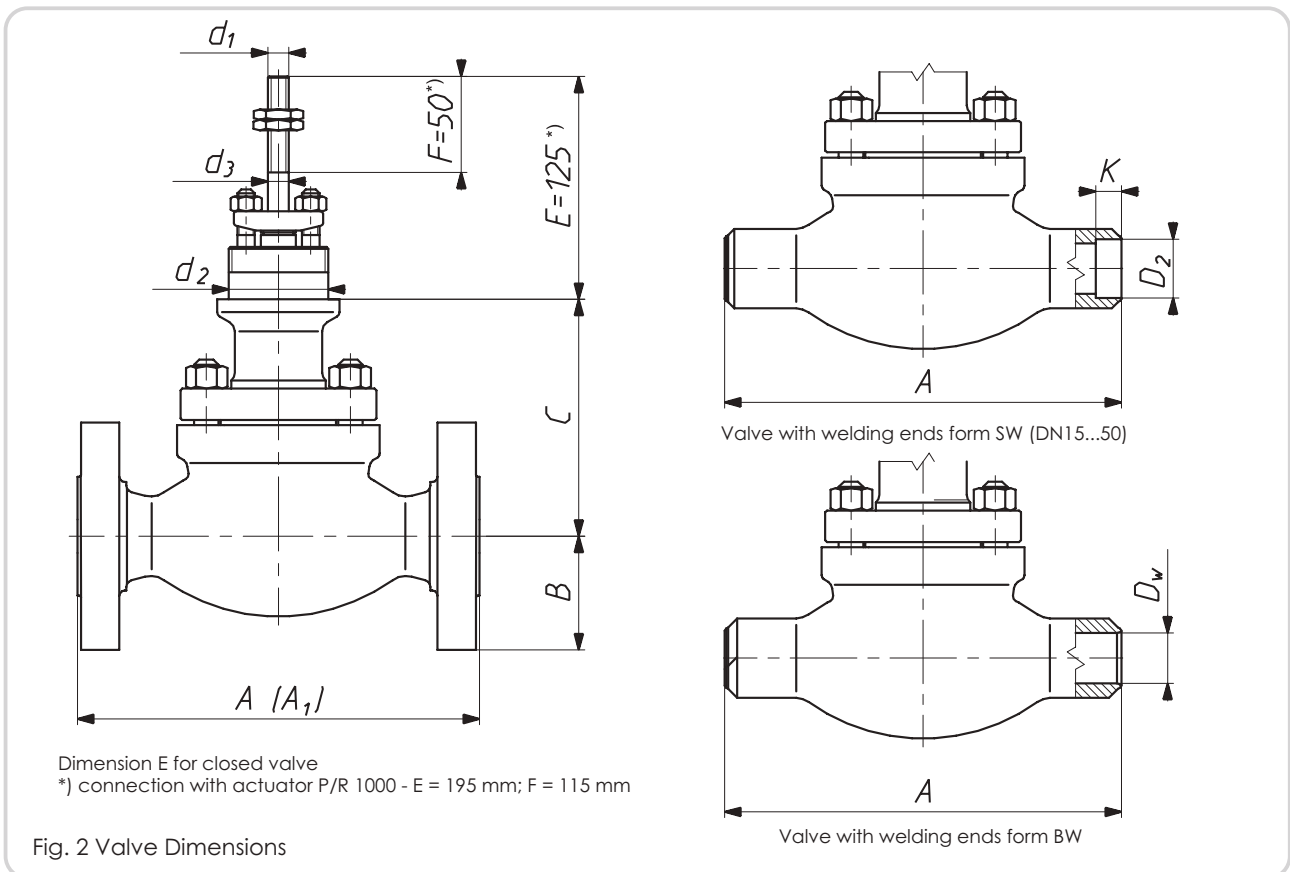


Table 10a Face-to-Face length [mm] with flange ends

DN	Dimension A [mm]										
	PN 10...40	PN 63...100	PN 160	PN 250; 320	PN 400	CL 150	CL 300	CL 600	CL 900	CL 1500	CL 2500
15	130	230		260	300	184	190	203	236	273	308
20	150						194	206	241		
25	160						197	210	248		
40	200	260	300	350	222	235	251	270	311	359	
50	230	300	350	400	254	267	286	311	340	400	
80	310	380	450	500	298	317	336	387	460	498	
100	350	430	520	580	352	368	394	464	530	575	
150	480	550	-	-	451	473	508	556	-	-	
200	600	650	-	-	-	543	568	610	-	-	
250	730	775	-	-	-	673	708	752	-	-	
> 250	Special Execution	-	-	-	Special Execution			-	-	-	

CAUTION: Face-to-Face length DN15 identical with DN20; DN25, except PN10...40; CL300...900

Table 10b Different Face-to-Face [mm] due to flange facing

Identification DIN (ANSI)	Pressure CL	Diameter DN	A ₁
Groove DL (GF) or Recess F (FF)	CL300	15...250	$A_1 = A + 5 * 2$
	CL600 CL900 CL1500 CL2500		$A_1 = A - 1,5 * 2$
Ring-Joint J (RTJ)	CL300	15	$A_1 = A + 5,5 * 2$
	CL150	20...40	$A_1 = A + 6,5 * 2$
		15...250	
	CL300	50...250	$A_1 = A + 8 * 2$
	CL600 CL900 CL1500	15...40	$A_1 = A$
	CL2500	15...25	
	CL600	50...250	$A_1 = A + 1,5 * 2$
	CL900 CL1500	50...100	
	CL2500	40...50	
	CL900	150	$A_1 = A + 3 * 2$
CL2500	80		
		100	$A_1 = A + 4,5 * 2$

Table 11 Face-to-Face length [mm] with welding ends

DN	Form SW		Dimension A [mm]		
	D ₂	K	PN10...CL600	CL900...PN160	PN250...CL2500
15	21,7	9,7	210	230	300
20	27	13			
25	34				
40	47,7	16	251	260	350
50	61		286	300	400
80	-	-	337	380	500
100			394	430	580
150			508	550	-
200			610	-	-
250			752	-	-
> 250			Special Execution	-	-

Table 12a Dimensions [mm] for welding ends form BW

DN	D _e	t	D _w	DIN (DIN3239)											
				10	16	25	40	63	100	160	250	320	400		
15	21,3	2	17,3	x	x	x	x	x	x	x	x				
		2,6	16,1									x			
		3,2	14,9											x	
		5	11,3												x
20	26,9	2,3	22,3	x	x	x	x	x	x						
		2,6	28,5	x	x	x	x	x							
		2,9	27,9								x				
		3,6	26,5									x			
25	33,7	5	23,7											x	
		7,1	19,5												x
		2,6	43,1	x	x	x	x								
		2,9	42,5						x						
40	48,3	3,6	41,1								x				
		5	38,3									x			
		6,3	35,7										x		
		10	28,3											x	
50	60,3	2,9	54,5	x	x	x	x	x							
		3,2	53,9							x					
		4	52,3									x			
		6,3	47,7										x		
80	88,9	8	44,3											x	
		12,5	35,3												x
		3,2	82,5	x	x	x	x								
		3,6	81,7						x						
100	114,3	4	80,9												
		6,3	76,3												
		11	66,9												
		12,5	63,9												
150	168,3	17,5	53,9												x
		17,5	79,3												
		3,6	107,1	x	x	x	x								
		4	106,3												
200	219,1	5	104,3												
		8	98,3												
		14,2	85,9												
		16	82,3												
250	273	22,2	69,9												x
		20	99,7												
		4,5	159,3	x	x	x	x								
		5,6	157,1												
> 250	Special Execution	7,1	154,1												
		12,5	143,3												
		19,7	168,7												
		5,9	207,3	x	x										
300	244,5	6,3	206,5												
		7,1	204,9												
		10	199,1												
		12,5	219,5												
350	320	6,3	260,4	x	x										
		7,1	258,8												
		8,8	255,4												
		12,5	248												

DN	Schedule	D _e	t	D _w	ANSI (ASME 31.10 M)								
					150	300	600	900	1500	2500			
½"	40	21,3	2,8	15,7	x	x	x	x					
	80		3,7	13,9							x		
	160		4,8	11,7								x	
¾"	40	26,7	2,9	20,9	x	x	x	x					
	80		3,9	18,9							x		
	160		5,6	15,5								x	
1"	40	33,4	3,4	26,6	x	x	x	x					
	80		4,5	24,4								x	
	160		6,4	20,6								x	
1 ½"	40	48,3	9,1	15,2									
	80		3,7	40,9	x	x	x	x					
	160		5,1	38,1	x	x	x	x					
2"	40	60,3	7,1	34,1								x	
	80		10,2	27,9									
	160		3,9	52,5	x	x	x	x					
3"	40	88,9	5,5	49,3									
	80		8,7	42,9								x	
	160		11,1	38,1									
4"	40	114,3	5,5	77,9	x	x	x						
	80		7,6	73,7								x	
	160		11,1	66,7								x	
6"	40	168,3	15,2	58,5								x	
	80		6	102,3	x	x	x						
	160		8,6	97,1								x	
8"	40	219,1	11,1	92,1									
	80		14,3	139,7								x	
	160		18,3	131,7								x	
10"	40	273	17,1	80,1								x	
	80		7,1	154,1	x	x							
	160		11	146,3								x	
> 12"	Special Execution		14,3	139,7									
			18,3	131,7									
			20,6	206,3	x	x							
12"	40	254	7	205,1									
	80		8,2	202,7									
	160		10,3	198,5								x	
14"	40	305	12,7	193,7									
	80		6,4	260,2	x	x							
	160		7,8	257,4								x	
16"	40	356	9,3	254,4									
	80		12,7	247,6									
	160		15,1	242,8									

D_e [mm] External pipe diameter
D_w [mm] Internal pipe diameter
t [mm] Pipe wall thickness

Execution with reduction stub

Table 12b Dimensions [mm] for welding ends form BW

DN	PN / ANSI	A max	B min	L		
15	PN10...CL300	38	20	50		
	PN63...CL600	48				
	PN160; CL900	40				
20	PN250...CL2500	48	23		50	
25	PN10...CL300	64				42
	PN63...CL600	75				
	PN160; CL900	66				
40	PN250...CL2500	66	28	75		
50	PN10...CL600	80				55
	PN160; CL900	80			50	
	PN250...CL2500	92	42			
80	PN10...CL300	110				82
	PN63...CL600	122				
	PN160; CL900	111	76			
100	PN250...CL2500	127		56		
	PN10...CL600	144			102	
	PN160; CL900	144	81			
150	PN250...CL2500	165		81		100
	PN10...CL300	183			160	
	PN63...CL600	196				
200	PN160; CL900	217	154	150		
	PN10...CL300	243			200	
	PN63...CL600	248				
250	PN10...CL300	291	248			150
	PN63...CL600	346				
	PN160; CL900	248				

Table 12a contains series of basic welding connections. It is allowed to execute connections for other dimensions of pipes. Should pipe dimensions fall within the range $\varnothing A \text{ max}$ and $\varnothing B \text{ min}$, connection can be executed as cast. Otherwise reduction stub is to be welded to body end, which shall result in extension for housing by L or 2L size.

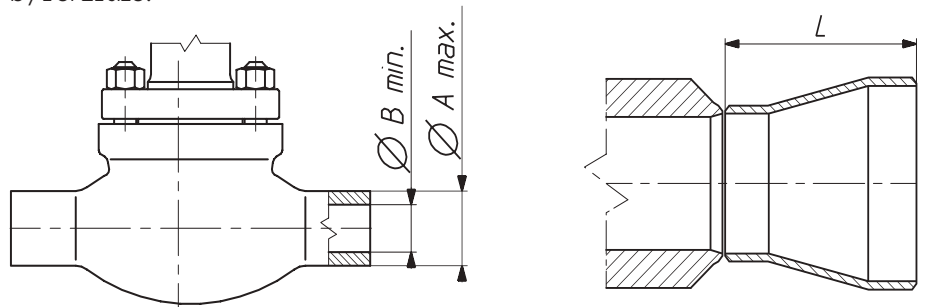


Fig. 3 External and Internal Diameters with Dimension for reduction stub

High-Performance Control Valve

BR12a

PNEUMATIC ACTUATOR TYPE P/R; P1/R1

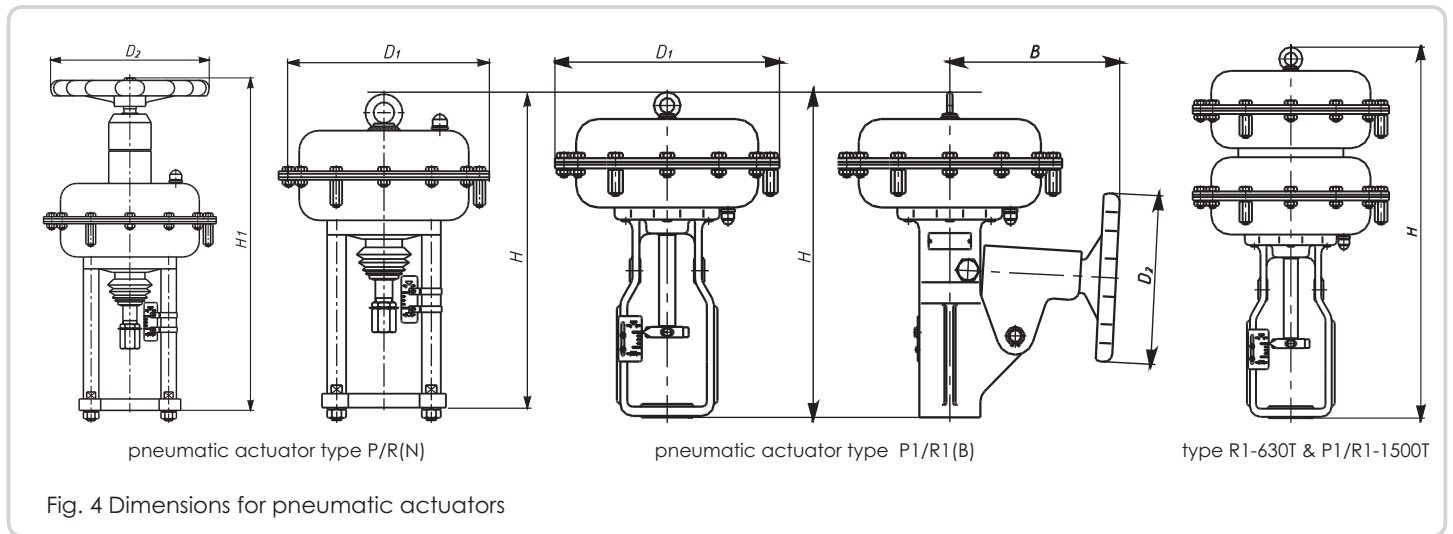


Table 13 Dimensions & Weight for pneumatic actuators

Type	Actuator Size [cm ²]	Diaphragm eff. area [cm ²]	Stroke [mm]	B	D1	D2	H	H1	Weight [kg] (P/R; P1/R1)	Revolutions per stroke (P/R-N; P1/R1-B)	Weight [kg] (P/R-N; P1/R1-B)
P/R	250	250	20	-	240	225	324	486	10	5	14,5
P/R	400	400		-	305		332	494	16		20,5
P1/R1	400	400		255	305		453	-	20		28
P/R	630	630	20; 38	-	375	305	424	586	30	5; 9	37
P1/R1				280			-	40	50		
R	630T	2 x 630		-			-	-	638		-
P/R	1000	1000	38; 50; 63	-	477	450	607	847	74	8; 10; 13	100
P1/R1				340			-	85	105		
P/R	1500	1500		38; 50; 63; 80; 100			-	550	450		704
P1/R1			410		-	120	150				
P/R	1500T	2 x 1500	-		-	-	1008			-	200
P1/R1			410	-	225	255					

MANUAL ACTUATOR TYPE 20

Table 14 Dimensions & Weight for manual actuator

Type	Stroke [mm]	d ₁	d ₂	H	D	Revolutions per stroke	Weight [kg]
20-20-57-M12	20	M12x1,25	57,15	265	228	8	7,5
20-20-84-M12			84,15				
20-38-57-M16	38	M16x1,25	57,15	385	298	15	10
20-38-84-M16			84,15				
20-38-95-M16			95,25				
20-50-84-M20	50	M20x1,5	84,15	457	457	16	16
20-50-95-M20			95,25				
20-63-95-M24	63	M24x1,5	95,25	533	610	20	19
20-80-95-M24	80						

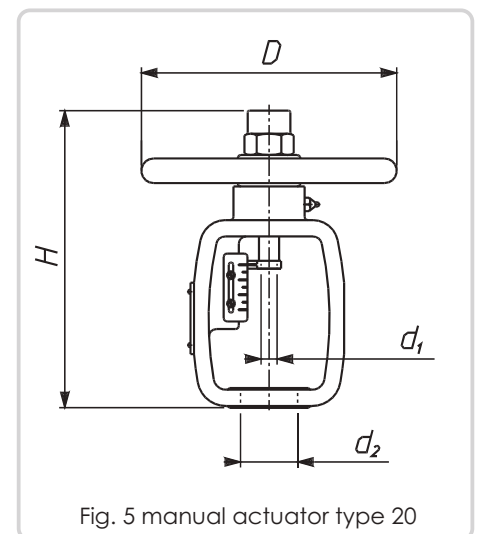


Fig. 5 manual actuator type 20

Application

The High Performance Control Valves BR12a are used in automatic and remote control installations as flow control elements to adjust flow of liquids, steam and gases. Wide range of materials and design variants makes the valve applicable in most demanding working conditions in power generation, petroleum chemistry, heating, chemical industry, metallurgy and so on. The valve is to be used even under the most difficult operating conditions. Design and production meets the requirements of Quality Management System ISO 9001.

Features

- » Nominal Diameters from DN15 up to DN400
- » Nominal Pressure PN10 up to CL2500
- » Face-to-Face length as per DIN EN 60534-3-1 or ANSI B16.10
- » Temperature range -196°C up to +650°C
- » Leakage Class IV and V according to DIN EN 60534-4
- » Charakteristik: Linear (L); Equal-percentage (P); ON/OFF [quick-opening] (S)
- » Rangeability 50:1
- » Design with Flange or Welding ends, TA-Luft, Bellows seal bonnet possible
- » Design as per Pressure Equipment Directive 2014/68/EU
- » Conformity CE and EAC
- » Optional certification/confirmation according to ATEX 2014/34/EU, GOST-R (TR), SIL2 (IEC 61508) and AD2000 Merkblatt

The various versions (multistage pressure reduction) serve to reduce noise and cavitation, reduce wear through flashing and eliminate chocked flow.

Design and technical Specification

Diameters: DN15; 20; 25; 40; 50; 80; 100; 150; 200; 250; 300*; 400*
* Special execution on request.

Pressure: PN10; 16; 25; 40 as per DIN EN 1092-1:2013 and DIN EN 1092-2:1999
PN63; 100; 160; 250; 320; 400 as per DIN EN 1092-1:2013
ANSI CL150; 300; 600; 900; 1500; 2500 as per DIN EN 1759-1:2005

Flanges as per DIN EN 1759-1:2005 can be assembled with flanges execution per standards ANSI / ASME B16.5 and MSS 3F44. They correspond to the standard DIN EN 7005-1:2002 following pressure ranges
CL150 ≙ PN20; CL300 ≙ PN50; CL600 ≙ PN110; CL900 ≙ PN150; CL1500 ≙ PN260 und CL250 ≙ PN420

Table 1 Flange Versions

Nominal Pressure	Flange Facing			
	Raised Face	Groove	Recess	Ring-Joint
Identification				
PN10...400	B ³⁾	D1 ¹⁾	F ¹⁾	-
CL150...300		DL (D1 ²⁾)	F (F1 ¹⁾)	J (RTJ)
CL600...2500	B ³⁾ (RF)	DL (GF)	F (FF)	

1) up to PN160; 2) only CL300; 3) B1 - (Ra = 12,5 mm, concentric surface structure "C"), B2 - (Ra as agreed with the customer); () - as per ASME B16.5

Table 2 Packing and Bonnet Versions

Packing	PN / CL	Temperature [°C]		
		Standard	Valve Bonnet Extended	Bellows Seal *
PTFE V-Ring	PN10 up to CL600	-46...+200	-196...-46 +200...+300	-100...+200
PTFE+Graphite				
PTFE V-Ring / TA-Luft				
Graphite	PN10 up to CL2500	+200...+300	+300...+537 (+650**)	+200...+400
Graphite / TA-Luft				

* Standard execution up to max. 35 bar, ** only with welding ends



Body (1); Bonnet (2); Valve Plug (3); Valve Seat (4); Valve Stem (3a; 3b; 3c); Control Cage (6a);
 Choke Cage (6b; 6c); Body Gasket (7); Seat Gasket (8); Control Cage Gasket (9)

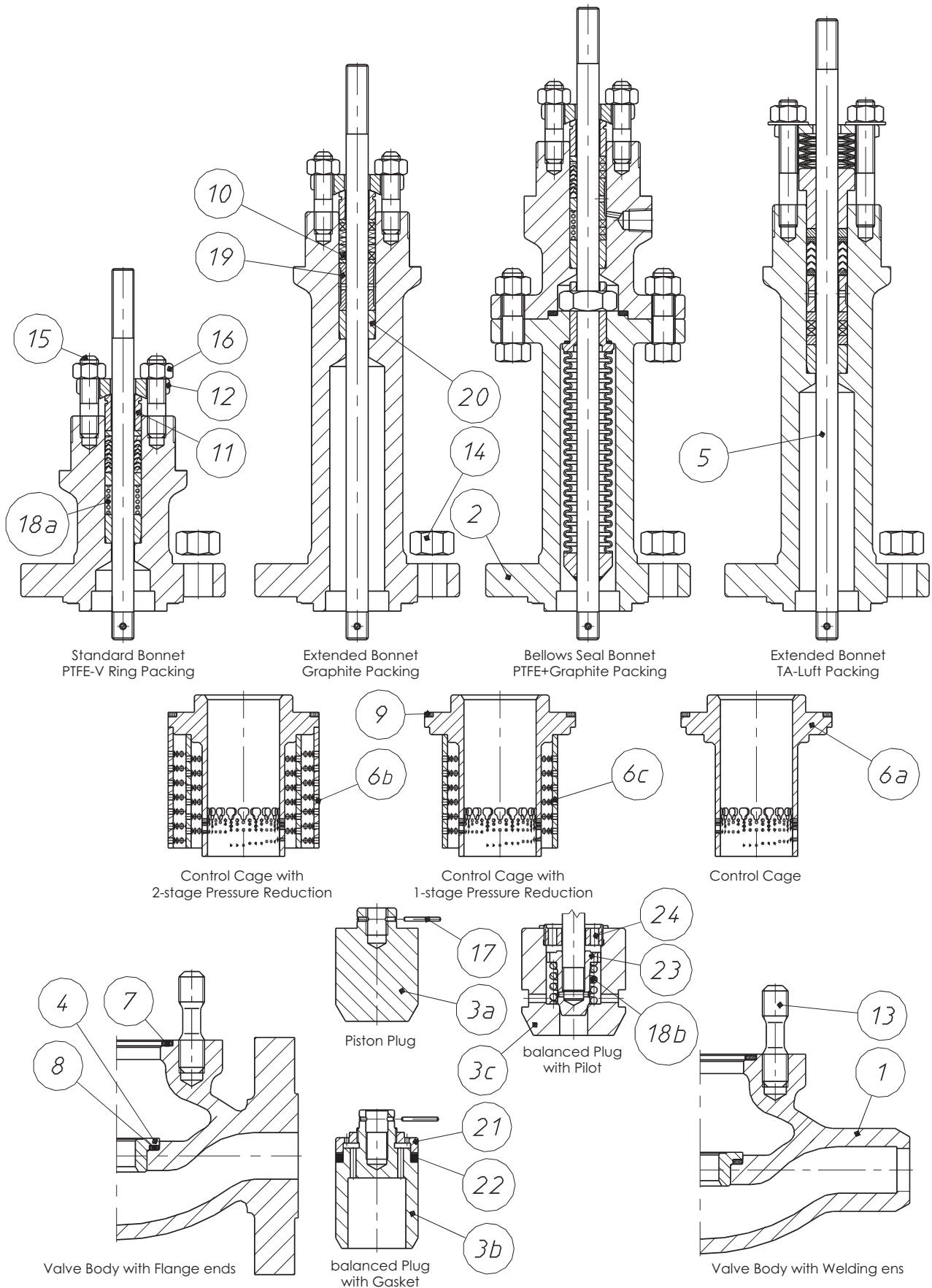


Fig. 1 Executions

NOTE: The control valves of series BR12b are recommended for application under heavy-duty working conditions, with excessive noise, flashing or choked flow. Selection of designs and materials depends on working conditions. It is based on computer-aided calculations of flow coefficients, noise level, fluid status, and effectiveness of such actions depends on data submitted by customer. Application of perforated control elements allows noise reduction by approx. 10 dBA regarding execution with contoured plug. Further noise reduction (~ 5 dBA) can be achieved by application of choke cage, which causes reduction in pressure drop between plug and seat. Such design is also recommended in case of choked flow, cavitation and flashing. Customers shall also appreciate possibility of achieving maximum flow ratio for all nominal sizes and control characteristics, and reduction in actuator costs due to application of balanced plugs.

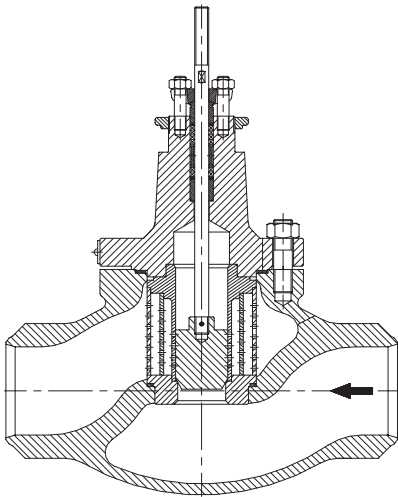


Fig. 1a Piston Plug with Control Cage and 2-stage Pressure Reduction

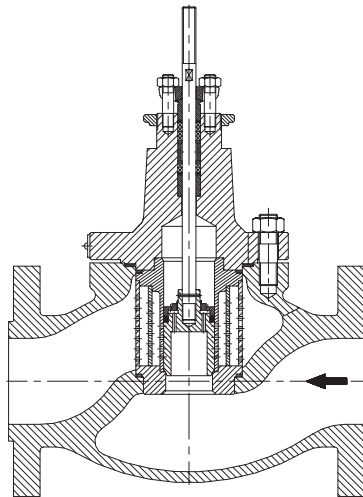


Fig. 1b balanced Plug with Gasket, Control Cage and 2-stage Pressure Reduction

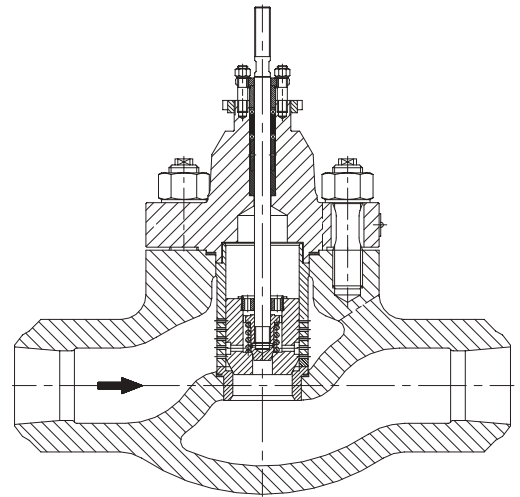
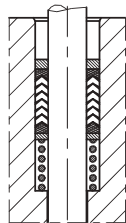
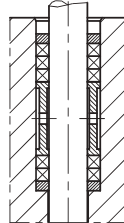


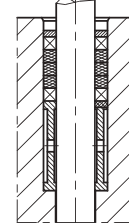
Fig. 1c balanced Plug with Pilot and Control Cage



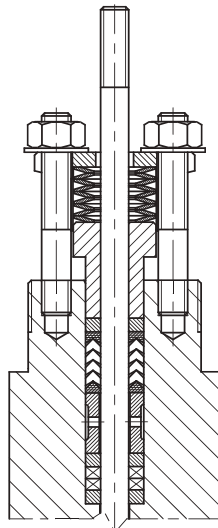
PTFE-V Ring Packing



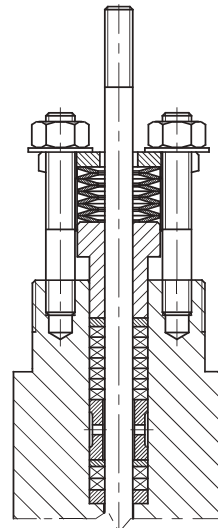
PTFE+Graphite Packing



Graphite Packing



TA-Luft (PTFE-V Ring)



TA-Luft (Graphite)

Fig. 2 Types of Packing units

Table 3 Components and Materials

Nr.	Component		Material			
1	Body		GP240GH (1.0619) WCB	G20Mn5 (1.6220)	G17CrMo9-10 (1.7379) WC9	GX5CrNiMo19-11-2 (1.4408) CF8M
2	Bonnet	DN25...50	S355J2G3 (1.0570)		13CrMo4-4 (1.7335)	X6CrNiMoTi17-12-2 (1.4571)
		DN80...400	GP240GH (1.0619) WCB	G20Mn5 (1.6220)	G17CrMo9-10 (1.7379) WC9	
3	Plug		X6CrNiMoTi17-12-2 (1.4571) + Stellite + Chrom(III)-nitride X17CrNi 16-2 (1.4057) + heat treatment			
4	Seat		X6CrNiMoTi17-12-2 (1.4571) X6CrNiMoTi17-12-2 (1.4571) + Stellite X17CrNi 16-2 (1.4057) + heat treatment			
5	Stem		X6CrNiMoTi17-12-2 (1.4571) X6CrNiMoTi17-12-2 (1.4571) + Stellite + Chrom(III)-nitride X17CrNi 16-2 (1.4057) + heat treatment			
6a	Control cage		X6CrNiMoTi17-12-2 (1.4571) X17CrNi 16-2 (1.4057) + heat treatment			
6b; c	Choke cage					
7	Body gasket					
8	Seat gasket		Graphite (98%) + 1.4404 (Spiral)			
9	Control cage gasket					
10	Packing		PTFE+Graphite PTFE-V Ring Graphite			
11	Press Sleeve		X6CrNiMoTi17-12-2 (1.4571)			
12	Press Lever		S 355 JSG3 (1.0570)			
13	Body bolt	PN10...CL300	8.8			A4 - 70 *
		PN63...CL2500	42CrMo4 (1.7225)	21CrMoV5-7 (1.7709)	X6NiCrTiMoVB25-15-2 (1.4980)	
14	Body nut	PN10...CL300	8.8			A4 - 70 *
		PN63...CL2500	42CrMo4 (1.7225)	21CrMoV5-7 (1.7709)	X6NiCrTiMoVB25-15-2 (1.4980)	
15	Bonnet bolt		8.8			A4 - 70 *
16	Bonnet nut		8.8			A4 - 70 *
17	Notched peg		X6CrNiMoTi17-12-2 (1.4571)			
18a; b	Spring		12R10 (SANDVIK); 9Ru10 (1.4571 + SANDVIK); Nimonic 90 (2.4969)			
19	Spacer sleeve		X6CrNiMoTi17-12-2 (1.4571)			
20	Guide sleeve		X6CrNiMoTi17-12-2 (1.4571) + Stellite + Chrom(III)-nitride X17CrNi 16-2 (1.4057) + heat treatment			
21	Plug nut		X6CrNiMoTi17-12-2 (1.4571)			
22	Plug sealing ring		Expanded Graphite			
23	Pilot		X105CrMo17 (1.4125)			
24	Nut		X6CrNiMoTi17-12-2 (1.4571)			
•	Rec. Spare parts					

Material	Standard
GP240GH (1.0619)	DIN EN 10213-2
WCB	ASTM A 216
G20Mn5 (1.6220)	DIN EN 10213-3
G17CrMo9-10 (1.7379)	DIN EN 10213-2
WC9	ASTM A217
GX5CrNiMo19-11-2 (1.4408)	DIN EN 10213-4
CF8M	ASTM A351
S355J2G3 (1.0570)	DIN EN 10025
13CrMo4-4 (1.7335)	DIN EN 10028
X6CrNiMoTi17-12-2 (1.4571)	DIN EN 10088
X17CrNi16-2 (1.4057)	DIN EN 10088
X105CrMo17 (1.4125)	DIN EN 10088
C45 (1.0503)	DIN EN 10083-1
X30Cr13 (1.4028)	DIN EN 10088
8.8	EN 20898-1
A4-70 *	EN ISO 3506-2
42CrMo4 (1.7225)	EN 10269
21CrMoV5-7 (1.7709)	EN 10269
X6NiCrTiMoVB25-15-2 (1.4980)	EN 10269

* bei Normdruckstufe(n) PN10...CL600

NOTE:

- » Padding of Surface with Stellite: ~ 40HRC
- » Chrom(III)-nitride Coating (~ 0,1 mm): ~ 950HV
- » Heat treatment (quenched & tempered): Plug ~ 45HRC; Seat & Cages ~ 35HRC; Guiding Sleeve & Pilot ~ 45HRC

Table 4a...4d Allowable Operating Pressure (DIN)

Table 4a		Material: GP240GH (1.0619) as per DIN EN 10213-2													
PN / CL	Standard	Temperature [°C]													
		-10...+50	100	150	200	250	300	350	400	450	500	550	600	650	
		Max. Operating Pressure [bar]													
PN10	DIN EN 1092-1	10	9,2	8,8	8,3	7,6	6,9	6,4	5,9	-	-	-	-	-	
PN16		16	14,8	14	13,3	12,1	11	10,2	9,5	-	-	-	-	-	
CL150	DIN EN 1759-1	17,3	15,4	14,6	13,8	12,1	10,2	8,4	6,5	-	-	-	-	-	
PN25	DIN EN 1092-1	25	23,2	22	20,8	19	17,2	16	14,8	-	-	-	-	-	
PN40		40	37,1	35,2	33,3	30,4	27,6	25,7	23,8	-	-	-	-	-	
CL300	DIN EN 1759-1	45,3	40,1	38,1	36	32,9	29,8	27,8	25,7	-	-	-	-	-	
PN63	DIN EN 1092-1	63	58,5	55,5	52,5	48	43,5	40,5	37,5	-	-	-	-	-	
PN100		100	92,8	88	83,3	76,1	69	64,2	59,5	-	-	-	-	-	
CL600	DIN EN 1759-1	90,5	80,2	76,1	72	65,8	59,7	55,5	51,4	-	-	-	-	-	
CL900		136	120	114	108	98,7	89,5	83,3	77,1	-	-	-	-	-	
PN160	DIN EN 1092-1	160	148,5	140,9	133,3	121,9	110,4	102,8	95,2	-	-	-	-	-	
PN250		250	232,1	220,2	208,3	190,4	172,6	160,7	148,8	-	-	-	-	-	
CL1500	DIN EN 1759-1	226	201	190	180	165	149	139	129	-	-	-	-	-	
PN320	DIN EN 1092-1	320	297,1	281,9	266,6	243,8	220,9	205,7	190,4	-	-	-	-	-	
PN400		400	371,4	352,3	333,3	304,7	276,1	257,1	238	-	-	-	-	-	
CL2500	DIN EN 1759-1	377	334	317	300	274	249	231	214	-	-	-	-	-	

Table 4b		Material: G20Mn5 (1.6220) as per DIN EN 10213-3													
PN / CL	Standard	Temperature [°C]													
		-40	100	150	200	250	300	350	400	450	500	550	600	650	
		Max. Operating Pressure [bar]													
PN10	-	6	6	3,8	3,6	3,48	3,4	-	-	-	-	-	-	-	
PN16		16	16	10,1	9,6	9,28	9,07	-	-	-	-	-	-	-	
PN25		25	25	15,8	15	14,5	14,2	-	-	-	-	-	-	-	
PN40		40	28	28	27	26	25	-	-	-	-	-	-	-	
PN63		63	59	58	55	53	51	-	-	-	-	-	-	-	
PN100		100	95	92	87	85	82	-	-	-	-	-	-	-	
PN160		160	152	148	140	136	132	-	-	-	-	-	-	-	

Table 4c		Material: G17CrMo9-10 (1.7379) as per DIN EN 10213-2													
PN / CL	Standard	Temperature [°C]													
		-10...+50	100	150	200	250	300	350	400	450	500	550	600	650	
		Max. Operating Pressure [bar]													
PN10	DIN EN 1092-1	10	10	10	10	10	10	9,7	9,2	8,8	6,4	3,2	-	-	
PN16		16	16	16	16	16	16	16	15,6	14,8	14	10,2	5,1	-	-
CL150	DIN EN 1759-1	19,5	17,7	15,8	14	12,1	10,2	8,4	6,5	4,7	2,8	-	-	-	
PN25	DIN EN 1092-1	25	25	25	25	25	25	24,4	23,2	22	16	8	-	-	
PN40		40	40	40	40	40	40	39	37,1	35,2	25,7	12,9	-	-	
CL300	DIN EN 1759-1	51,7	51,5	50,2	48,3	46,3	42,8	40,2	36,6	33,8	28,2	15,5	-	-	
PN63	DIN EN 1092-1	63	63	63	63	63	63	61,5	58,5	55,5	40,5	20,4	-	-	
PN100		100	100	100	100	100	100	97,6	92,8	88	64,2	32,3	-	-	
CL600	DIN EN 1759-1	103	103	100	96,7	92,6	85,7	80,4	73,1	67,6	56,4	31,1	-	-	
CL900		155	155	151	145	139	129	121	110	101	84,6	46,6	-	-	
PN160	DIN EN 1092-1	160	160	160	160	160	160	156,1	148,5	140,9	102,8	51,8	-	-	
PN250		250	250	250	250	250	250	244	232,1	220,2	160,7	80,9	-	-	
CL1500	DIN EN 1759-1	259	258	251	242	232	214	201	183	169	141	77,7	-	-	
PN320	DIN EN 1092-1	320	320	320	320	320	320	312,3	297,1	281,9	205,7	103,6	-	-	
PN400		400	400	400	400	400	400	390,4	371,4	352,3	257,1	129,5	-	-	
CL2500	DIN EN 1759-1	431	429	418	403	386	357	335	305	282	235	130	-	-	

Table 4d		Material: GX5CrNiMo19-11-2 (1.4408) as per DIN EN 10213-4													
PN / CL	Standard	Temperature [°C]													
		-10...+50	100	150	200	250	300	350	400	450	500	550	600	650	
		Max. Operating Pressure [bar]													
PN10	DIN EN 1092-1	10	10	9	8,4	7,9	7,4	7,1	6,8	6,7	6,6	6,5	5,6	-	
PN16		16	16	14,5	13,4	12,7	11,8	11,4	10,9	10,7	10,5	10,4	8,9	-	
CL150	DIN EN 1759-1	17,9	16,3	14,9	13,5	12,1	10,2	8,4	6,5	4,7	2,8	-	-	-	
PN25	DIN EN 1092-1	25	25	22,7	21	19,8	18,5	17,8	17,1	16,8	16,5	16,3	14	-	
PN40		40	40	36,3	33,7	31,8	29,7	28,5	27,4	26,9	26,4	26	22,4	-	
CL300	DIN EN 1759-1	46,7	42,5	38,9	35,3	32,9	30,5	28,8	27,6	26,9	26,4	22,2	-	-	
PN63	DIN EN 1092-1	63	63	57,3	53,1	50,1	46,8	45	43,2	42,4	41,7	41,1	35,4	-	
PN100		100	100	90,9	84,2	79,5	74,2	71,4	68,5	67,3	66,1	65,2	56,1	-	
CL600	DIN EN 1759-1	93,4	85	77,8	70,6	65,8	61	57,6	55,2	53,8	52,8	44,4	-	-	
CL900		140	127	117	106	98,6	91,4	86,4	82,8	80,6	79,2	66,7	-	-	
PN160	DIN EN 1092-1	160	160	145,5	134,8	127,2	118,8	114,2	109,7	107,8	105,9	104,3	89,9	-	
PN250		250	250	227,3	210,7	198,8	185,7	178,5	171,4	168,4	165,4	163	140,4	-	
CL1500	DIN EN 1759-1	233	212	194	176	164	152	144	138	134	132	111	-	-	
PN320	DIN EN 1092-1	320	320	291	269,7	254,4	237,7	228,5	219,4	215,6	211,8	208,7	179,8	-	
PN400		400	400	363,8	337,1	318	297,1	285,7	274,2	269,5	264,7	260,9	224,7	-	
CL2500	DIN EN 1759-1	389	354	324	294	274	254	240	230	224	220	185	-	-	

High-Performance Control Valve

BR12b

Table 4e...4g Allowable Operating Pressure (ASTM)

Table 4e		Material: WCB as per ASTM A216													
PN / CL	Standard	Temperature [°C]													
		-10...+50	100	150	200	250	300	350	400	450	500	550	600	650	
		Max. Operating Pressure [bar]													
PN10	DIN EN 1092-1	10	10	9,7	9,4	9	8,3	7,9	6,7	-	-	-	-	-	
PN16		16	16	15,6	15,1	14,4	13,4	12,8	10,8	-	-	-	-	-	
CL150	DIN EN 1759-1	19,3	17,7	15,8	14	12,1	10,2	8,4	6,5	-	-	-	-	-	
PN25	DIN EN 1092-1	25	25	24,4	23,7	22,5	20,9	20	16,9	-	-	-	-	-	
PN40		40	40	39,1	37,9	36	33,5	31,9	27	-	-	-	-	-	
CL300	DIN EN 1759-1	50	46,4	45,1	43,9	41,8	38,9	36,9	34,6	-	-	-	-	-	
PN63	DIN EN 1092-1	63	63	61,5	59,6	56,8	52,7	50,3	42,5	-	-	-	-	-	
PN100		100	100	97,7	94,7	90,1	83,6	79,8	67,5	-	-	-	-	-	
CL600	DIN EN 1759-1	100,1	92,8	90,6	87,8	83,6	77,5	74	69,1	-	-	-	-	-	
CL900		150,1	139,2	135,7	131,4	125,1	116,1	110,8	103,4	-	-	-	-	-	
PN160	DIN EN 1092-1	159,2	147,6	143,9	139,4	132,7	123,1	117,5	109,7	-	-	-	-	-	
PN250		241,4	223,5	217,8	211,2	201,1	186,6	178,1	166,2	-	-	-	-	-	
CL1500	DIN EN 1759-1	250,5	231,9	226	219,2	208,7	193,6	184,8	172,5	-	-	-	-	-	
PN320	DIN EN 1092-1	313	289,9	282,6	273,9	260,8	242	231	215,6	-	-	-	-	-	
PN400		396,4	367,3	358	346,9	330,3	306,6	292,6	273,1	-	-	-	-	-	
CL2500	DIN EN 1759-1	417,2	386,6	376,9	365,1	347,7	322,7	308	287,5	-	-	-	-	-	

Table 4f		Material: WC9 as per ASTM A217													
PN / CL	Standard	Temperature [°C]													
		-10...+50	100	150	200	250	300	350	400	450	500	550	600	650	
		Max. Operating Pressure [bar]													
PN10	DIN EN 1092-1	10	10	10	10	10	10	10	9,9	9,5	5,5	2,9	-	-	
PN16		16	16	16	16	16	16	16	16	15,9	15,3	8,9	4,7	-	
CL150	DIN EN 1759-1	19,5	17,7	15,8	14	12,1	10,2	8,4	6,5	4,6	2,8	-	-	-	
PN25	DIN EN 1092-1	25	25	25	25	25	25	25	24,8	23,9	14	7,4	-	-	
PN40		40	40	40	40	40	40	40	39,7	38,3	22,3	12	-	-	
CL300	DIN EN 1759-1	51,7	51,5	50,3	48,7	46,3	42,9	40,4	36,5	33,7	27,7	15,3	-	-	
PN63	DIN EN 1092-1	63	63	63	63	63	63	63	62,5	60,3	35,2	18,8	-	-	
PN100		100	100	100	100	100	100	100	99,2	95,6	55,9	29,9	-	-	
CL600	DIN EN 1759-1	103,4	103,1	100,3	97,5	92,7	85,7	80,4	73,3	67,7	55,7	30,7	-	-	
CL900		155,1	154,6	150,6	146,2	139	128,6	120,7	109,8	101,4	83,4	46	-	-	
PN160	DIN EN 1092-1	164,5	163,9	159,5	154,7	147,4	136,4	128	116,5	107,6	87,3	48,8	-	-	
PN250		249,2	248,1	239,8	231,2	222,6	206,6	193,8	176,4	162,9	122,2	74,1	-	-	
CL1500	DIN EN 1759-1	258,6	257,7	250,8	244	231,8	214,4	201,1	183,1	169,1	138,9	76,9	-	-	
PN320	DIN EN 1092-1	323,2	321,9	312,3	302,3	289,2	268	251,4	228,8	211,4	165,7	96	-	-	
PN400		409,4	408	397,1	385,7	366,8	339,4	318,5	389,7	267,7	218,5	121,5	-	-	
CL2500	DIN EN 1759-1	430,9	429,5	418,3	406,5	386,2	357,2	335,3	304,9	281,8	231,7	127,9	-	-	

Table 4g		Material: CF8M as per ASTM A351													
PN / CL	Standard	Temperature [°C]													
		-10...+50	100	150	200	250	300	350	400	450	500	550	600	650	
		Max. Operating Pressure [bar]													
PN10	DIN EN 1092-1	8,9	7,8	7,1	6,6	6,1	5,8	5,6	5,4	5,3	5,2	5,1	3,8	-	
PN16		14,3	12,5	11,4	10,6	9,8	9,3	9	8,7	8,5	8,4	8,2	6,1	-	
CL150	DIN EN 1759-1	18,4	16	14,8	13,6	12	10,2	8,4	6,5	4,6	2,8	-	-	-	
PN25	DIN EN 1092-1	22,3	19,5	17,8	16,5	15,5	14,6	14,1	13,6	13,4	13,2	12,9	9,6	-	
PN40		35,6	31,3	28,5	26,4	24,7	23,4	22,6	21,8	21,4	21	20,7	15,5	-	
CL300	DIN EN 1759-1	48,1	42,3	38,6	35,8	33,5	31,6	30,4	29,3	29	27,3	24	19,9	11,8	
PN63	DIN EN 1092-1	56,1	49,2	44,9	41,6	38,9	36,9	35,5	34,4	33,7	33,2	32,6	24,4	-	
PN100		89,1	78,1	71,3	66	61,8	58,5	56,4	54,5	53,4	52,6	51,7	38,7	-	
CL600	DIN EN 1759-1	96,3	84,5	77,1	71,2	66,7	63,1	61	58,9	57,7	54,8	47,8	39,8	24,5	
CL900		144,4	126,8	115,6	107	100,2	95	91,3	88,2	86,6	82,1	71,8	59,7	37,3	
PN160	DIN EN 1092-1	153,1	134,4	122,6	113,5	106,3	100,7	96,8	93,6	91,8	87,1	76,2	63,3	39,3	
PN250		231,9	203,3	185,4	171,9	160,9	152,4	146,7	141,7	139,1	131,7	115,4	95,9	60	
CL1500	DIN EN 1759-1	240,6	210,9	192,4	178,4	167	158,1	152,2	147,1	144,3	136,7	119,8	99,5	62,8	
PN320	DIN EN 1092-1	300,8	263,7	240,6	223	208,7	197,6	190,3	184	180,3	170,9	149,7	124,4	78,2	
PN400		381	334,1	304,8	282,4	264,2	250,3	241,1	233,1	228,4	216,6	189,5	157,7	99,4	
CL2500	DIN EN 1759-1	401	351,7	320,8	297,2	278,1	263,5	253,8	245,4	240,4	228	199,5	166	105,5	

NOTE:

At operating temperatures below -10°C* a notch impact test must be performed according to **AD2000 Merkblatt W10 ****, in which the lowest temperatures are mentioned in three categories (I, II, III) for the respective usage cases.

Category I (allowed Temperature **Ts** at 100% of allow Operating Pressure **Ps**)

Category II (allowed Temperature **Ts** at 75% of allow Operating Pressure **Ps**)

Category III (allowed Temperature **Ts** at 25% of allow Operating Pressure **Ps**)

* For low temperature usage a technical review of the manufacturer is required!

** The temperature limits mentioned in AD2000 Merkblatt W10 are purely theoretical values and relate only to the indicated material. Due to the multiplicity of used components - of a control valve - it also require a separate review of the manufacturer!

Table 5 Flow Ratios [KV_s]

KV _s [m ³ /h]		Stroke Ø Seat D [mm]	F _b [kN]	Nominal Diameter DN										
L	P			Class IV	Class V	25	40	50	80	100	150	200	250	
10	20	20,64	0,35	2,1	K1**	K2	K2							> DN250 Special Execution
16		25,25	0,4	2,6		K1	K2							
25		31,72	0,5	3,3		K1	K1	K2						
40	38	41,25	0,7	4,6			K1	K2	K2					
63		50,8	0,8	5,2				K1	K2	K2				
94		66,7	1,1	7,2				K0	K1	K2	K2			
125	50	88,9	1,4	9,1					K1	K2	K2	K2		
160								K1	K2	K2	K2			
200	63	107,92	1,7	11						K1	K2	K2		
250										K1	K2	K2		
320	80	126,95	2,0	13						K1	K2	K2		
500	100	158,72	2,5	16							K1	K2		
630		203,2	3,2	21								K1		
800	-											K1		
Coefficients :		F _L =0,95; X _r =0,78; F _d =0,1; xF _z =0,75			no Version for PN250...CL2500									
					** K0 for Nominal Pressure PN10...CL300									
					K0...2 Maximum numbers of cages									

NOTE: In Table 7 indicated pressure drops are based on closed control valve position and should not exceed 70% of allowable operating pressure for given nominal pressure, material execution and operating temperature as per Table 4.

Theoretical acceptable pressure drops are included. Actual pressure drops with consideration of tolerance of spring manufacture and friction of internal parts of the actuator are lower than those given by 20%.

- » Balanced Valve Plug with Gasket only possible in Leakage Class IV.
Application range: DN25...400; max. CL2500; max. 500°C
- » Balanced Valve Plug with Pilot are not allowed to be used for aggressive media.
Application range: DN50...400; max. CL600; max. 540°C

Formula for calculation of ... allowable pressure drop:
$$\ddot{A}p = \frac{F_s + F_D}{0,785 * 10^{-4} * D^2}$$

= possible ... needed force [kN]:
$$F_s = 0,785 * 10^{-4} * D^2 * \ddot{A}p + F_D$$

Table 6 Actuator forces F_s [kN]

Size [cm ²]	max. allowable Supply Pressure [cm ²]	Type P; P1 (NO, Stem retract) Supply Pressure [bar]			Type R; R1 (NC, Stem extends) Spring Range [bar]					
		1,4	2,5	4,0	0,2...1,0	0,4...1,2 0,4...2,0	0,6...1,4	0,8...2,4	1,2...2,8	1,8...3,8
250	6,0	1,0	3,8	7,5	0,5	1,0	1,5	2,0	3,0	-
400		1,6	6,0	12	0,8	1,6	2,4	3,2	4,8	-
630		2,5	9,5	18,9	1,3	2,5	3,8	5,0	7,6	11,3
R-630T	5,0	-	-	-	2,6	5,0	7,6	10	15,2	22,6
1000		4,0	15	30	2,0	4,0	6,0	8,0	12	18
1500		6,0	22,5	45	3,0	6,0	9,0	12	18	27
1500T		12	45	90	6,0	12	18	24	36	54

NOTE: For actuators with NO function (Stem retract, spring range 0,2...1,0 bar), the supply pressure is indicated in table 7. Supply pressure must be min. 1,4 bar. For actuators with NC function (Stem extends) the supply pressure should be min. 0,4 bar higher than the upper spring range. E.g. supply pressure 2,8 bar at spring range 0,8...2,4 bar.

High-Performance Control Valve

BR12b

Table 7 Allowable Pressure Drops

Ø Seat D [mm]	Size [cm ²]	NO, Stem retract						NC, Stem extends											
		Class IV			Class V			Class IV						Class V					
		Supply Pressure [bar]						Supply Pressure [bar]											
(Spring Range 0.2...1.0 bar)						Δp [bar]													
		1,4	2,5	4,0	1,4	2,5	4,0	0,2...1,0	0,4...1,2 4,0...2,0	0,6...1,4	0,8...2,4	1,2...2,8	1,8...3,8	0,2...1,0	0,4...1,2 4,0...2,0	0,6...1,4	0,8...2,4	1,2...2,8	1,8...3,8
20,64	250	20	100	210	-	48	159	5	20	34	49	78	-	-	-	-	26	-	
	400	37	166	280	-	115	280	14	37	60	84	131	-	-	9	32	79	-	
	630	65	272	280	11	218	280	27	65	103	140	216	280	11	49	86	162	274	
	R-630T	-	-	-	-	-	-	65	140	216	280	280	280	11	86	162	237	280	
25,25	250	12	67	142	-	23	98	2	12	22	32	52	-	-	-	8	-		
	400	24	112	232	-	68	188	8	24	40	56	88	-	-	-	12	44		
	630	42	180	280	-	136	280	17	42	67	92	143	218	-	23	48	98		
	R-630T	-	-	-	-	-	-	42	92	143	193	280	280	-	48	98	149	280	
31,72	250	6	41	88	-	5	53	-	6	12	19	31	-	-	-	-	-		
	400	14	70	145	-	34	110	4	14	24	34	54	-	-	-	-	19		
	630	25	113	232	-	78	197	10	25	41	57	90	137	-	6	21	54		
	R-630T	-	-	-	-	-	-	25	57	89	121	185	280	-	22	54	85		
41,25	630	13	63	130	-	35	102	4	13	22	31	49	75	-	-	3	21		
	R-630T	-	-	-	-	-	-	14	32	51	70	108	164	-	5	24	43		
50,8	630	9	43	90	-	21	69	2,5	9	15	21	34	53	-	-	-	12		
	1000	16	71	146	-	49	124	6	16	26	36	56	86	-	4	14	34		
	1500	25	107	218	3	85	196	10	25	40	55	84	129	-	3	18	33		
66,7	630	4	24	50	-	6	33	-	4	8	11	18	29	-	-	-	-		
	1000	8	40	83	-	22	65	3	8	14	20	31	48	-	-	2	14		
	1500	14	61	125	-	44	108	5	14	23	31	48	74	-	5	14	30		
88,9	1000	4	22	46	-	10	34	-	4	7	11	17	27	-	-	-	5		
	1500	7	34	70	-	21	58	3	7	12	17	27	41	-	-	5	14		
107,92	1000	3	14	30	-	4	20	-	3	5	7	11	18	-	-	-	-		
	1500	5	23	47	-	13	37	-	5	8	11	18	28	-	-	-	8		
	1500T	11	48	96	-	37	86	5	11	18	24	37	57	-	8	14	27		
126,95	1500	3	16	34	-	8	25	-	3	6	8	13	20	-	-	-	4		
	1500T	8	34	70	-	25	61	3	8	13	17	27	41	-	4	9	18		
158,72	1500	2	10	21	-	3	14	-	2	3	5	8	12	-	-	-	-		
	1500T	5	21	44	-	14	37	2	5	8	10	17	26	-	-	4	10		
203,2	1500	-	6	13	-	-	7	-	-	2	3	4,5	7	-	-	-	-		
	1500T	3	13	27	-	7	21	-	3	4,5	6	10	16	-	-	-	5		

Table 8 Valve Connection

DN	KVs	Stroke [mm]	d ₁	d ₂	d ₃	kN *
25...50	10...25	20	M12x1,25	57,15	12	13,5
50	40	38				
80	25	20				
80;100	40	38	M16.1,5	84,15	16	23
	63; 94					
100	125; 160	50				
150	63; 94	38	M20x1,5	95,25	20	38
	125; 160	50				
	200; 250	63				
200	320	80	M16x1,5	95,25	24	64
	94	38				
200; 250	125; 160	50				
	200; 250	63				
	320	80				
250	500	10	M24x1,5	95,25	24	64
	630; 800					

NOTE: Specified KVs-values are in version with Contoured plug. For Nominal Diameter DN80 and DN100 with TA-Luft bonnet d₂ = 84,15
 * To avoid buckling of the valve stem, the specified maximum forces should not be exceeded.

Table 9 Valve Dimensions [mm] and Weights [kg]

DN	PN/CL	B max	C		Bellows Seal	Weight [kg]
			Standard	Extended		
25	PN10...CL300	63	135	306	254	8
	PN63...CL600	70				
	CL900...PN160	75	149	320	-	8,5
	PN250...CL1500	80	193	364		9,5
	PN320	90				
40	PN10...CL300	75	145	316	254	15,5
	PN63...CL600	85				
	CL900...PN160	93	172	348	-	17,5
	PN250...CL1500	98	214	385		20
	PN320	110				22
50	PN10...CL300	83	155	326	270	22
	PN63...CL600	98				
	CL900...PN160	108	175	345	-	25
	PN250...CL1500	105	237	402		28
	PN320	118				31
80	PN10...CL300	105	206	375	405	40
	PN63...CL600	145				
	CL900...PN160	120	233	402	-	43
	PN250...CL1500	133	257	447		44
	PN320	138				50
100	PN10...CL300	128	217	407	405	65
	PN63...CL600	138				
	CL900...PN160	145	252	442	-	72
	PN250...CL1500	155	329	498		75
	PN320	168				86
150	PN10...CL300	160	287	426	470	132
	PN63...CL600	178				
	CL900...PN160	190	365	483	-	147
	PN250...CL1500	190	439	539		156
PN320	235	195				
200	PN10...CL300	190	439	539	580	220
	PN63...CL600	235				
	250	PN10...CL300	258	458	558	580
CL300 (KV's 800)		258				
PN63...CL600		255	-	-	660	330
						360

NOTE: Valve weights with standard bonnet, exclusive actuator!

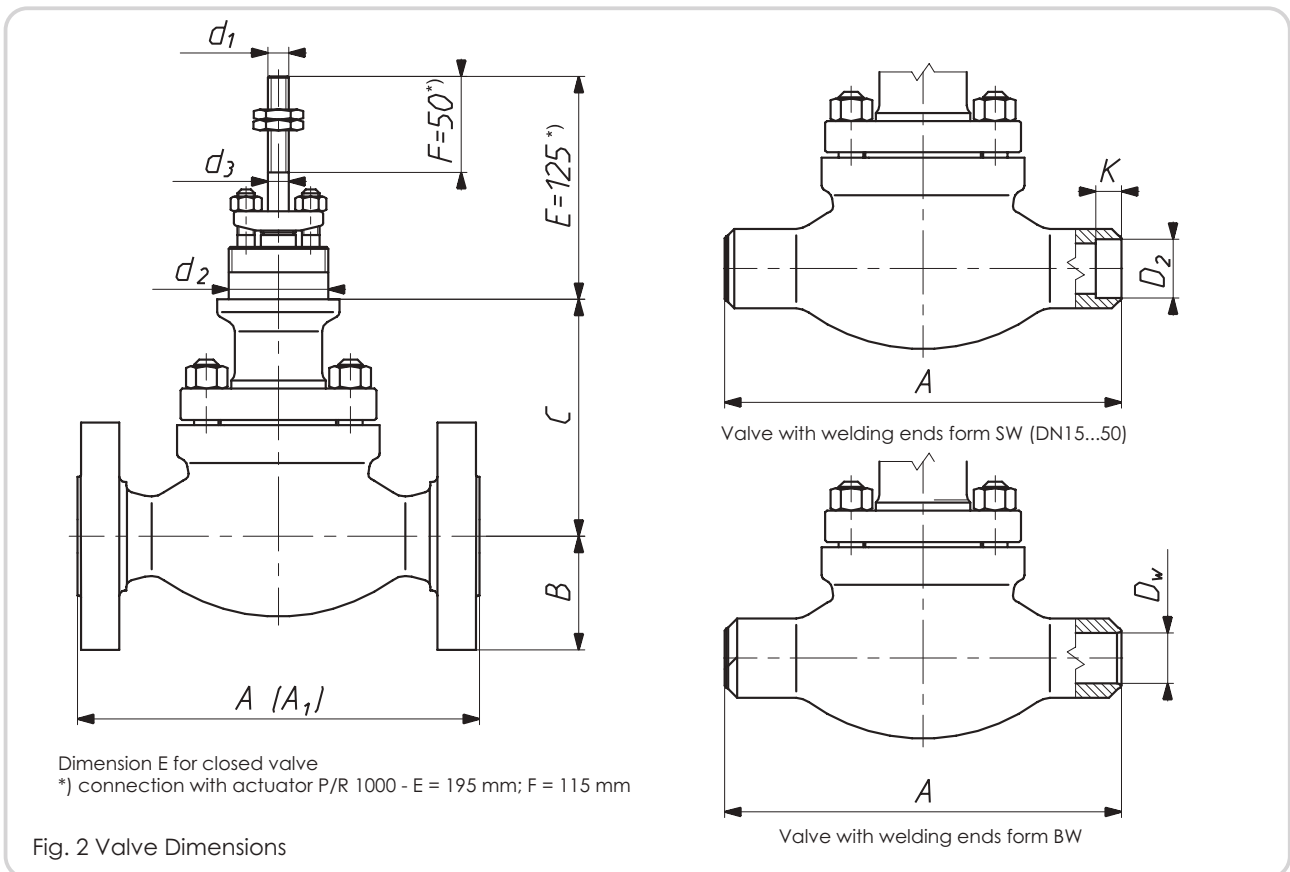


Fig. 2 Valve Dimensions

Table 10a Face-to-Face length [mm] with flange ends

DN	Dimension A [mm]										
	PN 10...40	PN 63...100	PN 160	PN 250; 320	PN 400	CL 150	CL 300	CL 600	CL 900	CL 1500	CL 2500
25	160	230	260	300	184	197	210	248	273	308	
40	200	260	300	350	222	235	251	270	311	359	
50	230	300	350	400	254	267	286	311	340	400	
80	310	380	450	500	298	317	336	387	460	498	
100	350	430	520	580	352	368	394	464	530	575	
150	480	550	-	-	451	473	508	556	-	-	
200	600	650	-	-	543	568	610	-	-	-	
250	730	775	-	-	673	708	752	-	-	-	
> 250	Special Execution		-	-	-	Special Execution		-	-	-	

Table 10b Different Face-to-Face [mm] due to flange facing

Identification DIN (ANSI)	Pressure CL	Diameter DN	A ₁
Groove DL (GF) or Recess F (FF)	CL300	15...250	$A_1 = A + 5 * 2$
	CL600		$A_1 = A - 1,5 * 2$
	CL900		
	CL1500 CL2500		
Ring-Joint J (RTJ)	CL300	15	$A_1 = A + 5,5 * 2$
	CL150	20...40	$A_1 = A + 6,5 * 2$
		15...250	
	CL300	50...250	$A_1 = A + 8 * 2$
	CL600 CL900 CL1500	15...40	$A_1 = A$
	CL2500	15...25	
	CL600	50...250	$A_1 = A + 1,5 * 2$
	CL900 CL1500	50...100	
	CL2500	40...50	
	CL900	150	$A_1 = A + 3 * 2$
CL2500	80		
		100	$A_1 = A + 4,5 * 2$

Table 11 Face-to-Face length [mm] with welding ends

DN	Form SW D ₂	K	Dimension A [mm]		
			PN10...CL600	CL900...PN160	PN250...CL2500
25	34	13	210	230	300
40	47,7	16	251	260	350
50	61		286	300	400
80	-	-	337	380	500
100			394	430	580
150			508	550	-
200			610	-	-
250			752	-	-
> 250			Special Execution	-	-

PNEUMATIC ACTUATOR TYPE P/R; P1/R1

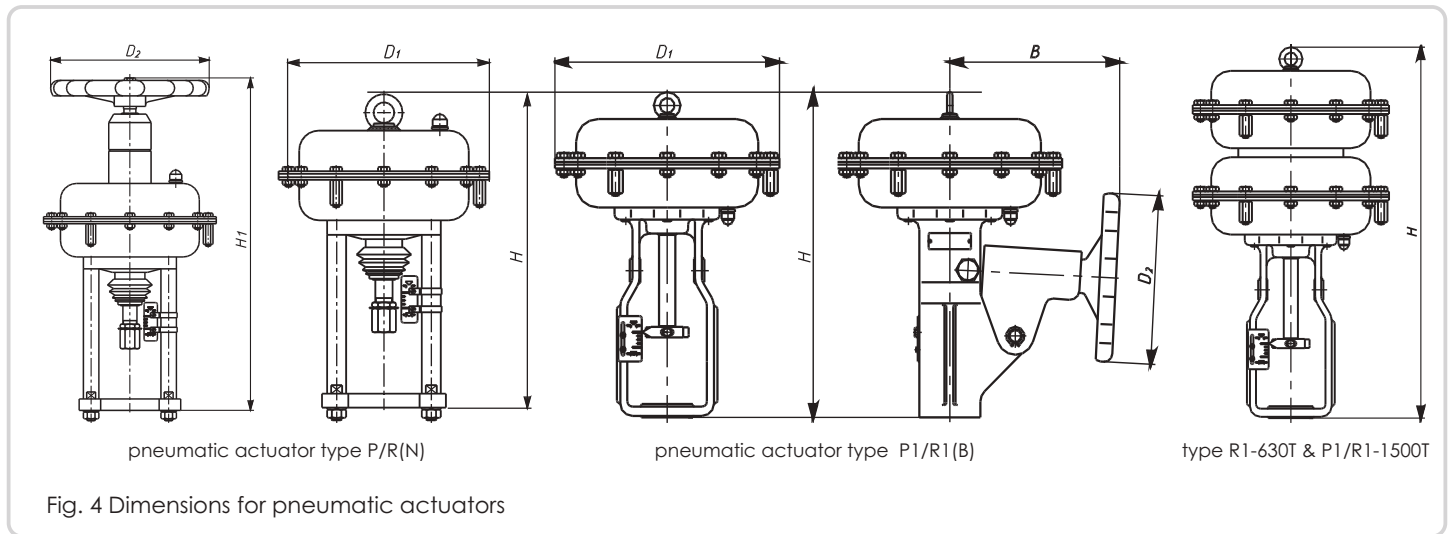


Table 13 Dimensions & Weight for pneumatic actuators

Type	Actuator Size [cm ²]	Diaphragm eff. area [cm ²]	Stroke [mm]	B	D1	D2	H	H1	Weight [kg] (P/R; P1/R1)	Revolutions per stroke (P/R-N; P1/R1-B)	Weight [kg] (P/R-N; P1/R1-B)	
P/R	250	250	20	-	240	225	324	486	10	5	14,5	
P/R	400	400		-	305		332	494	16		20,5	
P1/R1				255			453	-	20		28	
P/R	630	630	20; 38	-	375	305	424	586	30	5; 9	37	
P1/R1								280			548	-
R	630T	2 x 630			-			-	638		-	45
P/R	1000	1000	38; 50; 63	-	477	450	607	847	74	8; 10; 13	100	
P1/R1								340			773	-
P/R	1500	1500		38; 50; 63; 80; 100	-		550	450	704		-	95
P1/R1						410				833	-	120
P/R	1500T	2 x 1500			-					1008	-	200
P1/R1					410		1138	-	225	255		

MANUAL ACTUATOR TYPE 20

Table 14 Dimensions & Weight for manual actuator

Type	Stroke [mm]	d ₁	d ₂	H	D	Revolutions per stroke	Weight [kg]
20-20-57-M12	20	M12x1,25	57,15	265	228	8	7,5
20-20-84-M12			84,15				
20-38-57-M12	38	M16x1,5	57,15	385	298	15	10
20-38-57-M16			84,15				
20-38-84-M16			95,25				
20-50-57-M16	50	M16x1,5	57,15	385	457	16	16
20-50-84-M16			84,15				
20-50-95-M16			95,25				
20-63-84-M20	63	M20x1,5	84,15	533	610	20	24
20-63-95-M20			95,25				
20-80-84-M20	80	M20x1,5	84,15	533	610	19	24
20-80-95-M20			95,25				
20-100-95-M24	10	M24x1,5	95,25				

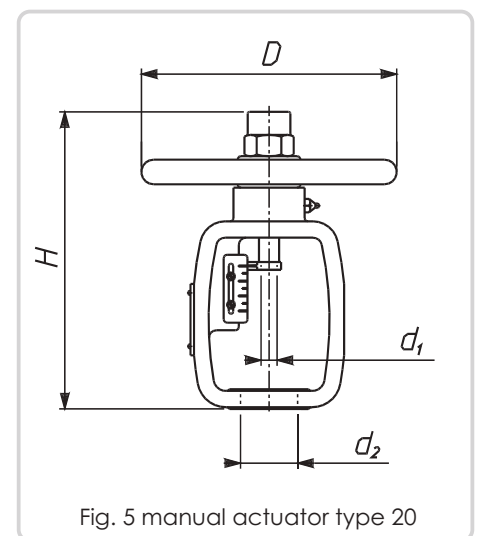


Fig. 5 manual actuator type 20

Application

The 3-Way Control Valves BR13 are used for mixing (BR13M) or diverting (BR13R) service. They are recommended for applications in city heating, HVAC systems and many branches of the industry. The version with bellows allowed the additional use of heat sources (e.g. thermal oil)

NOTE: A mixing valve should only be used for low differential pressures or gases and vapors in the ON/OFF function for diverting service.

Features

- » Nominal Diameters from DN15 up to DN250
- » Nominal Pressure from PN10 up to CL300
- » Face-to-Face length as per DIN EN 60534-3-1 or ANSI B16.10
- » Temperature range -196°C up to +450°C
- » Leakage Class IV and VI according to DIN EN 60534-4
- » Characteristic: Linear (L)
- » Seat guided Contoured Plug with Slot Plug
- » Rangeability 50:1
- » Design with Flange ends, TA-Luft, Bellows seal bonnet possible
- » Design as per Pressure Equipment Directive 2014/68/EU
- » Conformity CE and EAC
- » Optional certification/confirmation according to ATEX 2014/34/EU, GOST-R (TR) and AD2000 Merkblatt



Design and technical Specification

Diameters: DN15; 20; 25; 32; 40; 50; 65; 80; 100; 150; 200*; 250*
*Special executions on request.

Pressure: PN10; 16; 25; 40 as per DIN EN 1092-1:2013 and DIN EN 1092-2:1999
ANSI CL150; 300 and DIN EN 1759-1:2005

Flanges as per DIN EN 1759-1:2005 can be assembled with flanges execution per standards ANSI / ASME B16.5 and MSS SP44. They correspond to the standard DIN EN 7005-1:2002 following pressure ranges: CL150 \triangleq PN20 and CL300 \triangleq PN50

Table 1 Flange Versions

Material	Nominal Pressure	Raised Face	Flange Facing Identification		
			Groove	Recess	Ring-Joint
Cast Iron	PN10; 16	B ²⁾	-	-	-
Ductile Iron	PN10; 16; 25; 40		-	-	-
Carbon Steel Stainless Steel	PN10; 16; 25; 40		D	F	-
	CL150		-	-	J (RTJ)
	CL300		DL (D1 ¹⁾)	F (F1)	
1) only for CL300; 2) B1 – (Ra = 12,5 mm, concentric surface structure "C"), B2 – (Ra as agreed with the customer); () – as per ASME B16.5					

Table 2 Packing and Bonnet Versions

Packing	PN / CL	Temperature [°C]		
		Standard	Valve Bonnet Extended	Bellows Seal
PTFE V-Ring	PN10...CL300	-46...+200	-196...-46 +200...+300	-100...+200
PTFE+Graphite				
PTFE V-Ring / TA-Luft		+200...+300	+300...+450	+200...+400
Graphite				
Graphite / TA-Luft				

Table 3 Temperature Range depending on Execution

Execution	Operating Temperature [°C]		Max. Operating Pressure [bar]
	Min.	Max.	
Soft seated (PTFE inlay)	-100	+260	35
Bellows Seal Bonnet	-100	+400	35

Bonnet (1a); Stub (2); Valve Plug (3); Valve Seats (4); Valve Stem (5); Body Gasket (7); Packing (8)

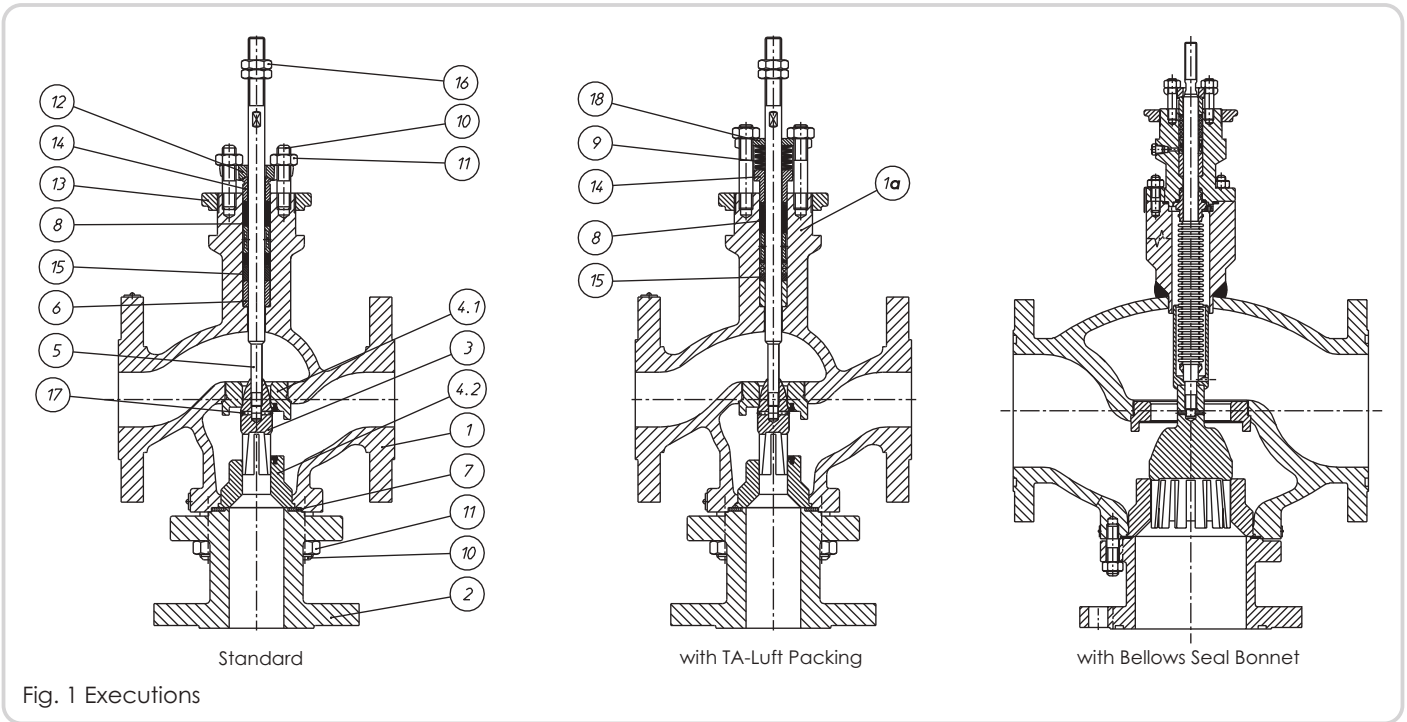


Table 4 Components and Materials

No.	Component	Material					
1	Body	EN-GJL250 (EN-JL 1040)	EN-GJS400-18LT (EN-JS 1025)	GP240GH (1.0619) WCB	G20Mn5 (1.6220)	G17CrMo9-10 (1.7379) WC9	GX5CrNiMo19-11-2 (1.4408) CF8M
1a	Bonnet			S355J2G3 (1.0570)			13CrMo4-4 (1.7335)
2	Stub	S355J2G3 (1.0570)			P355NL2 (1.1106)	G17CrMo9-10 (1.7379) WC9	GX5CrNiMo19-11-2 (1.4408) CF8M
3	Plug	X6CrNiMoTi17-12-2 (1.4571) X6CrNiMoTi17-12-2 (1.4571) + Stellite + Chrom(III)-nitride X17CrNi16-2 (1.4057) + heat treatment					
4.1 4.2	Screwed Seat Fitted-in Seat	X6CrNiMoTi17-12-2 (1.4571) X6CrNiMoTi17-12-2 (1.4571) + Stellite X6CrNiMoTi17-12-2 (1.4571) + PTFE X17CrNi16-2 (1.4057) + heat treatment					
5	Stem	X6CrNiMoTi17-12-2 (1.4571) X6CrNiMoTi17-12-2 (1.4571) + Stellite + Chrom(III)-nitride X17CrNi16-2 (1.4057) + heat treatment					
6	Guiding Sleeve	X6CrNiMoTi17-12-2 (1.4571) X17CrNi16-2 (1.4057) + heat treatment					
7	Body Gasket	Graphite (98%) + 1.4404 (Spiral)					
8	Packing	PTFE+Graphite, PTFE-V, Graphite					
9	Spring	12R10 (SANDVIK)					
10.1 10.2	Bolt	8.8			A4 - 70		
11.1 11.2	Nut	8			A4 - 70		
12	Press Lever	C45					
13	Fixing Nut	X6CrNiMoTi17-12-2 (1.4571)					
14	Press Sleeve						
15	Spacer Sleeve						
16	Nut (lower)	C45			X6CrNiMoTi17-12-2 (1.4571)		
17	Peg	X6CrNiMoTi17-12-2 (1.4571)					
18	Compression Plate						
•	Rec. Spare Parts						

NOTE:

- » Padding of Surface with Stellite: ~ 40HRC
- » Chrom(III)-nitride Coating (~ 0,1 mm): ~ 950HV
- » Heat treatment (quenched & tempered): Plug ~ 45HRC; Seat ~ 35HRC; Stem ~ 35HRC; Guiding Sleeve~ 45HRC

Table 5a...5f Allowable Operating Pressure (DIN)

Table 5a		Material: EN-GJL250 (EN-JL1040) as per DIN EN 1561								
PN	Standard	Temperature [°C]								
		-10...+50	100	150	200	250	300	350	400	450
Max. Operating Pressure [bar]										
PN10	DIN EN 1092-2	10	10	9	8	7	6	-	-	-
PN16		16	16	14,4	12,8	11,2	9,6	-	-	-

Table 5b		Material: EN-GJS400-18 LT (EN-JS1025) as per DIN EN 1563								
PN	Standard	Temperature [°C]								
		-10...+50	100	150	200	250	300	350	400	450
Max. Operating Pressure [bar]										
PN10	DIN EN 1092-2	10	10	9,7	9,2	8,7	8	7	-	-
PN16		16	16	15,5	14,7	13,9	12,8	11,2	-	-
PN25		25	25	24,3	23	21,8	20	17	-	-
PN40		40	40	38,8	36,8	34,8	32	28	-	-

Table 5c		Material: GP240GH (1.0619) as per DIN EN 10213-2								
PN / CL	Standard	Temperature [°C]								
		-10...+50	100	150	200	250	300	350	400	450
Max. Operating Pressure [bar]										
PN10	DIN EN 1092-1	10	9,2	8,8	8,3	7,6	6,9	6,4	5,9	-
PN16		16	14,8	14	13,3	12,1	11	10,2	9,5	-
CL150	DIN EN 1759-1	17,3	15,4	14,6	13,8	12,1	10,2	8,4	6,5	-
PN25	DIN EN 1092-1	25	23,2	22	20,8	19	17,2	16	14,8	-
PN40		40	37,1	35,2	33,3	30,4	27,6	25,7	23,8	-
CL300	DIN EN 1759-1	45,3	40,1	38,1	36	32,9	29,8	27,8	25,7	-

Table 5d		Material: G20Mn5 (1.6220) as per DIN EN 10213-3								
PN	Standard	Temperature [°C]								
		-40	100	150	200	250	300	350	400	450
Max. Operating Pressure [bar]										
PN10	-	6	6	3,8	3,6	3,48	3,4	-	-	-
PN16		16	16	10,1	9,6	9,28	9,07	-	-	-
PN25		25	25	15,8	15	14,5	14,2	-	-	-
PN40		40	28	28	27	26	25	-	-	-

Table 5e		Material: G17CrMo9-10 (1.7379) as per DIN EN 10213-2								
PN / CL	Standard	Temperature [°C]								
		-10...+50	100	150	200	250	300	350	400	450
Max. Operating Pressure [bar]										
PN10	-	10	10	10	10	10	10	9,7	9,2	8,8
PN16		16	16	16	16	16	16	15,6	14,8	14
CL150	DIN EN 1759-1	19,5	17,7	15,8	14	12,1	10,2	8,4	6,5	4,7
PN25	DIN EN 1092-1	25	25	25	25	25	25	24,4	23,2	22
PN40		40	40	40	40	40	40	39	37,1	35,2
CL300	DIN EN 1759-1	51,7	51,5	50,2	48,3	46,3	42,8	40,2	36,6	33,8

Table 5f		Material: GX5CrNiMo19-11-2 (1.4408) as per DIN EN 10213-4								
PN / CL	Standard	Temperature [°C]								
		-10...+50	100	150	200	250	300	350	400	450
Max. Operating Pressure [bar]										
PN10	DIN EN 1092-1	10	10	9	8,4	7,9	7,4	7,1	6,8	6,7
PN16		16	16	14,5	13,4	12,7	11,8	11,4	10,9	10,7
CL150	DIN EN 1759-1	17,9	16,3	14,9	13,5	12,1	10,2	8,4	6,5	4,7
PN25	DIN EN 1092-1	25	25	22,7	21	19,8	18,5	17,8	17,1	16,8
PN40		40	40	36,3	33,7	31,8	29,7	28,5	27,4	26,9
CL300	DIN EN 1759-1	46,7	42,5	38,9	35,3	32,9	30,5	28,8	27,6	26,9

3-Way Control Valve BR13

Table 5g...5i Allowable Operating Pressure (ASTM)


Table 5g		Material: WCB as per ASTM A216								
PN / CL	Standard	Temperature [°C]								
		-10...+50	100	150	200	250	300	350	400	450
		Max. Operating Pressure [bar]								
PN10	DIN EN 1092-1	10	10	9,7	9,4	9	8,3	7,9	6,7	-
PN16		16	16	15,6	15,1	14,4	13,4	12,8	10,8	-
CL150	DIN EN 1759-1	19,3	17,7	15,8	14	12,1	10,2	8,4	6,5	-
PN25	DIN EN 1092-1	25	25	24,4	23,7	22,5	20,9	20	16,9	-
PN40		40	40	39,1	37,9	36	33,5	31,9	27	-
CL300	DIN EN 1759-1	50	46,4	45,1	43,9	41,8	38,9	36,9	34,6	-

Table 5h		Material: WC9 as per ASTM A217								
PN / CL	Standard	Temperature [°C]								
		-10...+50	100	150	200	250	300	350	400	450
		Max. Operating Pressure [bar]								
PN10	DIN EN 1092-1	10	10	10	10	10	10	10	9,9	9,5
PN16		16	16	16	16	16	16	16	16	15,9
CL150	DIN EN 1759-1	19,5	17,7	15,8	14	12,1	10,2	8,4	6,5	4,6
PN25	DIN EN 1092-1	25	25	25	25	25	25	25	24,8	23,9
PN40		40	40	40	40	40	40	40	40	39,7
CL300	DIN EN 1759-1	51,7	51,5	50,3	48,7	46,3	42,9	40,4	36,5	33,7

Table 5i		Material: CF8M as per ASTM A351								
PN / CL	Standard	Temperature [°C]								
		-10...+50	100	150	200	250	300	350	400	450
		Max. Operating Pressure [bar]								
PN10	DIN EN 1092-1	8,9	7,8	7,1	6,6	6,1	5,8	5,6	5,4	5,3
PN16		14,3	12,5	11,4	10,6	9,8	9,3	9	8,7	8,5
CL150	DIN EN 1759-1	18,4	16	14,8	13,6	12	10,2	8,4	6,5	4,6
PN25	DIN EN 1092-1	22,3	19,5	17,8	16,5	15,5	14,6	14,1	13,6	13,4
PN40		35,6	31,3	28,5	26,4	24,7	23,4	22,6	21,8	21,4
CL300	DIN EN 1759-1	48,1	42,3	38,6	35,8	33,5	31,6	30,4	29,3	29

Table 6 Flow Ratios [KV_v]

KV _v [m³/h]	Stroke [mm]	Ø Seat D [mm]	F ₀ [kN]		Nominal Diameter DN												
			Class IV	Class VI	15	20	25	32	40	50	65	80	100	150			
0,63	20	12,7	0,2	0,25													
1,0			0,3	0,3													
1,6					0,33	0,5											
2,5					0,35	0,5											
4,0			19,05	0,4	0,6												
6,3			20,64	0,5	0,8												
10			25,25	0,7	1,0												
16			31,72	0,8	1,3												
25	38	41,25	1,1	1,7													
40			1,4	2,2													
63		50	107,92	1,7	2,7												
94			126,95	2,0	3,2												
125			Actuator Type		250		250; 400		400; 630		630		1000				
160																> DN 150 Special Execution	
250																	
320																	

 = possible

NOTE: Pressure drops should not exceed 70% of allowable operating pressure for given nominal pressure, material execution and operating temperature as per Table 5.

Formula for calculation of ...
 ... allowable pressure drop: $\Delta p = \frac{F_s + F_D}{0,785 * 10^{-4} * D^2}$
 ... needed force [kN]: $F_s = 0,785 * 10^{-4} * D^2 * \Delta p + F_D$

Pneumatic Actuator Type P/R (optional with top mounted handwheel type -N)

Features

completely reversibility - changing of operating mode P [NO] and R [NC] without any additional parts.

Table 7 Actuator forces F_s [kN]

Size [cm ²]	max. allowable Supply Pressure [bar]	Type P (NO, Stem retract) Supply Pressure [bar]			Type R (NC, Stem extends) Spring Range [bar]					
		1,4	2,5	4,0	0,4...1,2		0,6...1,4	0,8...2,4	1,2...2,8	1,8...3,8
					0,2...1,0	0,4...2,0				
250	6,0	1,0	3,8	7,5	0,5	1,0	1,5	2,0	3,0	-
400		1,6	6,0	12	0,8	1,6	2,4	3,2	4,8	-
630		2,5	9,5	18,9	1,3	2,5	3,8	5,0	7,6	11,3
1000	5,0	4,0	15	30	2,0	4,0	6,0	8,0	12	18

Table 8 Dimensions & Weight for type P/R & P/R-N; and manual actuator type NN

Size	Diaphragm eff. area [cm ²]	Stroke [mm]	Weight [kg] (P/R)	Revolutions per stroke (P/R-N; NN)	Weight [kg] (P/R-N)	Weight [kg] (NN)	H [mm]	H1 [mm]	H2 [mm]	D1 [mm]	D2 [mm]
250	250	20	10	5	14,5	5,5	377	474	304	240	225
400	400		16		20,5	6,5	385	484	306	305	
630	630	38	30	9	37	8,5	477	574	326	375	305
1000	1000	38; 50; 63	74	8; 10; 13	100	40	660	835	530	477	450

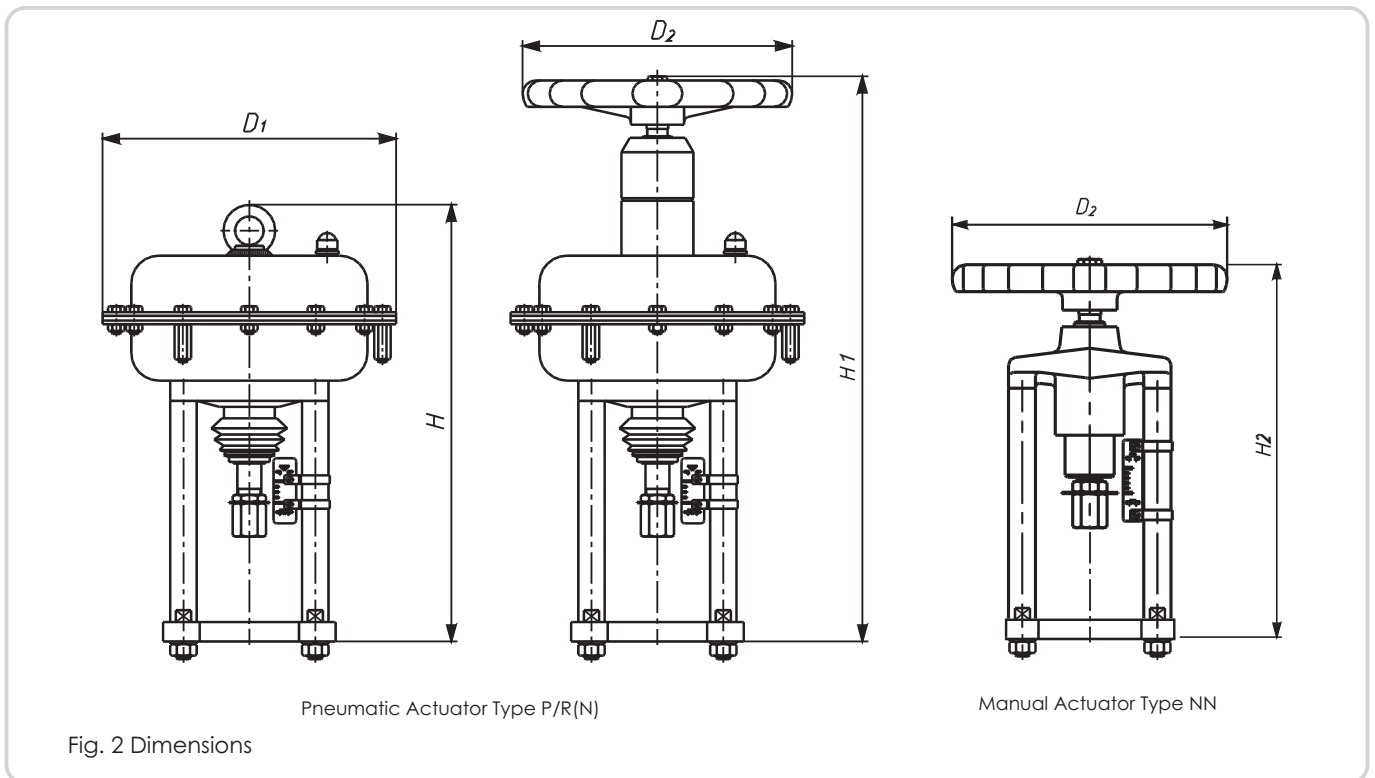


Fig. 2 Dimensions

3-Way Control Valve BR13

Valve Connection Dimensions & Weight

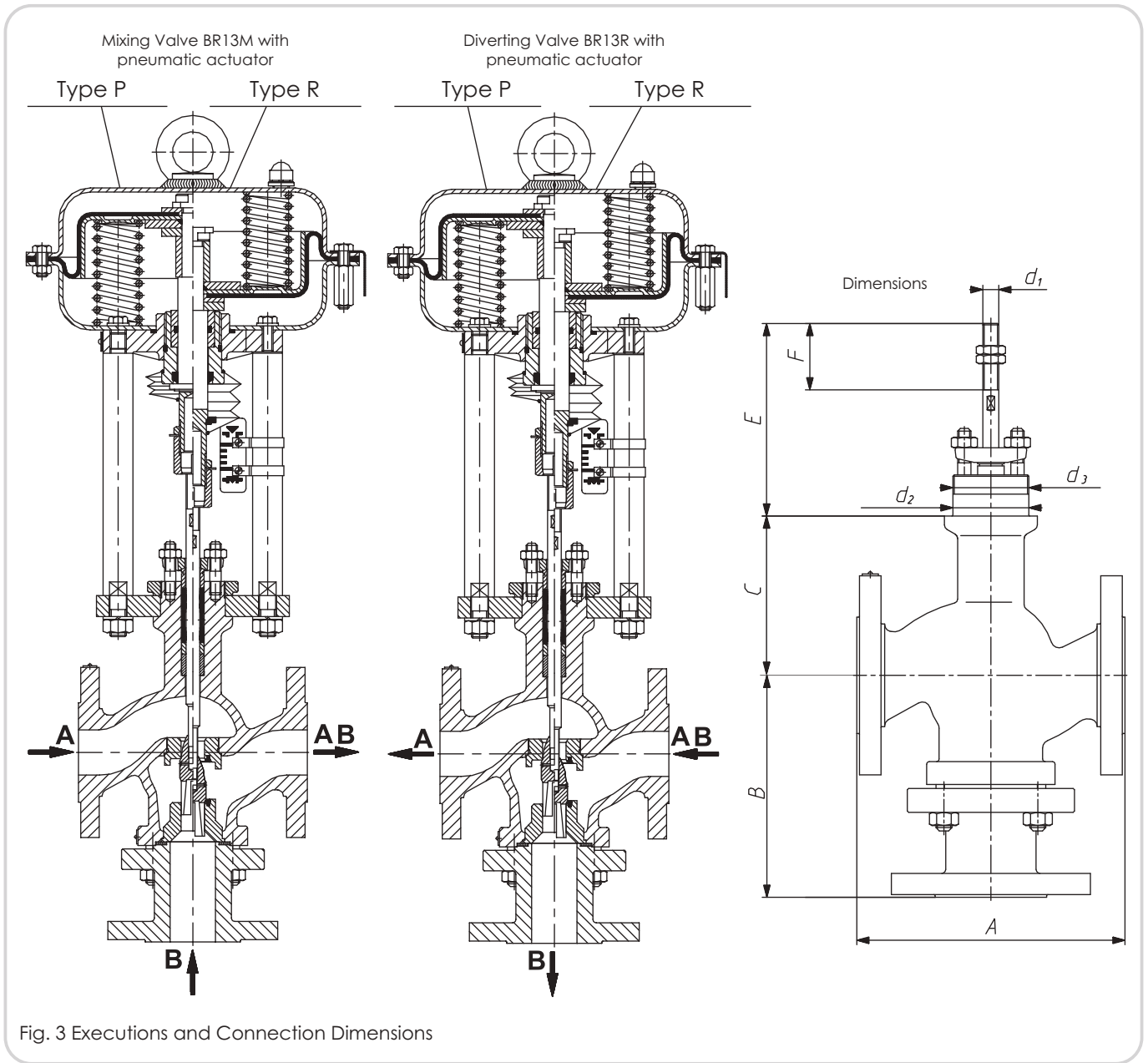


Fig. 3 Executions and Connection Dimensions

Table 9 Valve Dimensions [mm] and Weights [kg]

DN	A			B	C		E ¹⁾	F	d ₁	d ₂	d ₃	Weight [kg]
	CL150	CL300	PN10...40		Standard	Extended Bellows Seal						
15	-	-	130	140	97	297	125	50	M12x1,25	57,15	2 1/4" - 16UN2A	8,5
20	-	-	150									10,5
25	184	197	160									12
32	-	-	180	162	110	310						15
40	222	235	200		117	317						18
50	254	267	230	184	128	328						26,5
65	-	-	290	215,5	140	340						36
80	298	317	310	233,5	146	346						55
100	352	368	350	240	171	346						75
150	451	473	480	295	205	405	195 ¹⁾	100	M16x1,5	84,15	3 5/16" - 16NS2A	150

¹⁾ Valve Position CLOSE ¹⁾ Dimension for P/R-1000

Application

The range of applications of the rotary plug valve BR33 corresponds to the "standard" control valve, but it can also be used for many special applications. This valve is specifically used to regulate the flow of media containing solids in automated industrial installations.

The rotary plug valve is especially useful for the control of flow under conditions with high probability of cavitation and erosion. The BR33 also has high rangeability (200:1), enabling larger control ranges.

With the KV's adjustment, integrated into the associated rotary actuator BR99, it is possible to achieve different opening angles of the rotary plug, leading to larger KV's without the need to exchange plug and seat.

Features

- » Nominal Diameters from DN25 up to DN300
- » Nominal Pressure from PN10 up to CL300
- » Face-to-Face length as per DIN EN 60534-3-1, 3-2 or ANSI B16.10
- » Temperature range -40°C up to +250°C (optional +450°C)
- » Leakage Class IV and VI according to DIN EN 60534-4
- » Characteristic: Linear (L); Equal-percentage (P) with positioner
- » Rangeability 200:1
- » Design with Flange ends or Wafer type (Sandwich), TA-Luft, Bearing seal (upgradeable) and Outlet sleeve (upgradeable)
- » Design as per Pressure Equipment Directive 2014/68/EU
- » Conformity CE and EAC
- » Optional certification/confirmation according to ATEX 2014/34/EU, GOST-R (TR), SIL2 (IEC 61508) and AD2000 Merkblatt



Design and technical Specification

Diameters: DN25; 40; 50; 80; 100; 150; 200; 250; 300

Pressure: PN10; 16; 25; 40 as per DIN EN 1092-1:2013 and DIN EN 1092-2:1999
ANSI CL150; 300 and DIN EN 1759-1:2005

Flanges as per DIN EN 1759-1:2005 can be assembled with flanges execution per standards ANSI / ASME B16.5 and MSS SP44. They correspond to the standard DIN EN 7005-1:2002 following pressure ranges: CL150 ≙ PN20 and CL300 ≙ PN50

Table 1 Flange Versions

Material	Nominal Pressure	Flange Facing Identification			
		Raised Face	Groove	Recess	Ring-Joint
Carbon Steel Stainless Steel	PN10; 16; 25; 40	B ²⁾	D	F	-
	CL150		-	-	J (RTJ)
	CL300		DL (D1 ¹⁾)	F (F1)	
¹⁾ only for CL300; ²⁾ B1 – (Ra = 12,5 mm, concentric surface structure "C"), B2 – (Ra as agreed with the customer); () – as per ASME B16.5					

Table 2 Packing and Bonnet Versions

Packing	PN / CL	Temperature [°C]	
		Standard	Extended Yoke
PTFE V-Ring	PN10...CL300	-46...+200	+200...+300
PTFE+Graphite			
PTFE V-Ring / TA-Luft		+200...+250	+200...+450
Graphite			
Graphite / TA-Luft			

Table 3 Application range for soft seated version

Version	Operating Temperature [°C]		Max. Operating Pressure [bar]
	Min.	Max.	
soft seat (PTFE inlay)	-46	+260	35

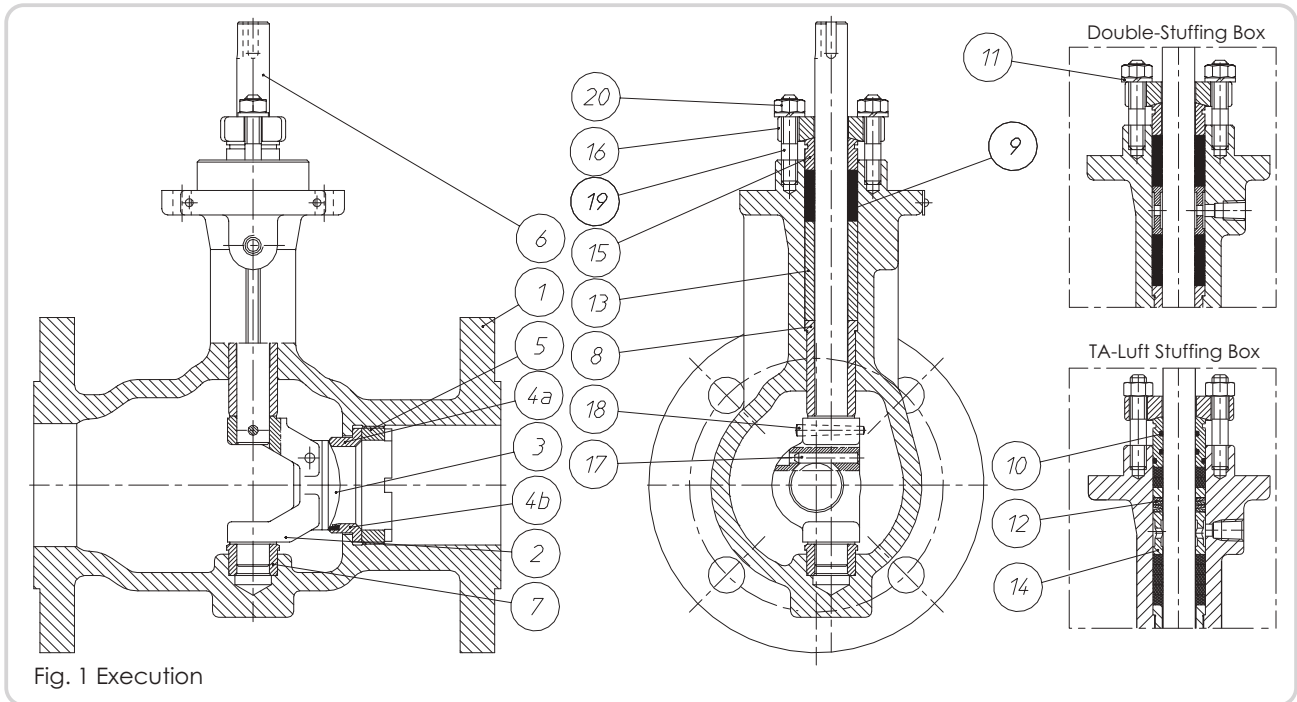


Table 4 Components and Materials

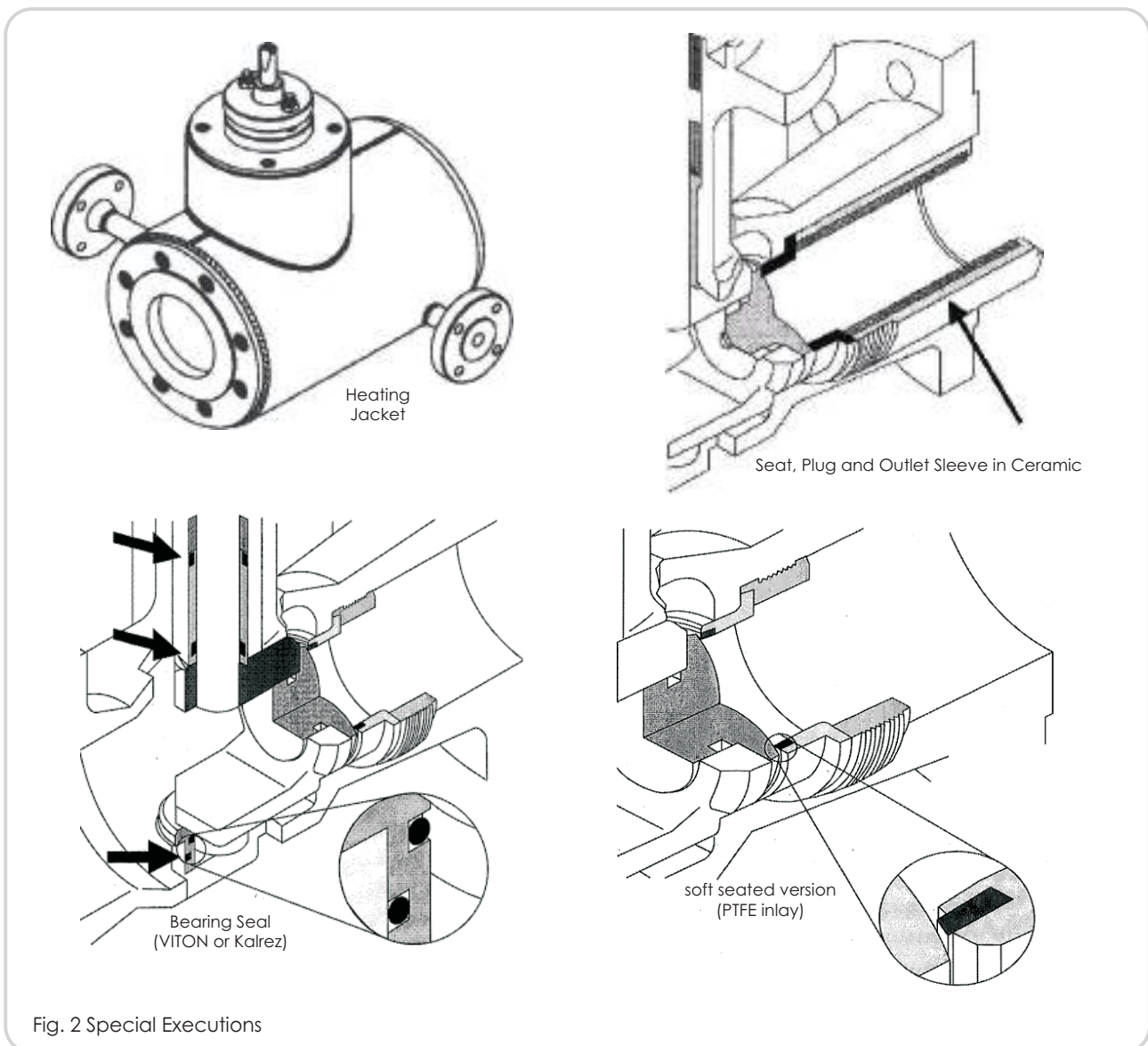
No.	Component	Material				
1	Body	GP240GH (1.0619)	WCB	G20Mn5 (1.6220)	GX5CrNiMo19-11-2 (1.4408)	CF8M
2	Bridge					
3	Plug	X6CrNiMoTi17-12-2 (1.4571); X6CrNiMoTi17-12-2 (1.4571) + Stellite X2CrNiMoTi17-12-2 (1.4404); X2CrNiMoTi17-12-2 (1.4404) + Stellite				
4	Seat	X6CrNiMoTi17-12-2 (1.4571); X6CrNiMoTi17-12-2 (1.4571) + Stellite; X6CrNiMoTi17-12-2 (1.4571) + PTFE X2CrNiMoTi17-12-2 (1.4404); X2CrNiMoTi17-12-2 (1.4404) + Stellite; X2CrNiMoTi17-12-2 (1.4404) + PTFE				
5	Screwed Plug	X6CrNiMoTi17-12-2 (1.4571)				
6	Shaft					
7	Plug Guiding	X6CrNiMoTi17-12-2 (1.4571) + Stellite + Chrom(III)-nitride X6CrNiMoTi17-12-2 (1.4571) + PTFE				
8	Shaft Guiding					
9	Packing	PTFE+Graphite, PTFE-V, Graphite				
10	Sealing Ring	FKM				
11	Sweep Ring	VMQ				
12	Spring	12R10 (SANDVIK)				
13	Spacer Sleeve	X6CrNiMoTi17-12-2 (1.4571)				
14	Lubricating Sleeve					
15	Press Sleeve	X6CrNiMoTi17-12-2 (1.4571); X2CrNiMoTi17-12-2 (1.4404)				
16	Press Lever					
17	Cylindrical Pin	X6CrNiMoTi17-12-2 (1.4571)				
18	Plug Pin					
19	Stud Bolt	8.8			A4-70	
20	Nut	8			A4-70	
•	Rec. Spare Parts					

Material	Standard
GP240GH (1.0619)	DIN EN 10213-2
WCB	ASTM A 216
G20Mn5 (1.6220)	EIN EN 10213-3
GX5CrNiMo19-11-2 (1.4408)	DIN EN 10213-4
CF8M	ASTM A351
X6CrNiMoTi17-12-2 (1.4571)	DIN EN 10088
X2CrNiMoTi17-12-2 (1.4404)	DIN EN 10088

NOTE: » Padding of Surface with Stellite: ~ 40HRC

Features

Due to the one-piece housing all occurring pipeline forces are compensated and have no effect on the torque and there are no additional forces on the seat and plug. Flow velocities minimized by the large volume and favorable aerodynamic housing (no deflection). The preferred flow direction (flow to close) has an added anti-wear property. The construction of the bridge construction ensures a free flow and a free of dead space. The double eccentricity of the bridge reduces the drive torque to a minimum, required for the safe closure of the valve. The plug of the BR33 control valve is a simple rotationally symmetrical part, always identical and therefore easily replaceable. By the double eccentric bearing and the required rotation angle of 60° for control, the BR33 has an almost linear inherent characteristic for maximum and reduced KVs.



Application ranges:

- » Heating Jacket with 2 or 3 Connections
- » Seat, Plug and Outlet Sleeve in 1.4571 + Stellite at Cavitation or Solids
- » Seat, Plug and Outlet Sleeve in Ceramic (Si3N4) at elevated Solids (e.g. calcium hydroxide)
- » Bearing Seal with O-Rings (VITON or Kalrez) at crystalizing, polymerized media

Table 4a...4e Allowable Operating Pressure

Table 4a		Material: GP240GH (1.0619) nach DIN EN 10213-2								
PN / CL	Standard	Temperature [°C]								
		-10...+50	100	150	200	250	300	350	400	450
		Max. Operating Pressure [bar]								
PN10	DIN EN 1092-1	10	9,2	8,8	8,3	7,6	6,9	6,4	5,9	-
PN16		16	14,8	14	13,3	12,1	11	10,2	9,5	-
CL150	DIN EN 1759-1	17,3	15,4	14,6	13,8	12,1	10,2	8,4	6,5	-
PN25	DIN EN 1092-1	25	23,2	22	20,8	19	17,2	16	14,8	-
PN40		40	37,1	35,2	33,3	30,4	27,6	25,7	23,8	-
CL300	DIN EN 1759-1	45,3	40,1	38,1	36	32,9	29,8	27,8	25,7	-

Table 4b		Material: G20Mn5 (1.6220) nach DIN EN 10213-3								
PN	Standard	Temperature [°C]								
		-40	100	150	200	250	300	350	400	450
		Max. Operating Pressure [bar]								
PN10		6	6	3,8	3,6	3,48	3,4	-	-	-
PN16		16	16	10,1	9,6	9,28	9,07	-	-	-
PN25		25	25	15,8	15	14,5	14,2	-	-	-
PN40		40	28	28	27	26	25	-	-	-

Table 4c		Material: GX5CrNiMo19-11-2 (1.4408) as per DIN EN 10213-4								
PN / CL	Standard	Temperature [°C]								
		-10...+50	100	150	200	250	300	350	400	450
		Max. Operating Pressure [bar]								
PN10	DIN EN 1092-1	10	10	9	8,4	7,9	7,4	7,1	6,8	6,7
PN16		16	16	14,5	13,4	12,7	11,8	11,4	10,9	10,7
CL150	DIN EN 1759-1	17,9	16,3	14,9	13,5	12,1	10,2	8,4	6,5	4,7
PN25	DIN EN 1092-1	25	25	22,7	21	19,8	18,5	17,8	17,1	16,8
PN40		40	40	36,3	33,7	31,8	29,7	28,5	27,4	26,9
CL300	DIN EN 1759-1	46,7	42,5	38,9	35,3	32,9	30,5	28,8	27,6	26,9

Table 4d		Material: WCB as per ASTM A216								
PN / CL	Standard	Temperature [°C]								
		-10...+50	100	150	200	250	300	350	400	450
		Max. Operating Pressure [bar]								
PN10	DIN EN 1092-1	10	10	9,7	9,4	9	8,3	7,9	6,7	-
PN16		16	16	15,6	15,1	14,4	13,4	12,8	10,8	-
CL150	DIN EN 1759-1	19,3	17,7	15,8	14	12,1	10,2	8,4	6,5	-
PN25	DIN EN 1092-1	25	25	24,4	23,7	22,5	20,9	20	16,9	-
PN40		40	40	39,1	37,9	36	33,5	31,9	27	-
CL300	DIN EN 1759-1	50	46,4	45,1	43,9	41,8	38,9	36,9	34,6	-

Table 4e		Material: CF8M as per ASTM A351								
PN / CL	Standard	Temperature [°C]								
		-10...+50	100	150	200	250	300	350	400	450
		Max. Operating Pressure [bar]								
PN10	DIN EN 1092-1	8,9	7,8	7,1	6,6	6,1	5,8	5,6	5,4	5,3
PN16		14,3	12,5	11,4	10,6	9,8	9,3	9	8,7	8,5
CL150	DIN EN 1759-1	18,4	16	14,8	13,6	12	10,2	8,4	6,5	4,6
PN25	DIN EN 1092-1	22,3	19,5	17,8	16,5	15,5	14,6	14,1	13,6	13,4
PN40		35,6	31,3	28,5	26,4	24,7	23,4	22,6	21,8	21,4
CL300	DIN EN 1759-1	48,1	42,3	38,6	35,8	33,5	31,6	30,4	29,3	29

NOTE: At operating temperatures below -10°C* a notch impact test must be performed according to **AD2000 Merkblatt W10****, in which the lowest temperatures are mentioned in three categories (I, II, III) for the respective usage cases.

* For low temperature usage a technical review of the manufacturer is required!

** The temperature limits mentioned in AD2000 Merkblatt W10 are purely theoretical values and relate only to the indicated material. Due to the multiplicity of used components - of a control valve - it also requires a separate review of the manufacturer!

Table 5 Flow Ratios [KV_s]

NC, Spring close													
DN	C	K	KV _s [m ³ /h]				Ø Seat D [mm]	R99-120		R99-240		R99-780	
			100% [60°]	75% [45°]	45% [25°]	120% [90°]		Spring Range [bar]					
								1,0...2,0	1,6...3,2	0,8...1,6	1,6...3,2	1,0...2,0	1,6...3,2
25	1,03	1,23	15	11	7	18	18	50	-	-	-	-	-
	0,45	0,82	6	5	3	7	12	50	-	-	-	-	-
	0,38	0,75	3	2	1	4	10	50	-	-	-	-	-
40	4,6	2,9	40	30	18	48	28,5	50	-	-	-	-	-
	2,2	2,3	16	12	7	19	20	50	-	-	-	-	-
50	8,2	4,4	60	45	27	72	38	50	-	-	-	-	-
	3,9	2,9	24	18	11	29	26	50	-	-	-	-	-
80	26,9	9,2	150	113	68	180	58	-	32	50	50	-	-
	11,5	6,1	60	45	27	72	38	-	50	50	50	-	-
100	52,9	14,3	240	180	108	288	72	-	13	27	50	-	-
	23,5	10,4	96	72	43	115	48	-	36	50	50	-	-
150	169	32	500	375	225	600	110	-	-	9	23	50	50
	72	19,6	200	150	90	240	72	-	-	25	50	50	50
200	312	47,3	800	600	360	960	136	-	-	-	13	44	50
	131	30,1	320	240	144	384	88	-	-	-	37	50	50
250	635	74,8	1250	938	563	1500	170	-	-	-	5	20	45
	253	48	500	375	225	600	110	-	-	-	17	50	50
300	980	100	1800	1350	810	2160	200	-	-	-	2	12	28
	390	62	720	540	324	864	126	-	-	-	10	34	50

NO, Spring open													
DN	C	K	KV _s [m ³ /h]				Ø Seat D [mm]	P99-120		P99-240		P99-780	
			100% [60°]	75% [45°]	45% [25°]	120% [90°]		Supply Pressure [bar] (Spring Range: 0,8...1,6 bar)					
								2,4	4,0	2,4	4,0	2,4	4,0
25	1,03	1,23	15	11	7	18	18	50	50	-	-	-	-
	0,45	0,82	6	5	3	7	12	50	50	-	-	-	-
	0,38	0,75	3	2	1	4	10	50	50	-	-	-	-
40	4,6	2,9	40	30	18	48	28,5	50	50	-	-	-	-
	2,2	2,3	16	12	7	19	20	50	50	-	-	-	-
50	8,2	4,4	60	45	27	72	38	50	50	-	-	-	-
	3,9	2,9	24	18	11	29	26	50	50	-	-	-	-
80	26,9	9,2	150	113	68	180	58	11	50	50	50	-	-
	11,5	6,1	60	45	27	72	38	33	50	50	50	-	-
100	52,9	14,3	240	180	108	288	72	2	24	27	50	-	-
	23,5	10,4	96	72	43	115	48	11	50	50	38	-	-
150	169	32	500	375	225	600	110	-	-	9	38	50	50
	72	19,6	200	150	90	240	72	-	-	24	50	50	50
200	312	47,3	800	600	360	960	136	-	-	-	23	44	50
	131	30,1	320	240	144	384	88	-	-	-	50	50	50
250	635	74,8	1250	938	563	1500	170	-	-	-	10	20	50
	253	48	500	375	225	600	110	-	-	-	29	50	50
300	980	100	1800	1350	810	2160	200	-	-	-	5	12	44
	390	62	720	540	324	864	126	-	-	-	17	34	50

Coefficients: FL=0,854; XT=0,6; FD=0,7; xFz=0,58

NOTE:

The indicated pressure drops (incl. K factor) refer to the version with **metallic sealing system** and should not exceed 70% of the allowable operating pressure for given nominal pressure, material execution and operating temperature as per Table 4. Theoretical acceptable pressure drops are included. Actual pressure drops with consideration of tolerance of spring manufacture and friction of internal parts of the actuator are lower than those given by 20%. With soft sealing system (**leakage class VI**) and diameter > DN200, an extra safety of 10% is needed.

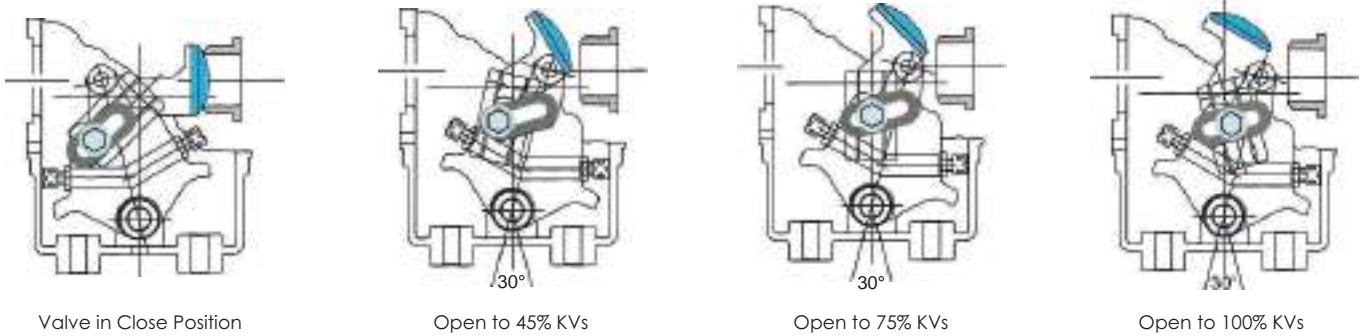
 Calculation of needed torque with **Leakage Class IV**:
$$\frac{\Delta p * C + 10 * K}{7,5} = Nm$$

 and needed torque for **Leakage Class VI**:
$$\frac{\Delta p * C + 10 * (K * 1,65)}{7,5} = Nm$$

Rotary Control Valve BR33

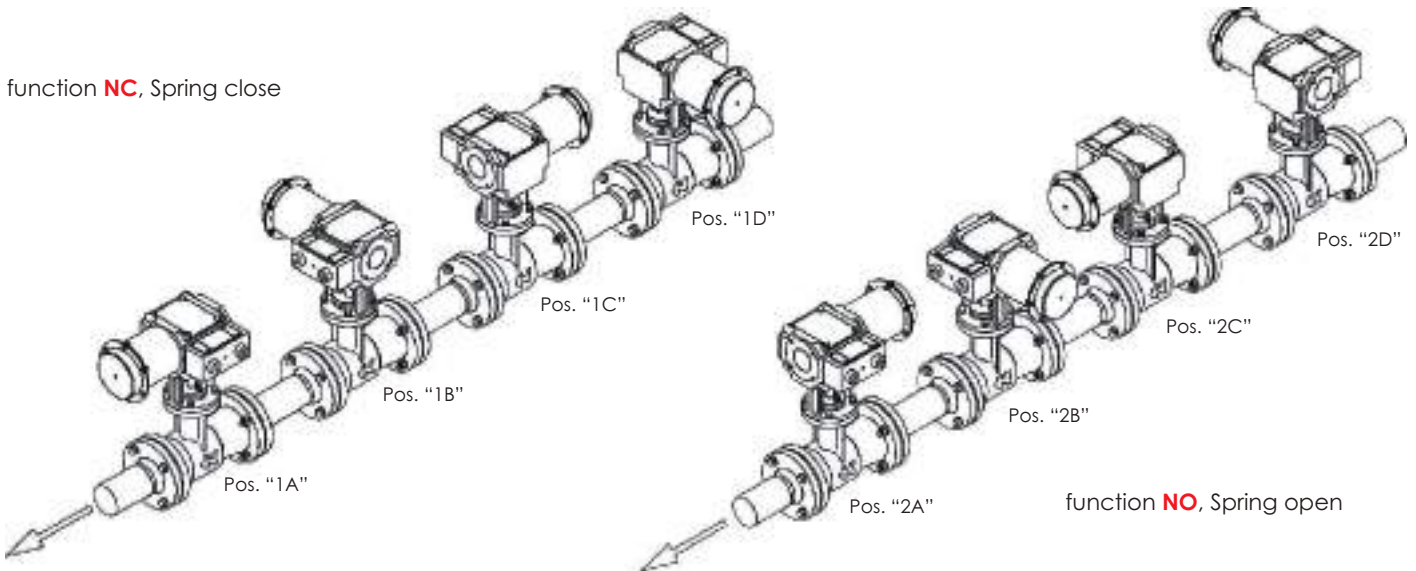
The Flexibility:

Adjustment of rotation angle of actuator type BR99 via system of two levers. Lever attached to diaphragm plate always turns by 30°, hence stroke, pressure range and positioner feedback lever position do not change. With change in setting of bearing pin turn angle of crankshaft and also valve shaft changes too, within values 25°, 45°, 60° and 90°. In closed position of valve movement of bearing pin to crankshaft guide at the beginning of lever rotation is parallel, hence closed position of valve is maintained.



Connector, which connects actuator to valve shaft, allows turning of actuator to valve by each 90° and since it is accessible from outside it eliminates the need for actuator or valve disassembly.

function **NC**, Spring close



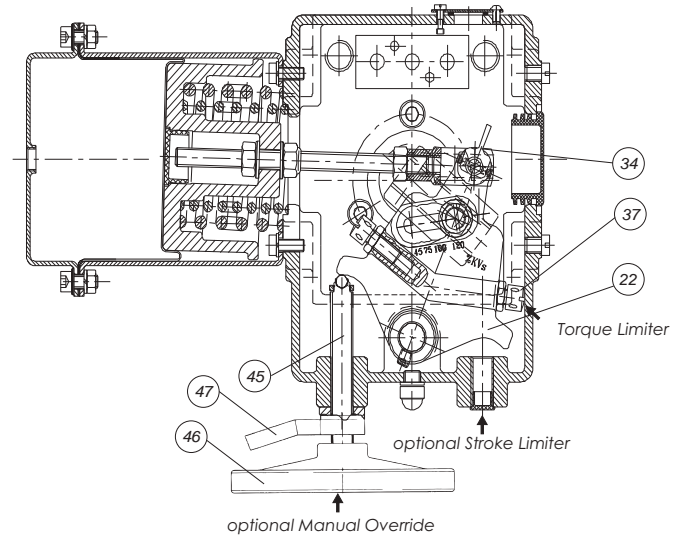
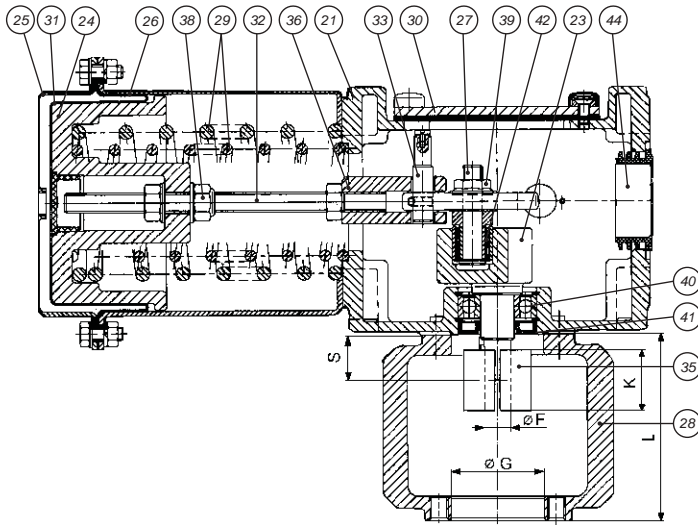
Pneumatic Actuator Type P/R99 (optional with Manual Override Type N)

Table 6 Pneumatic Actuator

Size	Diaphragm eff. area [cm ²]	max. allowable Supply Pressure [bar]	Spring Range [bar]	Connection [ISO 5211]	L	K	G	F	S	Weight [kg]
P/R99-120	120	6.0	1.0...2.0; 1.6...3.2	F07	110	36	55	16	24	18
P/R99-240	240			F12			60			
			F14	100	28	60		54		
				F16					130	
P/R99-780	780		1.0...2.0; 1.6...3.2	F14	200	60	100	36	71	189
				F16			130			

Pneumatic Connection: G 1/4", Pipe Diameter: Ø 6x1; Ø 8x1; Ø 10x1; Ø 12x1; Ambient Temperature Range: -30...+80°C; Maximum Supply Pressure: 6 bar

Components

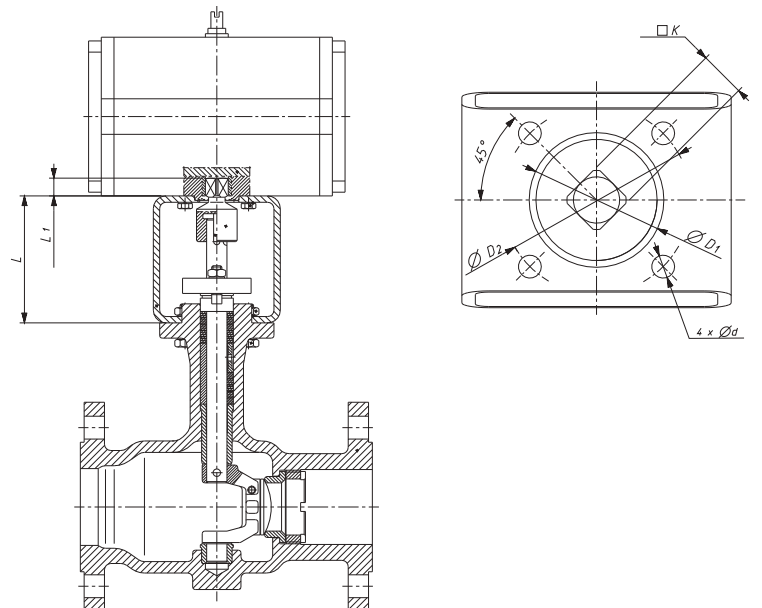
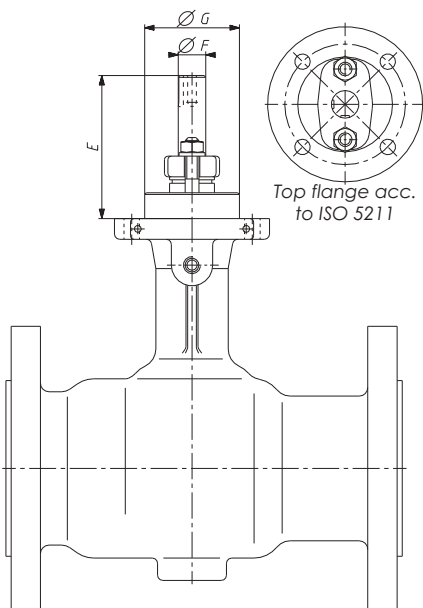


21	Actuator Housing	28	Actuator Yoke	35	Connector	42	Needle Bearing
22	Actuator Lever	29	Spring (1 + 2)	36	Fork	44	Closure Plug
23	Crankshaft	30	Front Nameplate	37	Torque Limiter	45	Handwheel Lock
24	Diaphragm Plate	31	Diaphragm	38	Adjusting Nut	46	Handwheel
25	Diaphragm Housing	32	Push Rod	39	Securing Nut	47	Locking Lever
26	Spring Case	33	Cylindrical Pin	40	Ball Bearing at Crankshaft	•	Rec. Spare Parts
27	Bearing Pin	34	Stroke Indicator	41	Sealing Ring at Crankshaft		

Table 7 Connection Dimensions

Dimensions according to ISO 5211				
DN	ISO 5211	E	F	G
25...50	F07	83	16	55
80...100	F12			
150	F14	116	28	100
		113		
200...300	F16	123	36	130
		133		
		120		

Dimensions incl. yoke and connector						
Flange	D ₁	D ₂	d	L	L ₁	K
F05	35	50	7	100	15	14
F07	55	70	9		18	17
F12	85	125	13	140	22	27
F14	100	140	17		37	36
F16	130	165	22	48	46	



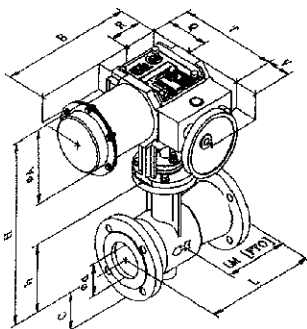
Rotary Control Valve

BR33

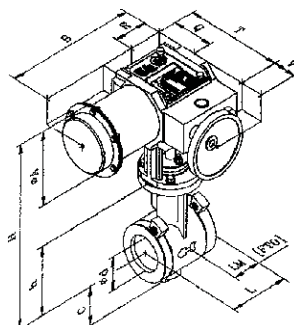
Table 8 Dimensions [mm] & Weight [kg]

DN	PN/ANSI	Actuator	H	h	Ø d	Ø A	C	L	LM	B	R	Q	V	T	Weight ¹⁾ [kg]
25	PN40	99-120	409	134	37	175	55	160	89	374	92	105	90	234	26
	CL150							184	113						26
	CL300							197	126						27
	Sandwich (KDF)							102	60						24
40	PN40	99-120	415	140	48	175	64	200	115	374	92	105	90	234	29
	CL150							222	137						29
	CL300							235	150						30
	Sandwich (KDF)							114	64						25
50	PN40	99-120	420	145	60	175	70	230	123	374	92	105	90	234	31
	CL150							254	135						31
	CL300							267	141						33
	Sandwich (KDF)							124	70						26
80	PN40	99-120	467	192	88	175	90	310	190	573	135	143	75	348	45
	CL150							298	178						45
	CL300							318	197						50
	Sandwich (KDF)							165	92						35
	PN40	99-240	607		88	250	90	310	190	573	135	143	75	348	81
	CL150							298	178						81
	CL300							318	197						86
	Sandwich (KDF)							165	92						71
100	PN40	99-120	477	202	107	175	103	350	215	374	92	105	90	234	58
	CL150							353	223						58
	CL300							368	234						68
	Sandwich (KDF)							194	116						43
	PN40	99-240	617		107	250	103	350	270	573	135	143	75	348	94
	CL150							353	241						94
	CL300							368	263						104
	Sandwich (KDF)							194	140						79
150	PN40	99-240	699	284	162	250	195	480	270	573	135	143	75	348	132
	CL150							451	241						123
	CL300							473	263						144
	Sandwich (KDF)							229	140						99
	PN40	99-780	789	284	162	430	195	480	365	925	220	230	90	526	267
	CL150							451	336,5						258
	CL300							473	349						279
	Sandwich (KDF)							229	157						234
200	PN40	99-240	727	312	204	250	216	600	365	573	135	143	75	348	192
	CL150							543	336,5						182
	CL300							568	349						212
	Sandwich (KDF)							243	157						132
	PN40	99-780	817	312	204	430	216	600	365	925	220	230	90	526	327
	CL150							543	336,5						317
	CL300							568	349						347
	Sandwich (KDF)							243	157						267
250	PN40	99-240	751	336	250	250	250	730	430	573	135	143	75	348	327
	CL150							673	401,5						297
	CL300							708	421						337
	Sandwich (KDF)							297	190						227
	PN40	99-780	841	336	250	430	250	730	430	925	220	230	90	526	462
	CL150							673	401,5						432
	CL300							708	421						472
	Sandwich (KDF)							297	190						362
300 */**	PN40	99-240	769	338	300	250	258	850	553	573	135	143	75	348	575
	Sandwich (KDF)							338	197,5						337
	PN40	99-780	859	342	300	430	258	850	553	925	220	230	90	526	710
	Sandwich (KDF)							338	197,5						472

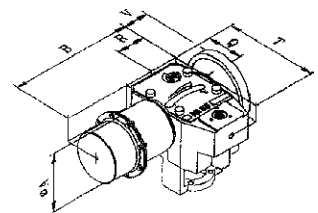
¹⁾ CL300: L=865 (+/-1mm); flange thickness=508 (+/-1mm); Ø flange = 521mm **) CL150: Body PN40, boring acc. to CL150¹⁾ approx. weights incl. actuator



Flange Version with Actuator Type P/R99-120



Sandwich Version with Actuator Type P/R99-120



Actuator Type P/R99-240; P/R99-780

Application

The single-acting, pneumatic actuators of series P/R are used for operating valves with linear movement in industrial automated systems and equipment.

Versions

P	NO, spring open (stem retract)
PN	inclusive top-mounted handwheel
R	NC, spring close (stem extends)
RN	inclusive top-mounted handwheel

Features

- » Temperature range -30°C up to +80°C (Buna-N® [NBR] with polyester fabric)
- » Low temperature version -40°C possible (Silicon diaphragm)
- » Optimal certification/confirmaton according to ATEX 2014/34/EU, GOST-R (TR) and SIL3 according to IEC 61508 (SIL2 > 5 years)



Design and technical Specification

Actuator Sizes:	250; 400; 630; 1000; 1500 cm ²
Supply Pressure:	max. 6,0 bar
Connection:	1/4" NPT; 1/2" NPT
Pipe Diameter:	Ø 6x1; Ø 8x1; Ø 10x1; Ø 12x1

Table 1 Actuator forces FS [kN]

Size [cm ²]	max. allowable Supply Pressure [bar]	Type P (NO, Stem retract) Supply Pressure [bar]			Type R (NC, Stem extends) Spring Range [bar]					
		1,4	2,5	4,0	0,2...1,0	0,4...1,2	0,4...2,0	0,6...1,4	0,8...2,4	1,2...2,8
250	6,0	1,0	3,8	7,5	0,5	1,0	1,5	2,0	3,0	-
400		1,6	6,0	12	0,8	1,6	2,4	3,2	4,8	-
630		2,5	9,5	18,9	1,3	2,5	3,8	5,0	7,6	11,3
R-630T	5,0	-	-	-	2,6	5,0	7,6	10	15,2	22,6
1000		4,0	15	30	2,0	4,0	6,0	8,0	12	18
1500		6,0	22,5	45	3,0	6,0	9,0	12	18	27
1500T		12	45	90	6,0	12	18	24	36	54

Table 2 Features

Size [cm ²]	Diaphragm eff. area [cm ²]	Stroke [mm]	Spring Range [bar]			Supply Pressure max. [bar]	Revolutions per stroke (P/R-N)
			3 Springs	6 Springs	12 Springs		
250	250	20	0,2...1,0	0,4...2,0	-	6,0	5
400	400						
630	630	20; 38	0,4...1,2	0,8...2,4	-	5,0	5; 9
R-630T	2 x 630						
1000	1000	38; 50; 63	0,6...1,4	1,2...2,8	1,2...2,8	5,0	8; 10; 13; 16; 20
1500	1500	38; 50; 63; 80; 100					
1500T	2 x 1500	50; 63; 80; 100					

Table 3 Actuator Volume

Size [cm ²]	Initial Volume [cm ³]	Final Volume [cm ³] at stroke					
		20 [mm]	38 [mm]	50 [mm]	63 [mm]	80 [mm]	100 [mm]
250	830	1130	-	-	-	-	-
400	1500	2300	-	-	-	-	-
630	3480	4740	5870	-	-	-	-
1000	5720	-	9520	10220	12020	-	-
1500	7900	-	13600	15400	17350	19900	22900

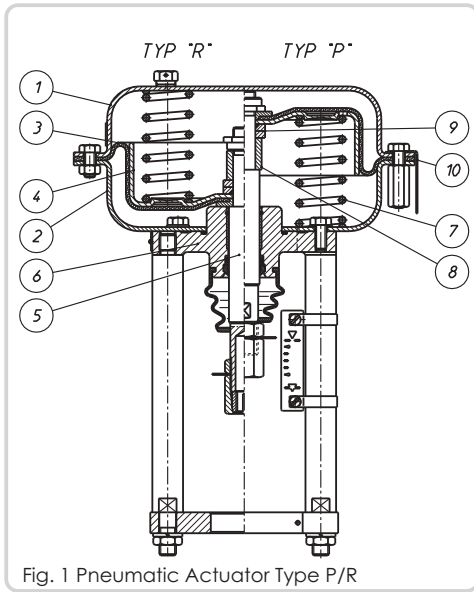


Fig. 1 Pneumatic Actuator Type P/R

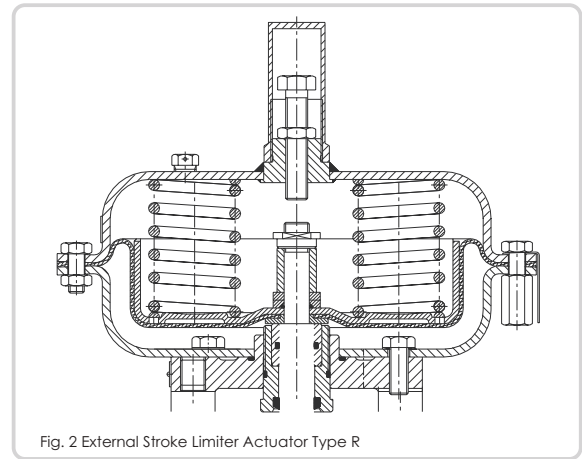


Fig. 2 External Stroke Limiter Actuator Type R

Actuator Chamber (1; 2); Diaphragm (3); Diaphragm Plate(4); Stem (5); Bearing and Connection Block (6); Spring (7); Distance Bushing (8); Distance Spacer (9); Warning Label (10)

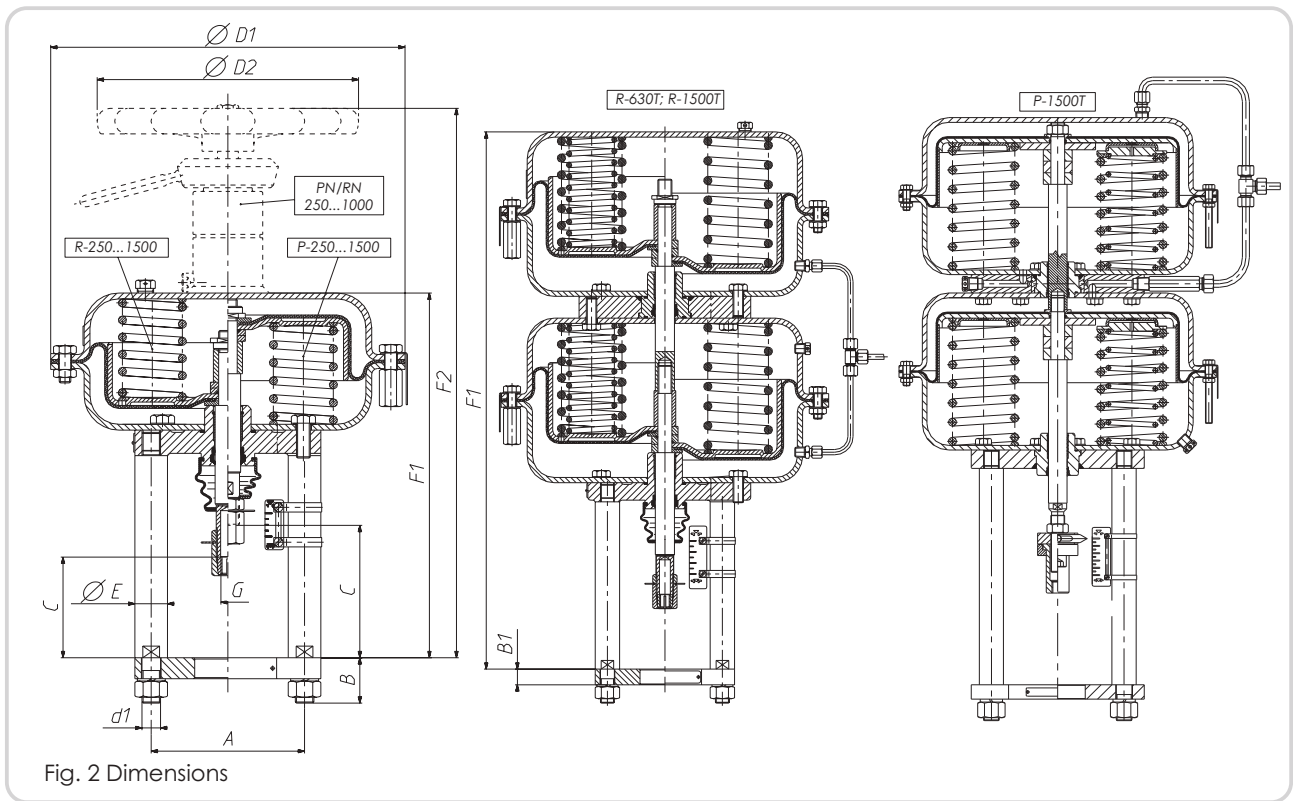


Fig. 2 Dimensions

Table 4 Dimensions [mm] & Weight [kg]

Size [cm ²]	A	B	B1	C		D1	D2	d1	E	F1	F2	G	Weight [kg]	
				P; PN	R; RN								P; R	PN; RN
250	110	31	18	112	86	240	225	M12	22	306	468	M12x1,25	10	14,5
400	132	39	20	116		305	305	M16	28	312	474		16	20,5
630			134	402		564	30			37				
R-630T	216	50	22	-		375	-	616	-	45	52			
1000			210	127	477	450	M24	585	825	M16x1,5	74	100		
1500	230	62	18	107	84	550	-	M27	42	679	-	M16; M20; M24x1,5	95	-
1500T			22	103	80									
			25	100	77									
			18	107	84									
			22	103	80									
			25	100	77									

Application

The single-acting, pneumatic actuators of series P1/R1 are used for operating valves with linear movement in industrial automated systems and equipment.

Versions

- P1 NO, spring open (stem retract)
P1B inclusive side-mounted handwheel
- R1 NC, spring close (stem extends)
R1B inclusive side-mounted handwheel

Features

- » Temperature range -30°C up to +80°C (Buna-N® [NBR] with polyester fabric)
- » Low temperature version -40°C possible (Silicon diaphragm)
- » Optimal certification/confirmaton according to ATEX 2014/34/EU, GOST-R (TR) and SIL3 according to IEC 61508 (SIL2 > 5 years)



Design and technical Specification

- Actuator Sizes: 250; 400; 630; 1000; 1500 cm²
Supply Pressure: max. 6,0 bar
Connection: 1/4" NPT; 1/2" NPT
Pipe Diameter: Ø 6x1; Ø 8x1; Ø 10x1; Ø 12x1

Table 1 Actuator forces FS [kN]

Size [cm ²]	max. allowable Supply Pressure [bar]	Type P1 (NO, Stem retract) Supply Pressure [bar]			Type R1 (NC, Stem extends) Spring Range [bar]					
		1,4	2,5	4,0	0,2...1,0	0,4...1,2 0,4...2,0	0,6...1,4	0,8...2,4	1,2...2,8	1,8...3,8
400	6,0	1,6	6,0	12	0,8	1,6	2,4	3,2	4,8	-
630	6,0	2,5	9,5	18,9	1,3	2,5	3,8	5,0	7,6	11,3
1000	5,0	4,0	15	30	2,0	4,0	6,0	8,0	12	18
1500	5,0	6,0	22,5	45	3,0	6,0	9,0	12	18	27
1500T	5,0	12	45	90	6,0	12	18	24	36	54

Table 2 Features

Size [cm ²]	Diaphragm eff. area [cm ²]	Stroke [mm]	Spring Range [bar]			Supply Pressure max. [bar]	Revolutions per stroke (P1/R1-B)
			3 Springs	6 Springs	12 Springs		
400	400	20	0,2...1,0	0,4...2,0	-	6,0	5
630	630	20; 38					5; 9
1000	1000	38; 50; 63	0,4...1,2	0,8...2,4	1,8...3,8	5,0	8; 10; 13; 16; 20
1500	1500	38; 50; 63; 80; 100					
1500T	2 x 1500	50; 63; 80; 100	0,6...1,4	1,2...2,8			

Table 3 Actuator Volume

Size [cm ²]	Initial Volume [cm ³]	Final Volume [cm ³] at stroke					
		20 [mm]	38 [mm]	50 [mm]	63 [mm]	80 [mm]	100 [mm]
400	1500	2300	-	-	-	-	-
630	3480	4740	5870	-	-	-	-
1000	5720	-	9520	10220	12020	-	-
1500	7900	-	13600	15400	17350	19900	22900

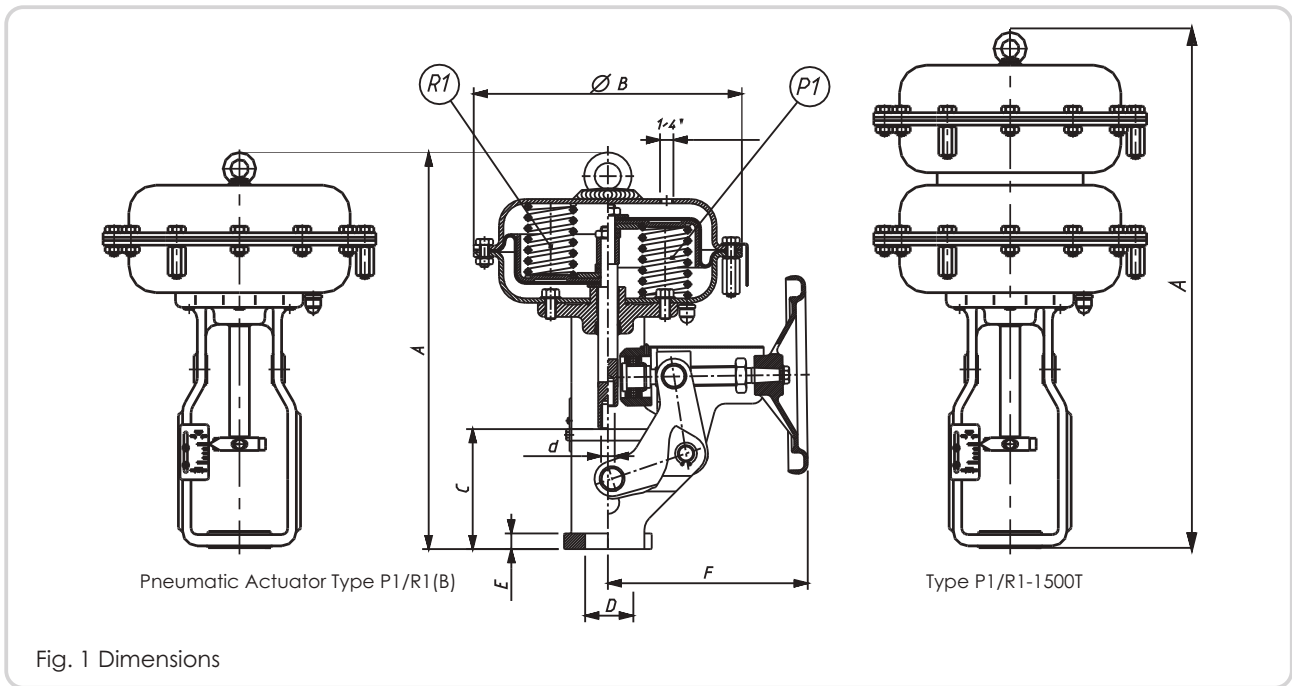


Fig. 1 Dimensions

Table 4 Dimensions [mm] & Weight [kg]

Size [cm ²]	A	B	C		D	E	F	d	Weight [kg]	
			P1; P1B	R1; R1B					P1; R1	P1B; R1B
400	453	305	127	100	57,15	17,7	255	M12x1,25	20	28
630	548	375		107	84,15	22,5		280	M12x1,25 M16x1,5	40
1000	773	477	153	90	57,15	17,7	340	M12x1,25 M16x1,5 M20x1,5	85	105
1500	833	550	184	102	84,15	22,5		410	M12x1,25 M16x1,5 M20x1,5	120
1500T	1138	550			84,15 95,25		95,25		M24x1,5	225

MANUAL ACTUATOR TYPE 20

Table 14 Dimensions & Weight

Type	Stroke [mm]	d ₁	d ₂	H	D	Revolutions per stroke	Weight [kg]
20-20-57-M12	20	M12x1,25	57,15	265	228	8	7,5
20-20-84-M12			84,15				
20-38-57-M16	38	M16x1,25	57,15	385	298	15	10
20-38-84-M16			84,15				
20-38-95-M16			95,25				
20-50-84-M20	50	M20x1,5	84,15	533	610	16	16
20-50-95-M20			95,25				
20-63-95-M24	63	M24x1,5	95,25	533	610	20	24
20-80-95-M24	80					19	

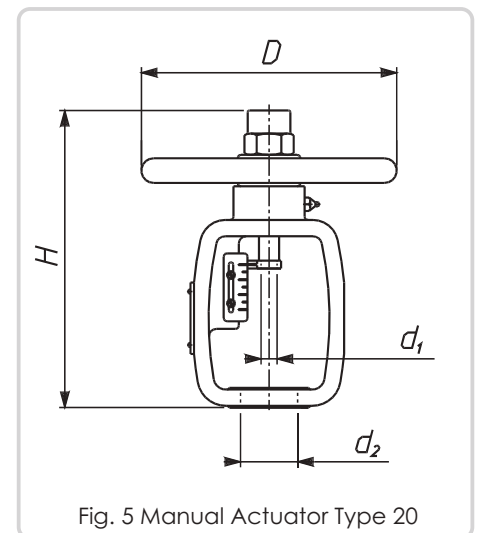


Fig. 5 Manual Actuator Type 20

Application

Self-acting pressure regulators ZSN are used for flow control in heating systems and in industrial and process technology of water and steam (max. 200°C) and non-flammable gases (max. 80°C). They operate through preset downstream pressure (ZSN 1) or upstream pressure (ZSN 3) without auxiliary power (controlled by the transported media).

Versions

ZSN1 Pressure Reducing Regulator
ZSN3 Pressure Relief Regulator

Design

Regulator comprises three main units **Valve (01)**; **Actuator (02)** and **Adjuster (03)** and is executed with a balanced valve plug.

Features

- » Nominal Diameters from DN15 up to DN100
- » Nominal Pressure from PN10 up to CL300
- » Face-to-Face length as per DIN EN 60534-3-1 or ANSI B16.10
- » Maximum allowable Operating Temperature: +200°C
- » Maximum allowable Pressure in Actuator Chamber: 20 bar
- » Characteristic: linear (proportional)
- » Leakage Class IV and Class VI (PTFE or VMQ Einlage)
- » Design with Flange ends
- » Design as per Pressure Equipment Directive 2014/68/EU
- » Conformity CE and EAC
- » Optional certification/confirmation according to GOST-R (TR) and AD2000 Merkblatt



Design and technical Specification

Diameters: DN15; 20; 25; 32; 40; 50; 65; 80; 100

Pressure: PN10; 16; 25; 40 as per DIN EN 1092-1:2013 and DIN EN 1092-2:1999
ANSI CL150; 300 and DIN EN 1759-1:2005

Flanges as per DIN EN 1759-1:2005 can be assembled with flanges execution per standards ANSI / ASME B16.5 and MSS SP44. They correspond to the standard DIN EN 7005-1:2002 following pressure ranges: CL150 ≙ PN20 and CL300 ≙ PN50

Table 1 Flange Versions

Material	Nominal Pressure	Raised Face	Flange Facing Identification		
			Groove	Recess	Ring-Joint
Cast Iron	PN10; 16	B ²⁾	-	-	-
Ductile Iron	PN10; 16; 25; 40		-	-	-
Carbon Steel Stainless Steel	PN10; 16; 25; 40		D	F	-
	CL150		-	-	J (RTJ)
	CL300		DL (D1 ¹⁾)	F (F1)	

¹⁾ only for CL300; ²⁾ B1 - (Ra = 12,5 mm, concentric surface structure "C"), B2 - (Ra as agreed with the customer); () - as per ASME B16.5

NOTE:

The pressure regulators must be installed in a horizontal pipe. At temperatures > 130°C, the pressure regulator should be installed so that the adjuster (03) is facing down. The impulse line should not exceed the pipe diameter of 6 mm. Also it is to be recommended to use a strainer to guarantee a proper operation of the pressure regulator.

Table 2 Technical Spezifikation

DN		15	20	25	32	40	50	65	80	100	
KVs [m³/h]	full flow	3,2	5	8	12,5	20	32	50	80	125	
	reduced flow	1	1,6	2,5	5	8	12,5	20	32	50	
		1,6	2,5	3,2							
2,5	3,2	5									
Z-Coefficient		0,65	0,6	0,55		0,45	0,4		0,35		
Spring Range [bar]		0,1...0,4		0,2...0,8	0,4...1,6	0,8...3,2	1,0...4,0	2,0...8,0	2,8...11,2		
Max. Pressure in Chamber [bar]		20									
Max. allowable Δp [bar]		12						10			
Max. Temperature		Water						200°C ¹⁾			
		Steam									
		Gases						80°C ²⁾			

Table 3 Components & Materials

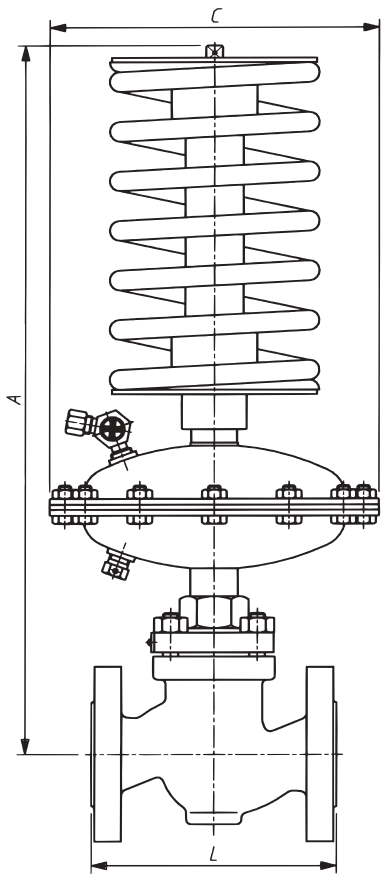
No.	Component	Materials			
01	Valve Body	EN-GJL250 (EN-JL 1040)	EN-GJS400-18LT (EN-JS 1025)	GP240GH (1.0619)	GX5CrNiMo19-11-2 (1.4408)
2	Seat	X6CrNiMoTi17-12-2 (1.4571) X6CrNiMoTi17-12-2 (1.4571) + PTFE			
5	Plug	X6CrNiMoTi17-12-2 (1.4571)			
4	Guiding Sleeve				
35	Packing	EPDM ³⁾			
02	Actuator	ZSN1.1; ZSN3.1		ZSN1.2; ZSN3.2	
19	Actuator Chamber	S235JRG2C (1.0122)		X6CrNiMoTi17-12-2 (1.4571)	
37	Stem	X17CrNi16-2 (1.4057)			
29	Diaphragm	EPDM + polyester fabric ³⁾			
35	Packing	EPDM ³⁾			
03	Adjuster	C45 (1.0503)			
60	Spring	60Si7			

¹⁾ for steam applications a condensation tank L130 is needed; ²⁾ no burnable gases; ³⁾ Other materials on request

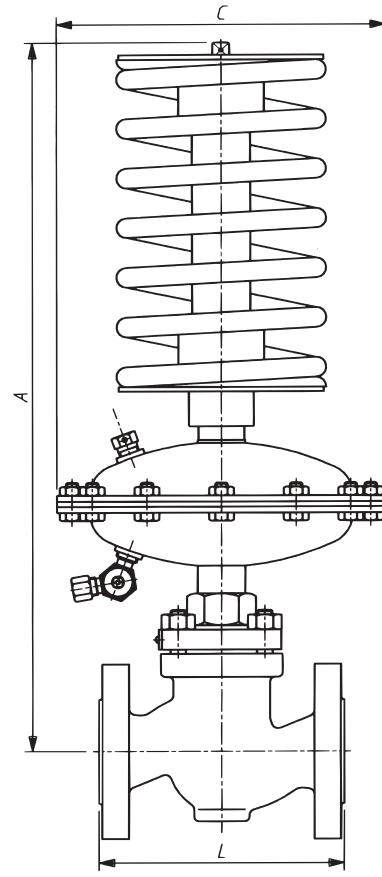
Table 4 Dimensions [mm] & Weight [kg]

DN	01 VALVE				
	A [mm]	DIN	L [mm] CL150	CL300	Weight [kg]
15	470	130	184	190	4,0
20		150		194	5,1
25		160		197	5,6
32	485	180	200	213	8,5
40	490	200	222	235	10,6
50	495	230	254	267	14
65	605	290	276	292	23
80		310	298	317	29
100	615	350	352	368	44

02 ACTUATOR			03 ADJUSTER		
Spring Range	C [mm]	Diaphragm eff.area [cm²]	Weight [kg]	DN15...50 [kg]	DN65...100 [kg]
0,1...0,4	215	160	4,4	3,2	3,6
0,2...0,8					
0,4...1,6				5,6	7,1
0,8...3,2					
1,0...4,0	150	80	2,4	6,8	8,35
2,0...8,0					
2,8...11,2					



Pressure Regulator Type **ZSN1**



Pressure Relief Regulator Type **ZSN3**

Fig. 1.1 Executions and Dimension

No.	Component
01	Valve Body
2	Seat
5	Plug
4	Guiding Sleeve
35	Packing
02	Actuator
19	Actuator Chamber
37	Stem
29	Diaphragm
35	Packing
03	Adjuster
60	Spring

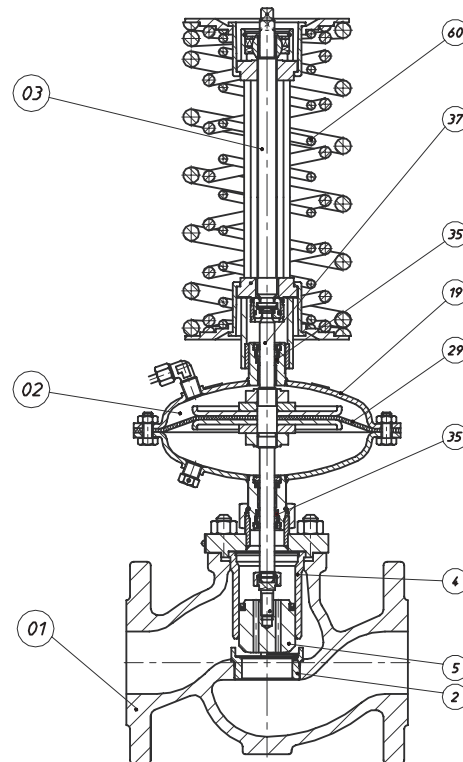


Fig. 1.2 Details and Components

Table 5a...5d Allowable Operating Pressure (DIN)

Table 5a		Material: EN-GJL250 (EN- JL1040) as per DIN EN 1561			
PN	Standard	Temperature [°C]			
		-10...+50	100	150	200
		Max. Operating Pressure [bar]			
PN10	DIN EN 1092-2	10	10	9	8
PN16		16	16	14,4	12,8

Table 5b		Material: EN-GJS400-18 LT (EN-JS1025) as per DIN EN 1563			
PN	Standard	Temperature [°C]			
		10...+50	100	150	200
		Max. Operating Pressure [bar]			
PN10	DIN EN 1092-2	10	10	9,7	9,2
PN16		16	16	15,5	14,7
PN25		25	25	24,3	23
PN40		40	40	38,8	36,8

Table 5c		Material: GP240GH (1.0619) as per DIN EN 10213-2			
PN / CL	Standard	Temperature [°C]			
		-10...+50	100	150	200
		Max. Operating Pressure [bar]			
PN10	DIN EN 1092-1	10	9,2	8,8	8,3
PN16		16	14,8	14	13,3
CL150	DIN EN 1759-1	17,3	15,4	14,6	13,8
PN25	DIN EN 1092-1	25	23,2	22	20,8
PN40		40	37,1	35,2	33,3
CL300		DIN EN 1759-1	45,3	40,1	38,1

Table 5d		Material: GX5CrNiMo19-11-2 (1.4408) as per DIN EN 10213-4			
PN / CL	Standard	Temperature [°C]			
		-10...+50	100	150	200
		Max. Operating Pressure [bar]			
PN10	DIN EN 1092-1	10	10	9	8,4
PN16		16	16	14,5	13,4
CL150	DIN EN 1759-1	17,9	16,3	14,9	13,5
PN25	DIN EN 1092-1	25	25	22,7	21
PN40		40	40	36,3	33,7
CL300		DIN EN 1759-1	46,7	42,5	38,9

CAUTION: Maximum allowable pressure in actuator chamber is 20 bar!

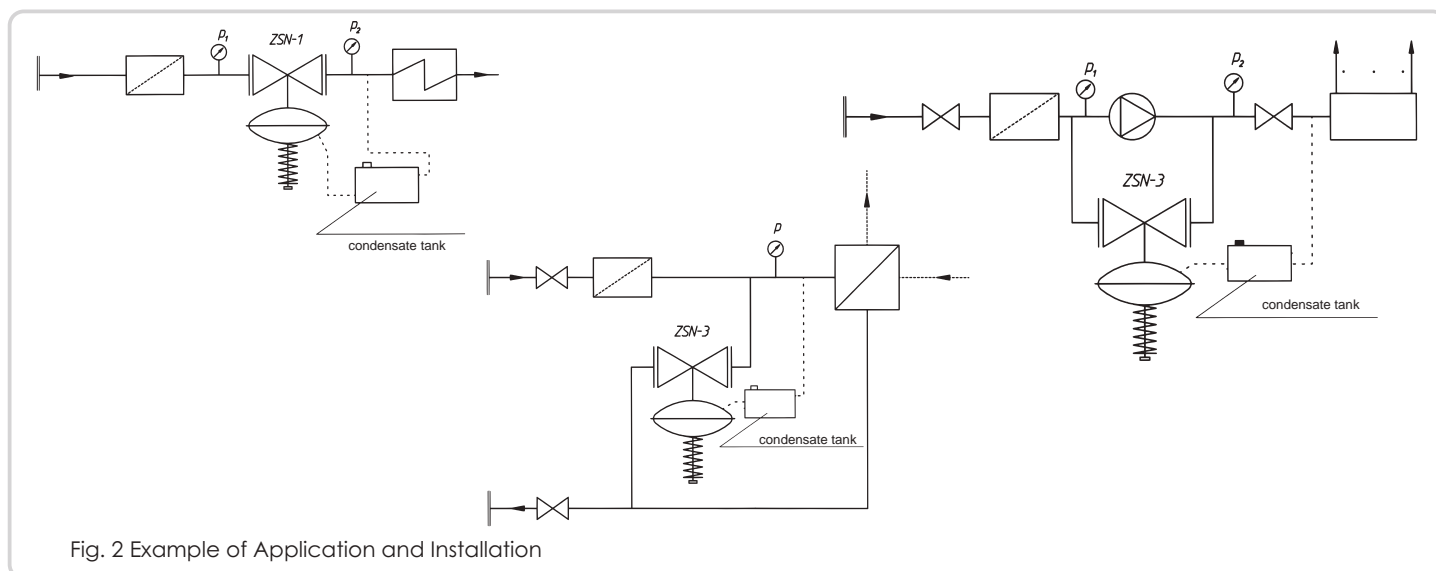
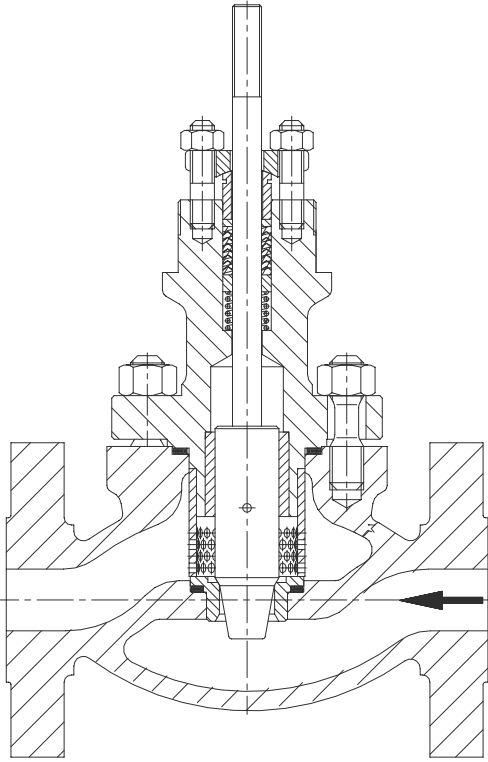
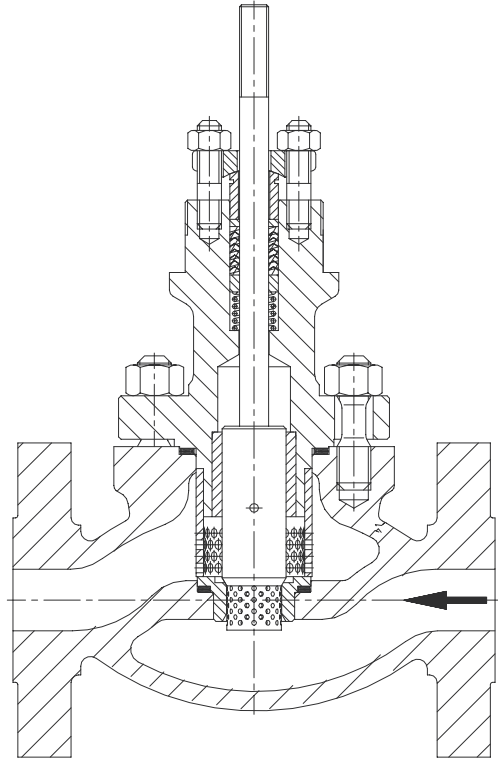


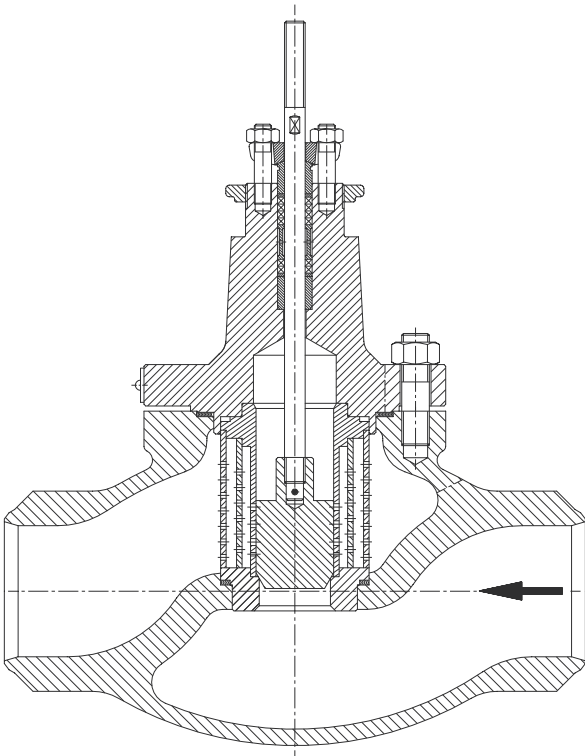
Fig. 2 Example of Application and Installation



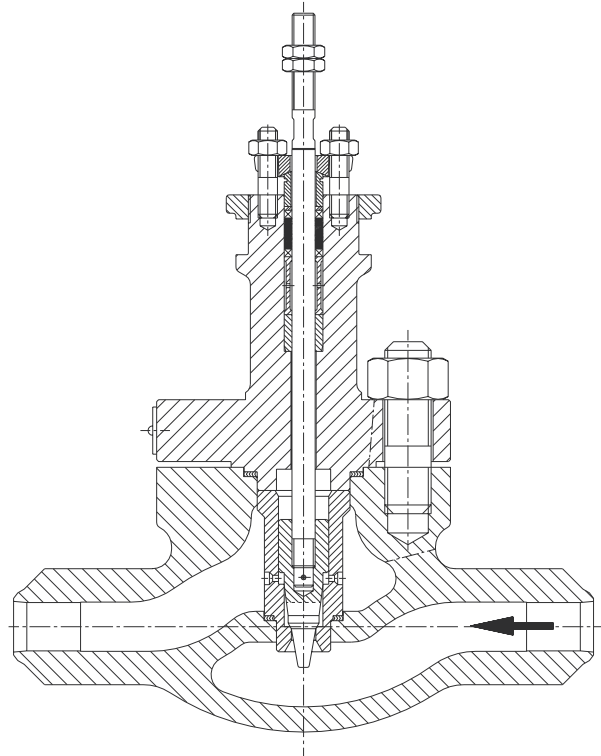
High-Performance Control Valve **BR12a**
with Contoured Plug and Choke Cage



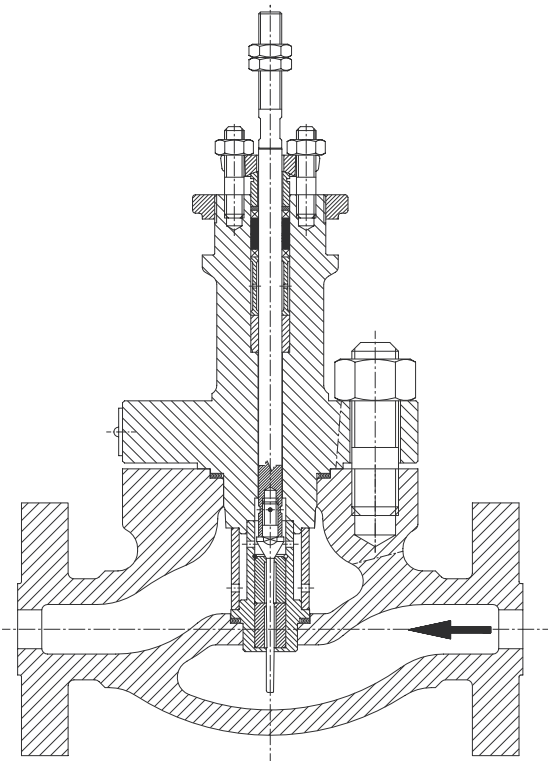
High-Performance Control Valve **BR12a**
with Perforated Plug and Choke Cage



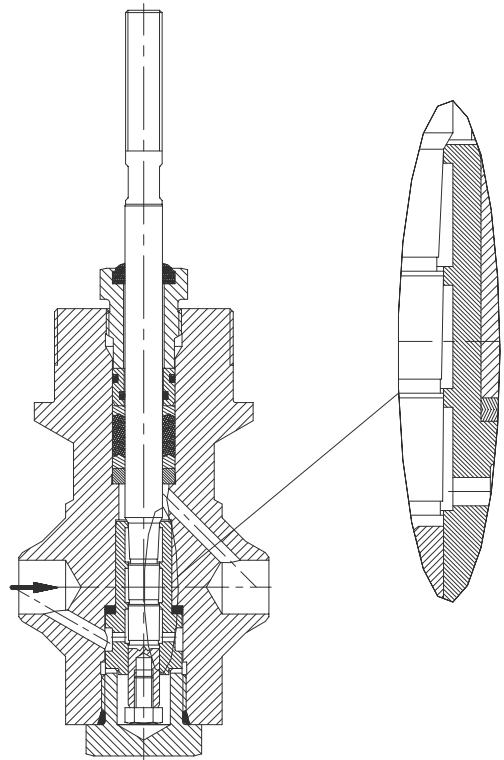
High-Performance Control Valve **BR12b**
with Piston Plug, Control Cage and
2-stage Pressure Reduction



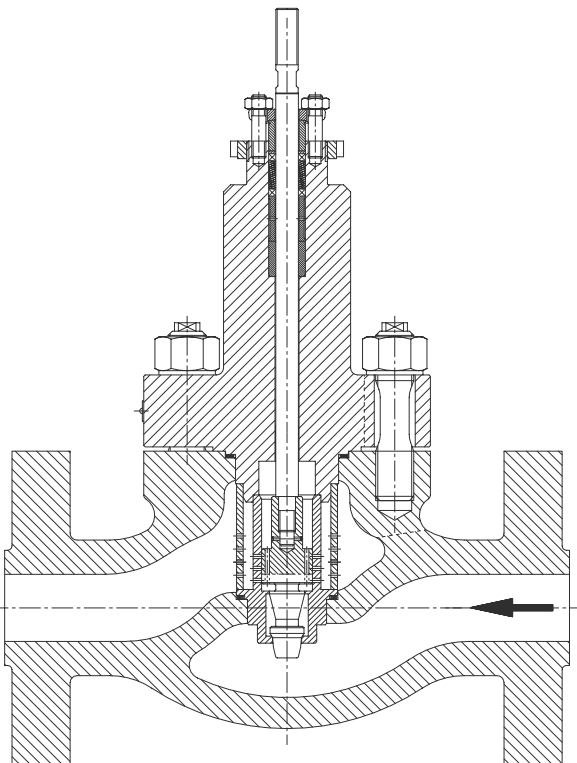
High-Performance Control Valve **BR12**
with 3-stage Pressure Reduction (active & passive)



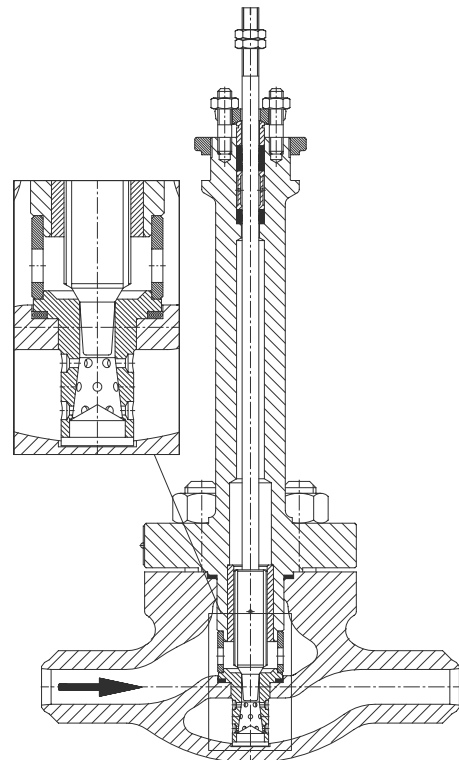
High-Performance Control Valve **BR12**
with 4-stage Pressure Reduction (active & passive)



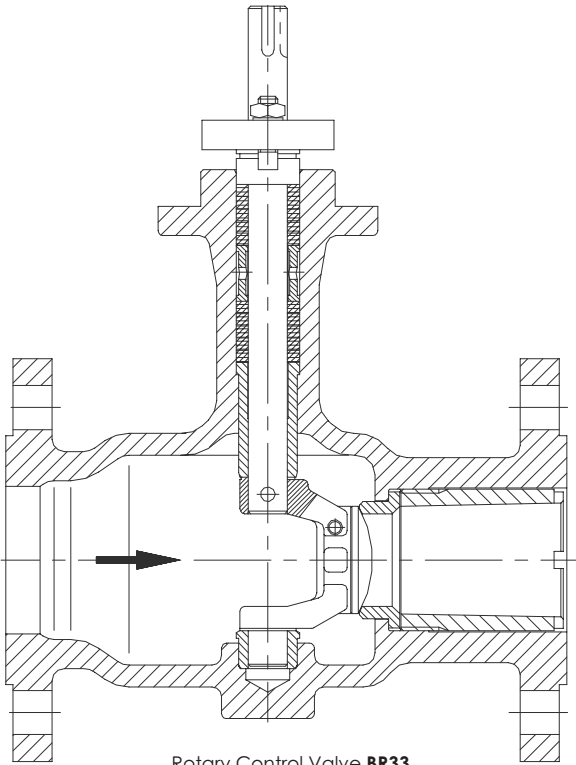
Forged High-Performance Control Valve
with 2-stage active Pressure Reduction



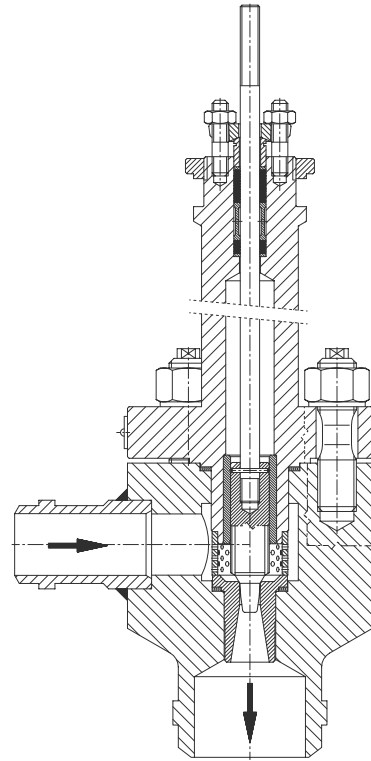
High-Performance Control Valve **BR12b**
with 2-stage Balanced Plug, Control Cage and
1-stage Pressure Reduction



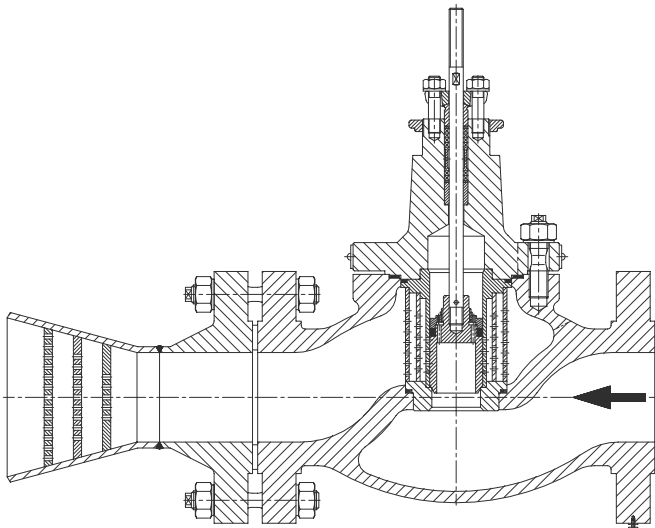
High-Performance Control Valve **BR12a**
with Protection Cage
for Applications under Flashing Conditions



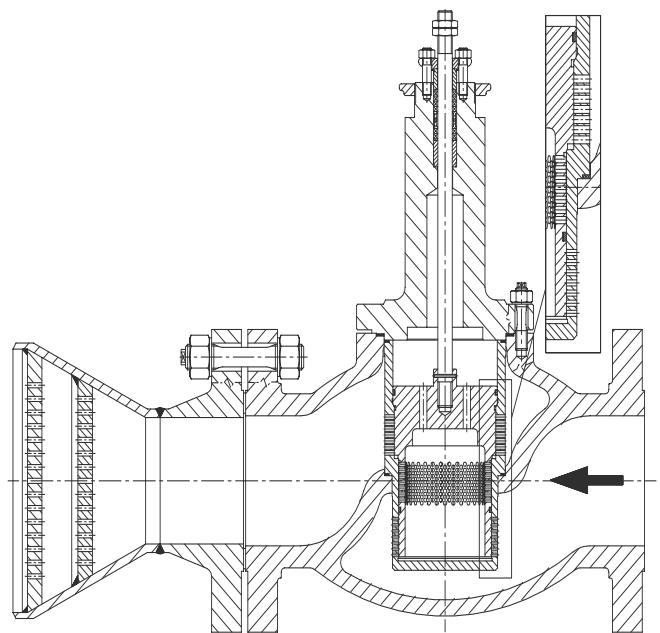
Rotary Control Valve **BR33**
with Outlet Sleeve made of wear-resistant material
(Stellite, Ceramik, ...), to protect Valve Body for Solids



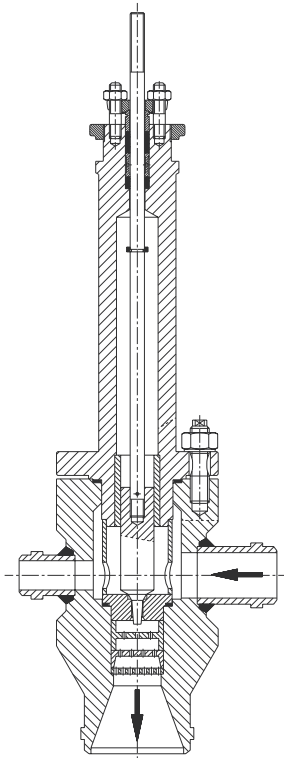
Forged Angle Valve
with Choke Cage and internal Diffuser



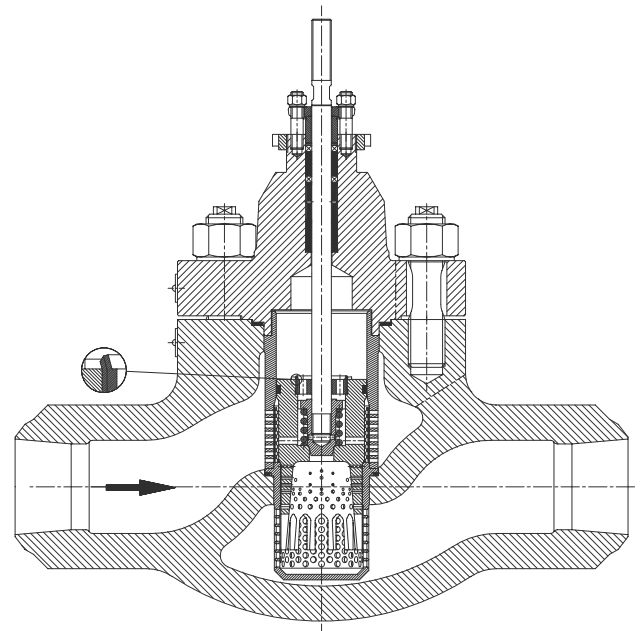
High-Performance Control Valve **BR12b**
with Balanced Plug, Control Cage, 2-stage Pressure Reduction
and Diffuser with welded perforated plates



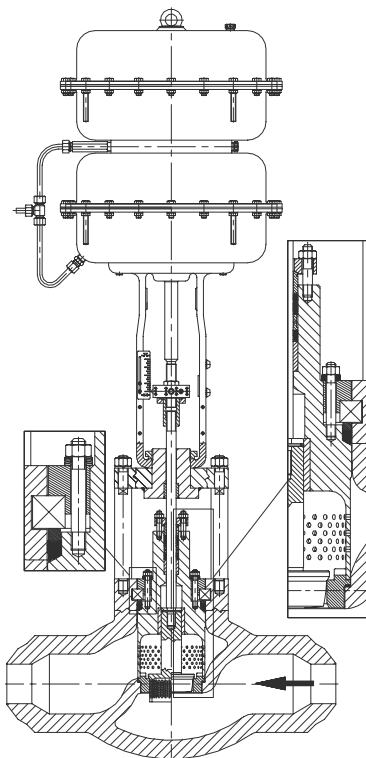
High-Performance Control Valve **BR12b**
with Balanced Plug, Control Cage, multi-stage Pressure Reduction
and Diffuser with welded perforated plates



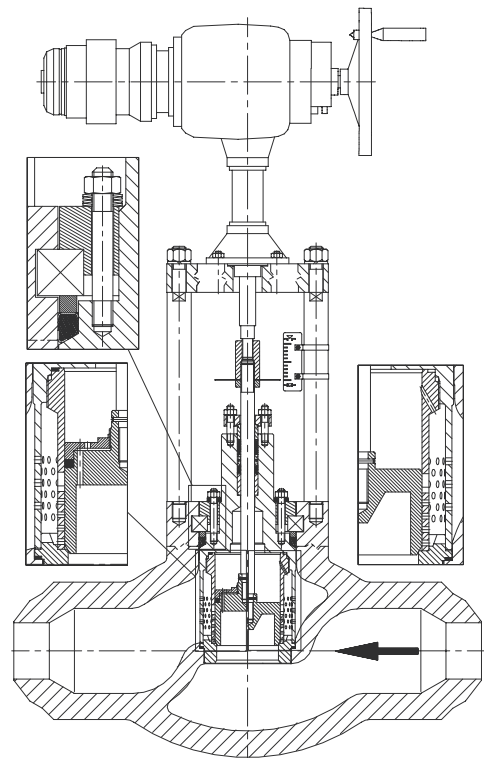
Forged Angle Valve
with 3-stage Pressure Reduction and Drainage



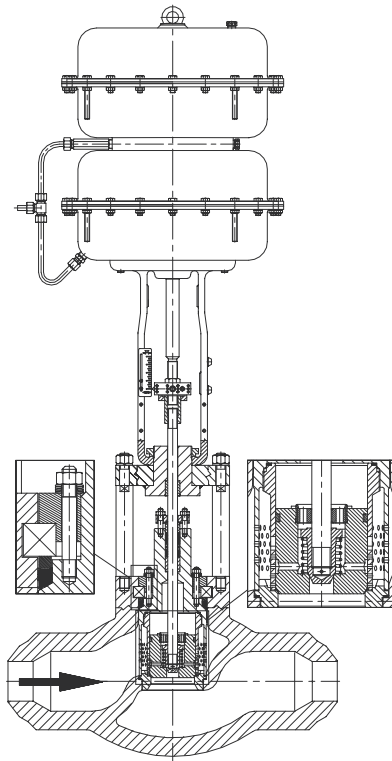
High-Performance Control Valve **BR12b**
for Steam Applications
(high Rangeability, Thermoshock- and Erosion-resistant)



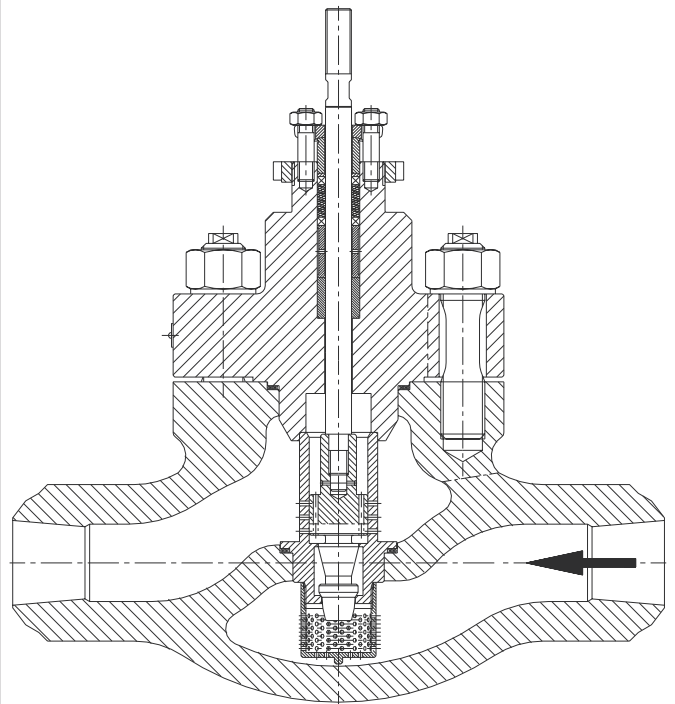
High-Performance Control Valve **BR12a**
with Perforated Plug and Choke Cage
in High-Pressure Execution DN150...300 PN160...420



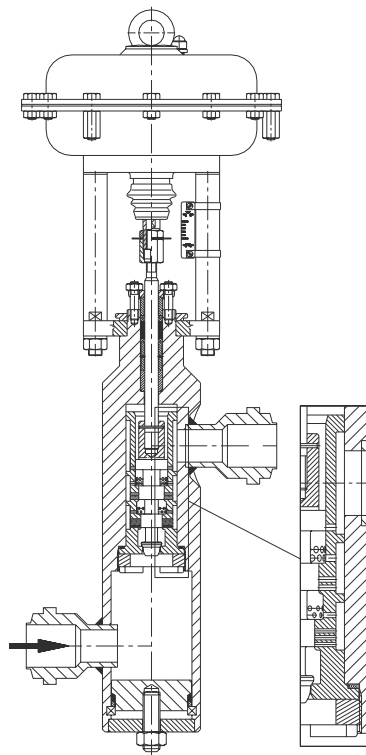
High-Performance Control Valve **BR12b**
with Balanced Plug, Control Cage and additional Cage
in High-Pressure Execution DN150...300 PN160...420



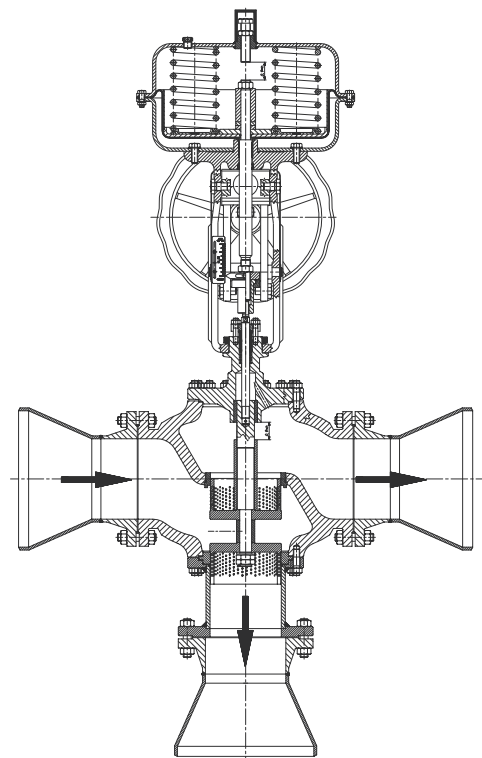
High-Performance Control Valve **BR12b**
with Balanced Pilot Plug, Control Cage and 1 add. Cage
in High-Pressure Execution DN150...300 PN160...420



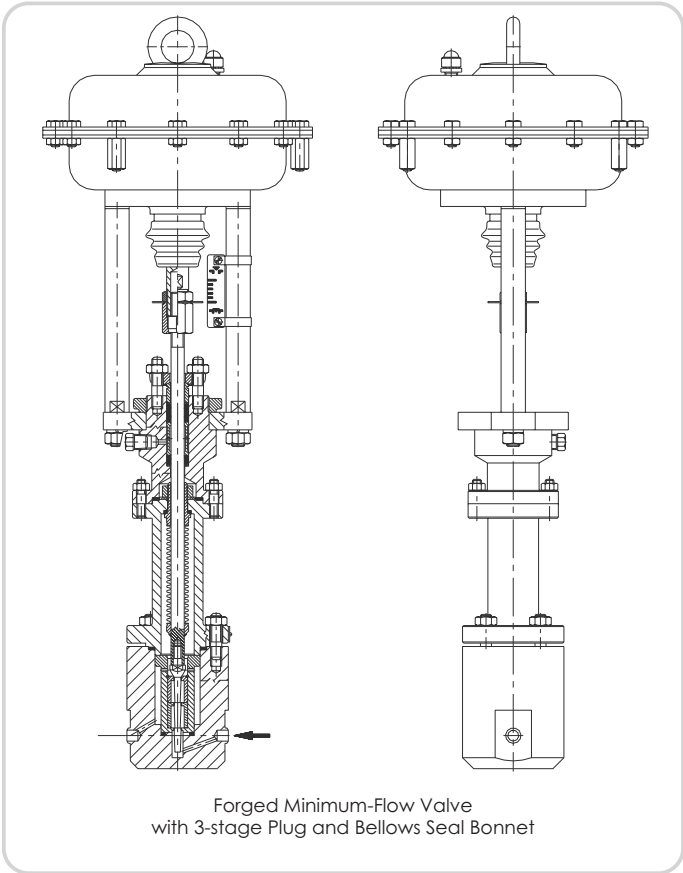
High-Performance Control Valve **BR12b**
with 2-stage Balanced Plug, Control Cage
and Protection Cage



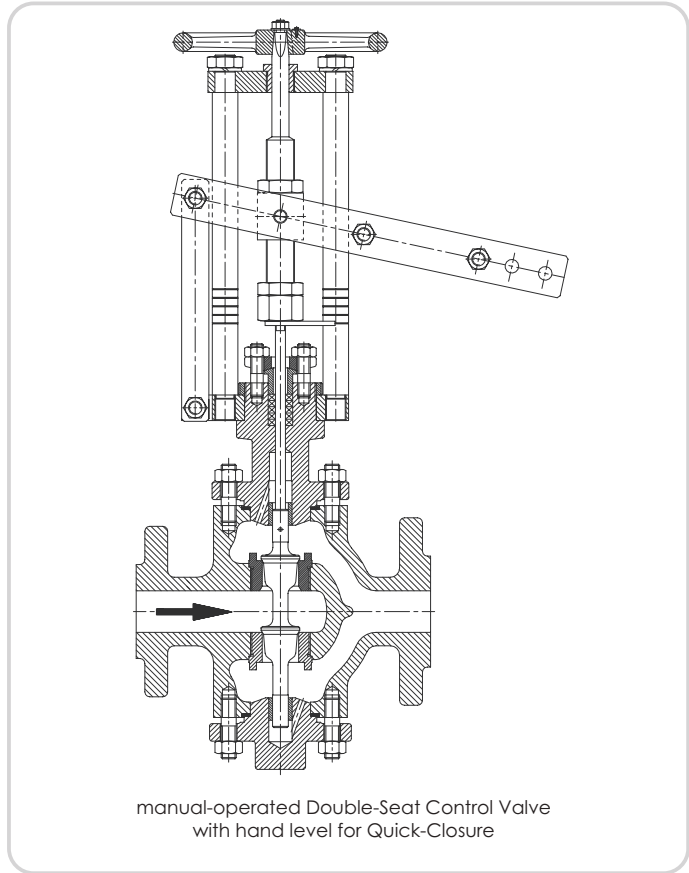
Minimum-Flow Valve with
multi-stage Pressure Reduction



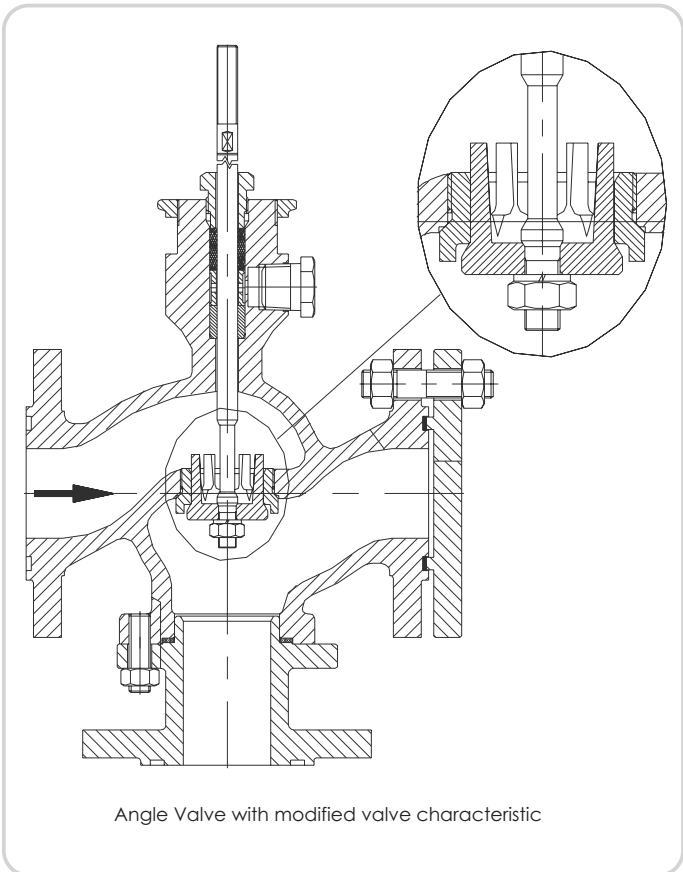
3-Way Diverging Valve **BR13R**
with Perforated Plug (active Pressure Reduction)



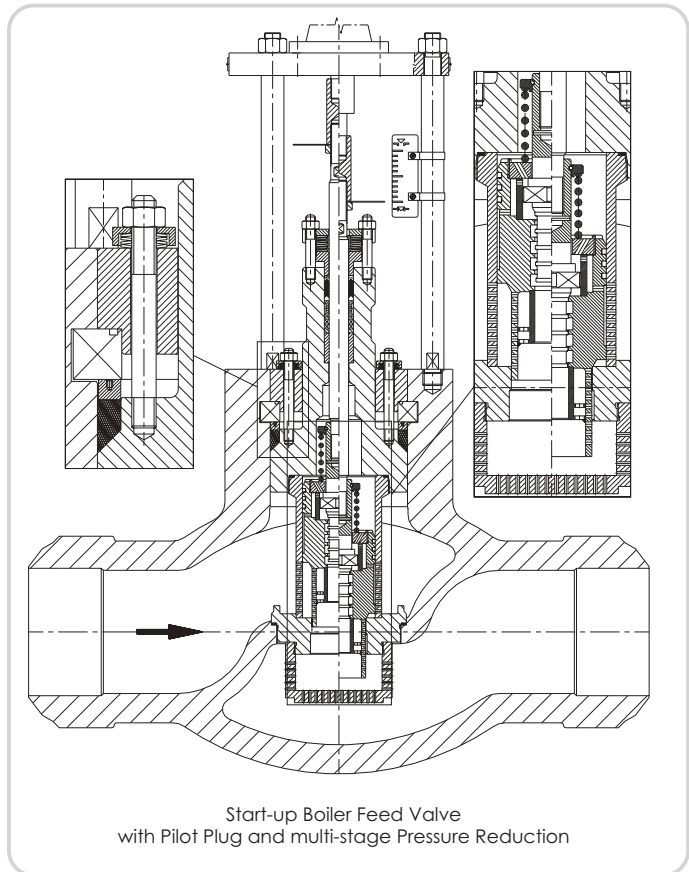
Forged Minimum-Flow Valve
with 3-stage Plug and Bellows Seal Bonnet



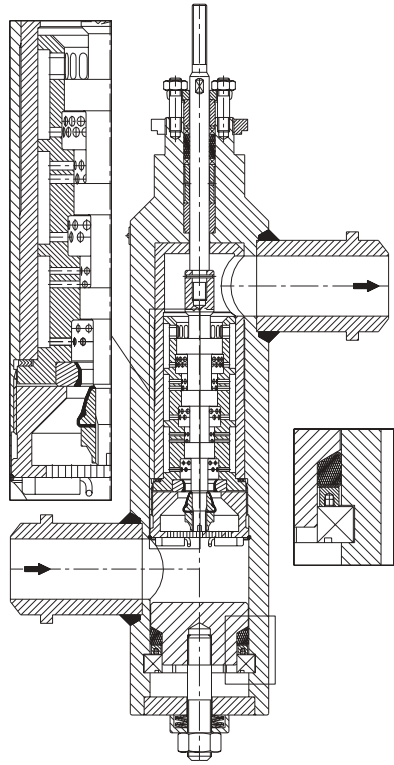
manual-operated Double-Seat Control Valve
with hand level for Quick-Closure



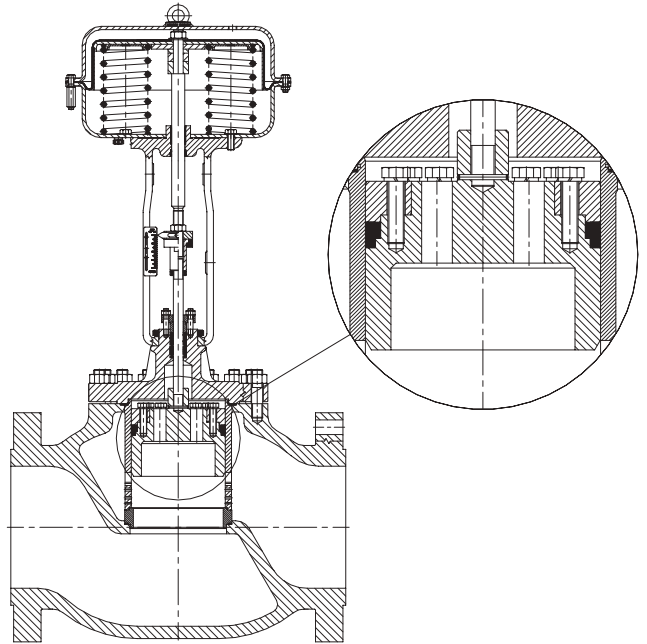
Angle Valve with modified valve characteristic



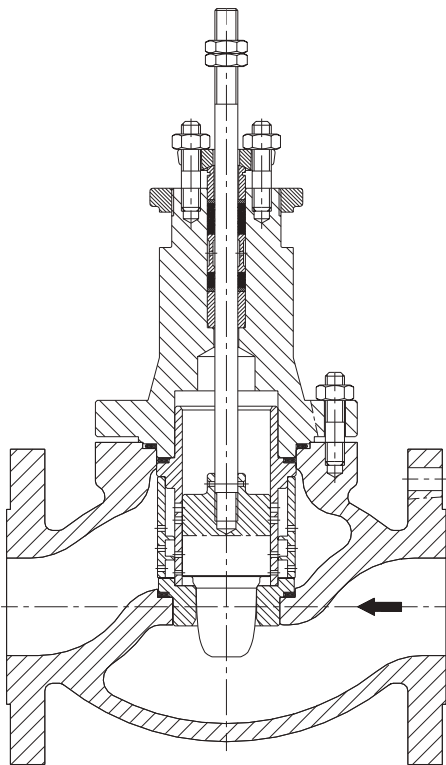
Start-up Boiler Feed Valve
with Pilot Plug and multi-stage Pressure Reduction



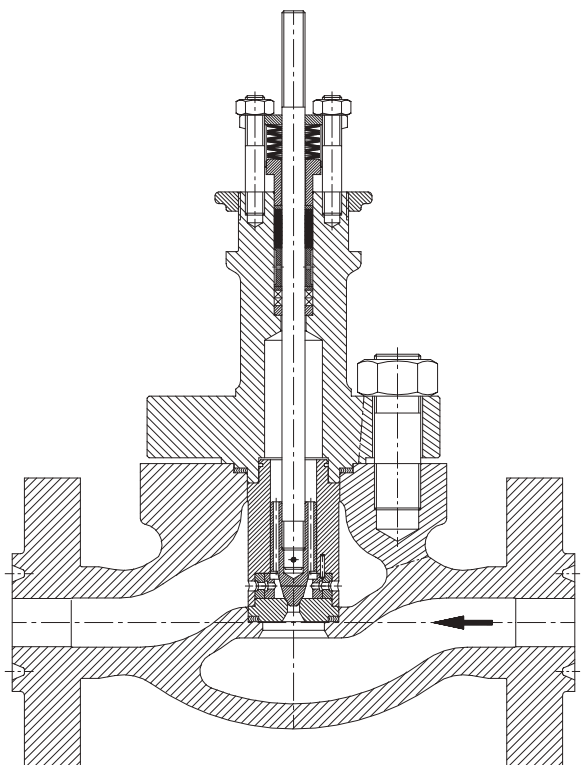
Minimum-Flow Valve
with multi-stage Pressure Reduction and Soft Seat



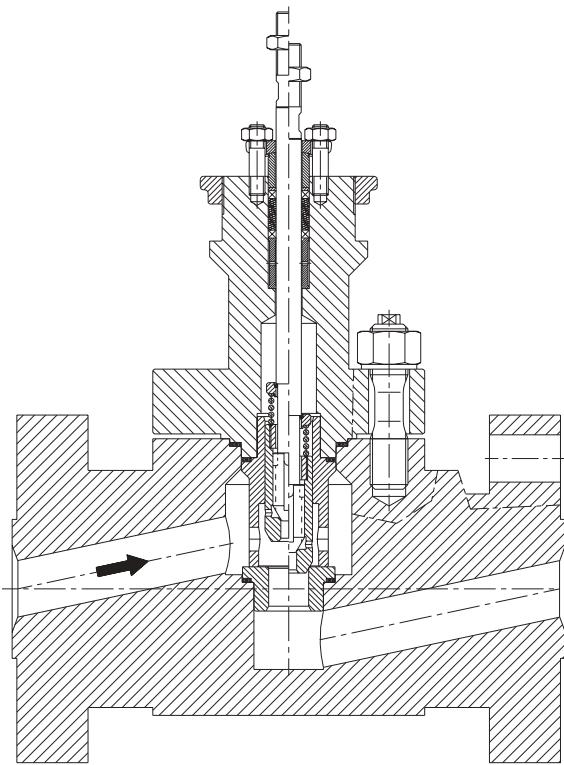
High-Performance Control Valve **BR12b**
with Balanced Plug and Control Cage
for Low-Temperature Execution (Elastomers from Silicon)



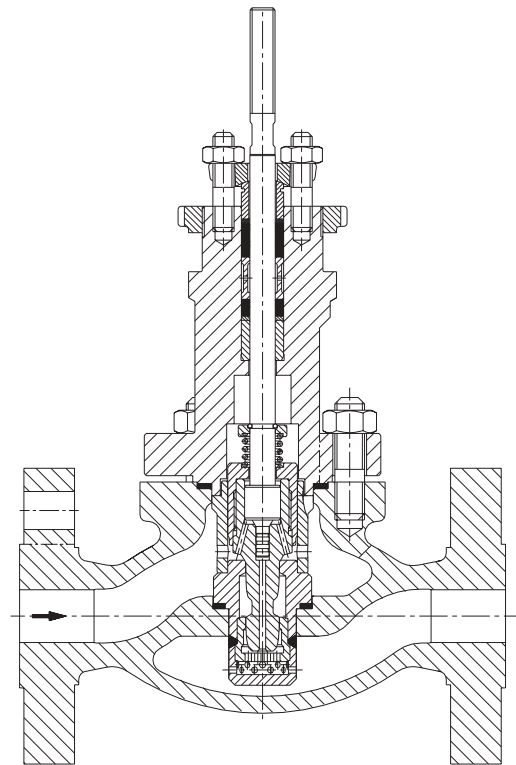
High-Performance Control Valve **BR12b**
with Contoured Plug, Control Cage and
1-stage Pressure Reduction



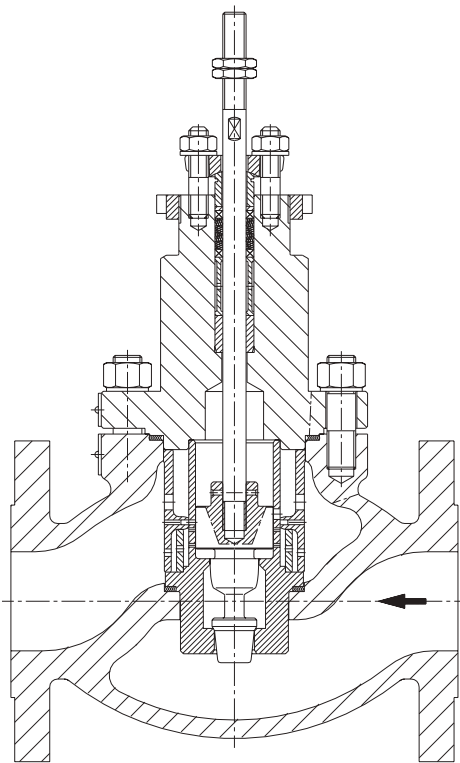
High-Performance Control Valve **BR12a**
with multi-hole structure



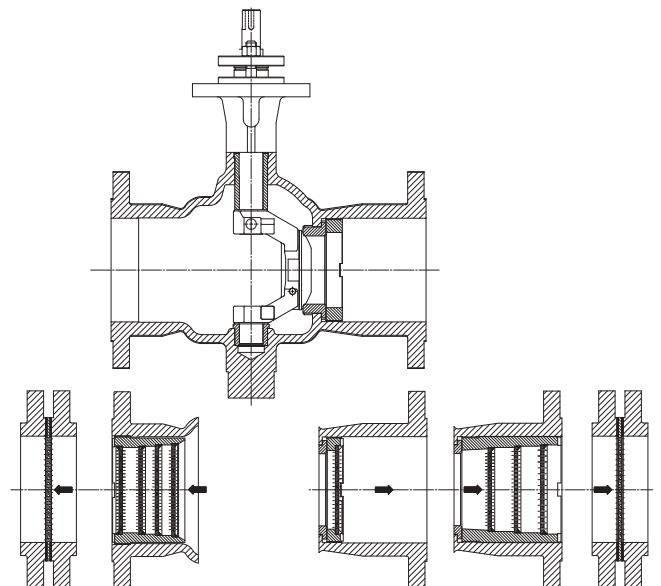
Forged (Mat. 1.4404) High-Performance Control Valve for Applications up to 530 bar for food industry



High-Performance Control Valve **BR12b** with 2-stage Balanced Plug, Control Cage and Protection Cage with Soft Seat



High-Performance Control Valve **BR12b** with 2-stage Plug, Control Cage and multi-hole structure



Rotary Control Valve **BR33** with various perforated plates & structures

To provide our customers the best solutions, for each application, we work together with reputable and leading manufacturers!



electro-pneumatic positioner
TZIDC and PositionMaster EDP300



electro-pneumatic
positioner SIPART PS2



Ball Valves Series INTEC K200, K400, K500, K700, K800



Ball Valves FIG02, FIG04, FIG06



Butterfly Valves 900, 2E, 3E



Knife Gate Valves 200, 300



Lined Butterfly Valves CST



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solenoid valves **24010, 24011, ...** (Inline & NAMUR)

