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LDM valves
with SPA Praha actuators

Kv coefficient calculation

Calculation itself is carried out with respect to conditions of regulating circuit and operating medium according to equations mentioned below. Control valve must be designed to be able to regulate maximal flow quantity at given operating conditions. At the same time it is necessary to check whether minimal flow quantity can be even regulated or not.

Condition is the following ratio **$r > Kvs / Kv_{min}$**

Because of eventual minus tolerance 10% of Kv_{100} against Kvs and requirement for possible regulation within range of maximal flow (decrement and increase of flow), producer recommends to select Kvs value higher than maximal operating Kv value:

$$Kvs = 1.1 \div 1.3\ Kv$$

It is necessary to take into account to which extent Q_{max} involve "precautionary additions" that could result in valve oversizing.

Relations of Kv calculation

		Pressure drop $p_2 > p_1/2$, $\Delta p < p_1/2$	Pressure drop $\Delta p \geqq p_1/2$, $p_2 \leqq p_1/2$
Kv =	Liquid	$\frac{Q}{100}\sqrt{\frac{\rho_1}{\Delta p}}$	
	Gas	$\frac{Q_n}{5141}\sqrt{\frac{\rho_n . T_1}{\Delta p . p_2}}$	$\frac{2.Q_n}{5141.p_1}\sqrt{\rho_n . T_1}$
	Superh. steam	$\frac{Q_m}{100}\sqrt{\frac{v_2}{\Delta p}}$	$\frac{Q_m}{100}\sqrt{\frac{2v}{p_1}}$
	Sat. steam	$\frac{Q_m}{100}\sqrt{\frac{v_2 . x}{\Delta p}}$	$\frac{Q_m}{100}\sqrt{\frac{2v.x}{p_1}}$

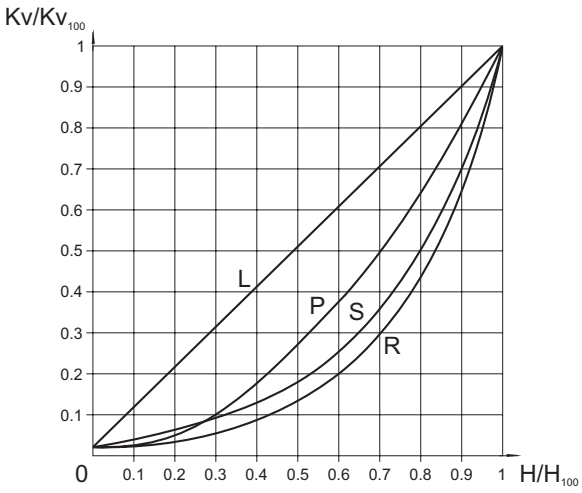
Above critical flow of vapours and gases

When pressure ratio is above critical ($p_2 / p_1 < 0.54$), speed of flow reaches acoustic velocity at the narrowest section. This event can cause higher level of noisiness. Then it is convenient to use a throttling system ensuring low noisiness (multi-step pressure reduction, damping orifice plate at outlet).

Flow characteristic selection in regard of valve stroke

To make right selection of valve flow characteristic, it is suitable to carry out checking of what stroke values will be reached in different operation states. We recommend to carry out such checking at least for minimal, nominal and maximal flow rates. The principle for flow characteristic selection is to avoid, if possible, 5÷10% of the beginning and end of the valve stroke range.
To calculate valve stroke at different operating conditions with different types of flow characteristics is possible with the advantage of using LDM´s calculation programme VALVES. The programme serves for complete design of valve from Kv calculation to specification of a concrete valve with its actuator.

Valve flow characteristics



L - linear characteristic
$Kv/Kv_{100} = 0.0183 + 0.9817 . (H/H_{100})$

R - equal-percentage characteristic (4-percentage)
$Kv/Kv_{100} = 0.0183 . e^{(4 . H/H_{100})}$

P - parabolic characteristic
$Kv/Kv_{100} = 0.0183 + 0.9817 . (H/H_{100})^2$

S - LDM spline® characteristic
$Kv/Kv_{100} = 0.0183 + 0.269 . (H/H_{100}) - 0.380 . (H/H_{100})^2 + 1.096 . (H/H_{100})^3 - 0.194 . (H/H_{100})^4 - 0.265 . (H/H_{100})^5 + 0.443 . (H/H_{100})^6$

Dimensions and units

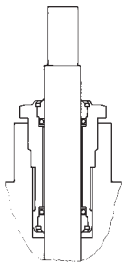
Marking	Unit	Name of dimension
Kv	$m^3.h^{-1}$	Flow coefficient under condition of units of flow
Kv_{100}	$m^3.h^{-1}$	Flow coefficient at nominal stroke
Kv_{min}	$m^3.h^{-1}$	Flow coefficient at minimal flow rate
Kvs	$m^3.h^{-1}$	Valve nominal flow coefficient
Q	$m^3.h^{-1}$	Flow rate in operating conditions (T_1, p_1)
Q_n	$Nm^3.h^{-1}$	Flow rate in normal conditions (0°C, 0.101 Mpa)
Q_m	$kg.h^{-1}$	Flow rate in operating conditions (T_1, p_1)
p_1	MPa	Upstream absolute pressure
p_2	MPa	Downstream absolute pressure
p_S	MPa	Absolute pressure of saturated steam at given temperature (T_1)
Δp	MPa	Valve differential pressure ($\Delta p = p_1 - p_2$)
ρ_1	$kg.m^{-3}$	Process medium density in operating conditions (T_1, p_1)
ρ_n	$kg.Nm^{-3}$	Gas density in normal conditions (0°C, 0.101 Mpa)
v_2	$m^3.kg^{-1}$	Specific volume of steam when temperature T_1 and pressure p_2
v	$m^3.kg^{-1}$	Specific volume of steam when temperature T_1 and pressure $p_1/2$
T_1	K	Absolute temperature at valve inlet ($T_1 = 273 + t_1$)
x	1	Proportionate weight volume of saturated steam in wet steam
r	1	Rangeability

Principles for plug type selection

V-ported plugs should not to be used in above - critical differential pressures with inlet pressure $p_1 \geq 0{,}4$ MPa and for regulation of saturated steam. In these cases we recommend to use a perforated plug. The perforated plug should be also used always when cavitation may occur due to a high differential pressure value or valve ports erosion caused by high speed of process medium flow. If the parabolic plug is used (because of small Kvs) for pressures $p_1 \geq 1{,}6$ MPa and above - critical differential pressures, it is necessary to close both plug and seat with a hard metal overlay, i.e. stellited trim.

Packing - O -ring EPDM

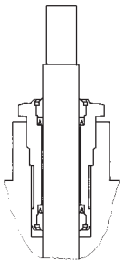
Packing is designed for non-aggressive media with temperature from 0°C to 140°C. Packing excels with its reliability and long time tightness. It has ability of sealing even if the valve stem is a bit damaged. Low frictional forces enables valve to be actuated with a low-linear-force actuator. Service life of sealing rings depends on operating conditions and it is more than 400 000 cycles on average.



Applied to RV 2xx

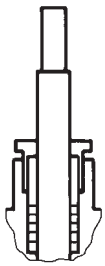
Packing - DRSpack® (PTFE)

DRSpack® (Direct Radial Sealing Pack) is a packing with high tightness at both low and high operating pressure values.
It is the most used type of packing suitable for temperatures ranging from 0°C to 260°C. The pH range is from 0 to 14. The packing enables using of actuators with low linear force. The design enables an easy change of the whole packing. The average service life of DRSpack® is more than 500 000 cycles.



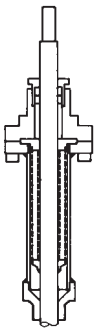
Packing - Graphite

This type of packing can be used for media with temperature up to 550°C and pH range: 0 to 14. Packing can be "sealed up" either by screwing the packing screw in or adding another sealing ring. In regard of intensive frictional forces, graphite packing is suitable for actuators with a sufficient linear force.



Packing - Bellows

Bellows packing is suitable for low and high temperatures ranging from -50°C to 550°C. Bellows ensures absolute tightness to environment. Packing is equipped with safety PTFE packing as standard to prevent medium from leaking in case of damage to bellows. Intensive linear forces are not required.



Application of bellows packing

Bellows packing is suitable for applications with very aggressive, toxic or other dangerous media that require absolute tightness to environment. In such case, it is necessary to check compatibility of used body material as well as the valve inner parts material with process medium. It is recommended to use bellows with safety packing preventing medium from leaking in case of damage to bellows when there is an extremely dangerous process medium used.
Bellows is also a great solution to use of process medium either with temperature below zero when ice accretions cause premature damage to packing or with high temeperatures when bellows ensures medium cooling.

Service life of bellows packing

Bellows material	Temperature				
	200°C	300°C	400°C	500°C	550°C
1.4541	100 000	40 000	28 000	7 000	not applicable
1.4571	90 000	34 000	22 000	13 000	8 000

Values specified in the table above show minimal guaranteed number of cycles with the valve full stroke when the bellows is fully lenghtened and pressed. In regulation, when the valve moves only in a portion of the stroke range at the inner centre of the valve, the service life of the bellows is many times longer then depending on concrete operating conditions.

Procedure for designing of two-way valve

Given: medium water, 155°C, static pressure at piping spot 1000 kPa (10 bar), Δp_{DISP} = 80 kPa (0,8 bar), $\Delta p_{PIPELINE}$ = 15 kPa (0,15 bar), $\Delta p_{APPLIANCE}$ = 25 kPa (0,25 bar), nominal flow rate Q_{NOM} = 8 $m^3.h^{-1}$, minimal flow rate Q_{MIN} = 1,3 $m^3.h^{-1}$.

$\Delta p_{DISP} = \Delta p_{VALVE} + \Delta p_{APPLIANCE} + \Delta p_{PIPELINE}$

$\Delta p_{VALVE} = \Delta p_{DISP} - \Delta p_{APPLIANCE} - \Delta p_{PIPELINE}$ = 80 - 25 - 15 = 40 kPa (0,4 bar)

$$Kv = \frac{Q_{NOM}}{\sqrt{\Delta p_{VALVE}}} = \frac{8}{\sqrt{0,4}} = 12,7\ m^3.h^{-1}$$

Precautionary additions for process tolerances (provided that flow rate Q was not oversized):

Kvs = (1,1 to 1,3) . Kv = (1,1 to 1,3) . 12,7 = 14 to 16,5 $m^3.h^{-1}$

Now we choose the nearest Kvs value from those available in our catalogue, i.e. Kvs = 16 $m^3.h^{-1}$. This value corresponds to nominal size of DN 32. Then if we choose flanged execution PN 16, body made of spheroidal cast iron, with metal - PTFE seat sealing, packing PTFE and equal-percentage flow characteristic, we will get the following specification No.:

RV 21x XXX 1423 R1 16/220-32

x in the valve code above (21x) stands for valve execution (direct or reverse) and depends on type of used actuator which should be chosen in respect to demands of regulating system (type, producer, voltage, type of control, necessary torque or linear force, etc.)

Determination of real pressure drop Value of a chosen valve at fully open

$$\Delta p_{VALVE\ H100} = \left(\frac{Q_{NOM}}{Kvs}\right)^2 = \left(\frac{8}{16}\right)^2 = 0,25 \text{ bar (25 kPa)}$$

The control valve's real pressure drop calculated this way shall be taken into account in a hydraulic calculation of regulating

Determination of valve´s real authority

$$a = \frac{\Delta p_{VALVE\ H100}}{\Delta p_{VALVE\ H0}} = \frac{25}{80} = 0,31$$

Value a should be at least equal to 0,3. A chosen valve checking is then satisfactory.

Caution: the valve's authority calculation should be related to a valve pressure difference in its closed position i.e. disposition pressure value in a branch $\Delta p_{AVAIL.}$ when flow rate is zero, not to a pressure value of a pump Δp_{PUMP}, because, due to pipeline circuit pressure drops up to the spot where the regulating branch is connected, the following equation applies: $\Delta p_{AVAIL.} < \Delta p_{PUMP}$. In such cases we consider for simplicity the following: $\Delta p_{AVAIL.\ H100} = \Delta p_{AVAIL.\ H0} = \Delta p_{DISP}$.

Checking of rangeability

We carry out the same checking for minimal flow rate Q_{MIN} =1,3 $m^3.h^{-1}$. The following differential pressure values correspond to the min. flow rate: $\Delta p_{APPLIANCE\ QMIN}$ = 0,40 kPa, $\Delta p_{PIPELINE\ QMIN}$ = 0,66 kPa. $\Delta p_{VALVE\ QMIN}$ = 80 - 0,4 - 0,66 = 78,94 = 79 kPa.

$$Kv_{MIN} = \frac{Q_{MIN}}{\sqrt{\Delta p_{VALVE\ QMIN}}} = \frac{1,3}{\sqrt{0,79}} = 1,46\ m^3.h^{-1}$$

Necessary rangeability value

$$r = \frac{Kvs}{Kv_{MIN}} = \frac{16}{1,46} = 11$$

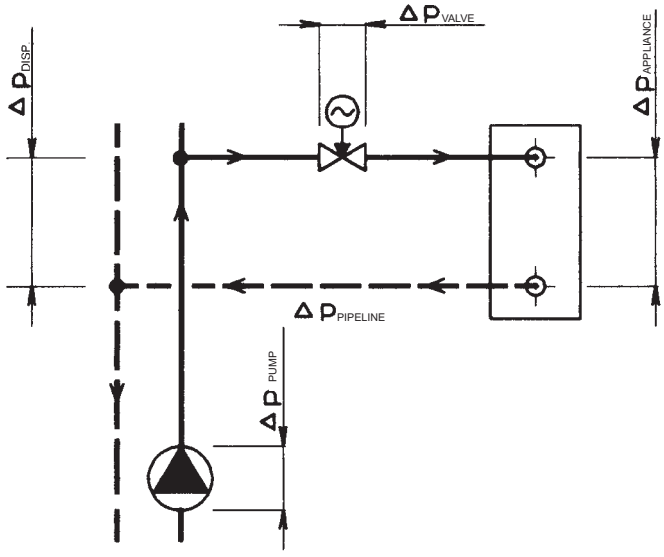
shall be lower than mentioned rangeability value of r = 50. Checking is then satisfactory.

Selection of suitable flow characteristic

On the basis of calculated values Kv_{NOM} and Kv_{MIN}, it is possible to read the appropriate stroke values from the graph for individual types of flow characteristics of the valve and choose the most suitable one accordingly. Here we have h_{NOM} = 96%, h_{MIN} = 41% for equal-percentage characteristic. In that case, LDMspline® flow characteristic is more suitable (93% and 30% of the stroke). It corresponds to the following specification code :

RV 21x XXX 1423 S1 16/220-32

Scheme of typical regulation loop with the application of two-way control valve



Remark: More detailed information on calculation and design of LDM control valves is mentioned in calculation instructions No. 01-12.0. Equations mentiened above apply in a simlified way to water. To reach optimum results, we recommend to use original calculation programme VALVES which is available on request free of charge.

Procedure for designing of three-way valve

Given: medium water, 90°C, static pressure at piping spot 1000 kPa(10 bar), Δp_{PUMP2} = 40 kPa (0,4 bar), $\Delta p_{PIPELINE}$ = 10 kPa (0,1bar), $\Delta p_{APPLIANCE}$ = 20 kPa (0,2 bar), flow rate Q_{NOM} = 7 $m^3.h^{-1}$

$\Delta p_{PUMP2} = \Delta p_{VALVE} + \Delta p_{APPLIANCE} + \Delta p_{PIPELINE}$

$\Delta p_{VALVE} = \Delta p_{PUMP2} - \Delta p_{APPLIANCE} - \Delta p_{PIPELINE} = 40 - 20 - 10 = 10$ kPa (0,1bar)

$$Kv = \frac{Q_{NOM}}{\sqrt{\Delta p_{VALVE}}} = \frac{7}{\sqrt{0,1}} = 22,1 \ m^3.h^{-1}$$

Precautionary additions for process tolerances (provided that flow rate Q was not oversized):

$$Kvs = (1,1 \text{ to } 1,3) \,.\, Kv = (1,1 \text{ to } 1,3) \,.\, 22,1 = 24,3 \text{ to } 28,7 \ m^3.h^{-1}$$

Now we choose the nearest Kvs value from those available in our catalogue, i.e. Kvs = 25 $m^3.h^{-1}$. This value corresponds to nominal size of DN 40. Then if we choose flanged execution PN 16, body made of spheroidal cast iron, with metal - PTFE seat sealing, packing PTFE and equal-percentage flow characteristic, we will get the following specification No.:

RV 21x XXX 1413 L1 16/140-40

x in the valve code above (21x) stands for valve execution (direct or reverse) and depends on type of used actuator which should be chosen in respect to demands of regulating system (type, producer, voltage, type of control, necessary torque or linear force, etc.)

Determination of real pressure drop value of a chosen valve at fully open

$$\Delta p_{VALVE\ H100} = \left(\frac{Q_{NOM}}{Kvs}\right)^2 = \left(\frac{7}{25}\right)^2 = 0,08 \text{ bar } (8 \text{ kPa})$$

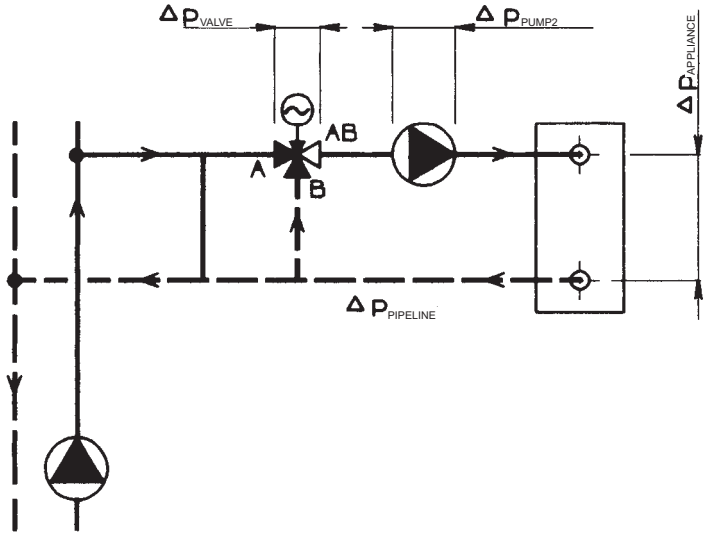
The control valve's real pressure drop calculated this way shall be taken into account in a hydraulic calculation of regulating circuit.

Caution: To ensure reliable function of three-way valves, the most important condition is to keep minimum available pressure difference between A and B ports. Three-way valves are capable to manage even high pressure difference between A and B ports but valve's flow characteristic deformates then and so regulation properties deteriorate. So if in doubt about pressure difference value between those two ports (e.g. when three-way valve is piped directly into primary side without pressure separation), we recommend to use a two-way valve in combination with a primary-secondary side short cut to ensure a reliable regulation. The authority of A-AB way of three-way valve is, providing a constant flow rate in appliance circuit, the following:

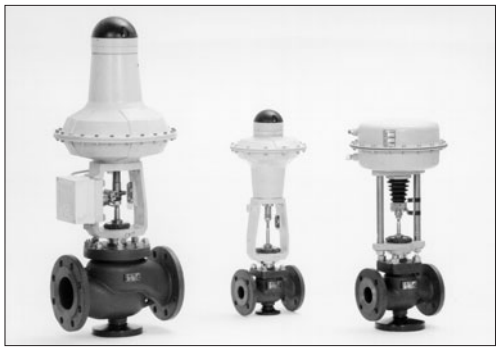
$$a = \frac{\Delta p_{VALVE\ H100}}{\Delta p_{VALVE\ H0}} = \frac{8}{8} = 1 \ ,$$

which means that the behaviour of flow in A-AB way corresponds to ideal flow curve of the valve. In that case there are Kvs values in both ports the same with linear characteristic i.e. the total flow is nearly constant.
A combination of equal-percentage characteristic in A port and linear characteristic in B port shall be selected in those cases when loading of A port with differential pressure against B port cannot be avoided or when the primary side parametres are too high.

Scheme of a typical regulation loop with the application of a three-way mixing control valve



Remark: More detailed information on calculation and design of LDM control valves is mentioned in calculation instructions No. 01-12.0. Equations mentiened above apply in a simlified way to water. To reach optimum results, we recommend to use original calculation programme VALVES which is available on request free of charge.



200 line

RV / UV 2x0 P (Ex)

Control and Shut-off valves DN 15 - 150, PN 16 and 40 with SPA Praha pneumatic actuators

Description

Control valves RV / UV 210 (Ex), RV / UV 220 (Ex) and RV / UV 230 [further only RV/UV 2x0 (Ex)] are single-seated valves designed for regulation and shut-off of process medium flow. In regard of used actuators, the valves are suitable for regulation at low and medium high differential pressures. Flow characteristics, Kvs values and leakage rates correspond to international standards.

Valves RV/UV 2x0 (Ex) are especially designed for pneumatic actuators of SPA Praha.

Application

The valves series RV / UV 2x0 are designed for applications in heating, ventilation, power generation and chemical processing industries. The valves RV / UV 2x0 Ex meet the requirements II 1/2G IIB acc. to ČSN-EN 13 463-1 (9/2002) and ČSN EN 1127-1 (9/1998), and in connection with suitable actuators, they are also designed for applications in gas and chemical industries. Valve body can be optionally made of spheroidal cast iron, cast steel and stainless steel.

The materials selected correspond to recommendations stipulated by ČSN-EN 1503-1 (1/2002) (steels) and ČSN-EN 1503-3 (1/2002) (cast). The maximal permissible operating pressures in behaviour with types of material and temperature are specified in the table on page 25 of this catalogue.

Process media

Valves series RV (UV) 2x0 are designed for regulation (RV 2x0) and shut-off (UV 2x0) of flow and pressure of liquids, gases and vapours without abrasive particles e.g. water, steam, air and other media compatible with material of the valve inner parts. The valves series RV /UV 2x0 Ex are also designed for control and shut-off of the flow and pressure of technical and fuel gases and inflammable liquids. The usage of the valve made of sphe-roidal cast iron (RV 210) for steam is limited by the following parametres. The steam must be superheated (its dryness at valve outlet $x_1 \geq 0{,}98$) and inlet pressure $p_1 \leq 0{,}4$ MPa when differential pressure is of above-critical value, and $p_1 \leq 1{,}6$ MPa when differential pressure is of under-critical value. In case these two conditions are not kept, it is necessary to use the value made of cast steel (RV 220). To ensure a reliable regulation, the producers recommends to pipe a strainer in front of the valve into pipeline or ensure in any other way that process medium does not contain abrasive particles or impurities.

Installation

The valve is to be piped the way so that the direction of medium flow will coincide with the arrows on the body.

The valve can be installed in any position except position when the actuator is under the valve body. When medium temperature exceeds 150°C, it is necessary to protect the actuator against glowing heat from the pipeline e.g. by the means of proper insulating of the pipeline and valve or by tilting the valve away from the heat radiation.

Technical data

Series		RV / UV 210 (Ex)	RV / UV 220 (Ex)	RV / UV 230 (Ex)
Type of valve		Two-way, single-seated, control (shut-off) valve		
Nominal size range		DN 15 to 150		
Nominal pressure		PN 16, PN 40		
Body material		Spheroidal cast iron EN-JS 1025 (EN-GJS-400-10-LT)	Cast steel 1.0619 (GP240GH) 1.7357 (G17CrMo5-5)	Stainless steel 1.4581 (GX5CrNiMoNb19-11-2)
Seat material :	DN 15 - 50	1.4028 / 17 023.6	1.4028 / 17 023.6	1.4571 / 17 347.4
DIN W.Nr./+ČSN	DN 65 - 150	1.4027 / 42 2906.5	1.4027 / 42 2906.5	1.4581 / 42 2941.4
Plug material :	DN 15 - 65	1.4021 / 17 027.6	1.4021 / 17 027.6	1.4571 / 17 347.4
DIN W.Nr./+ČSN	DN 80 - 150	1.4027 / 42 2906.5	1.4027 / 42 2906.5	1.4581 / 42 2941.4
Operating temperature range		-20 to 300°C	-20 to 500°C	-20 to 400°C
Face to face dimensions		Section 1 acc. to ČSN-EN 558-1 (3/1997)		
Connection flanges		Acc. to ČSN-EN 1092-1 (4/2002)		
Flange faces		Type B1 (raised-faced) or Type F (female) acc. to ČSN-EN 1092-1 (4/2002)		
Type of plug		V-ported, contoured, perforated		
Flow charakteristic		Linear, equal-percentage, LDMspline®, parabolic, on - off		
Kvs value		0.1 to 360 m^3/hour		
Leakage rate		Class III. acc. to ČSN-EN 1349 (5/2001) (<0.1% Kvs) for c. valves with metal-metal seat sealing		
		Class IV. acc. to ČSN-EN 1349 (5/2001) (<0.01% Kvs) for c. valves with metal-PTFE seat sealing		
Leakage rate for Ex version		Leakage rate 6 acc. to ČSN 13 3060 - section 2		
Regentability r		50 : 1		
Packing		O - ring EPDM t_{max}=140°C, DRSpack® (PTFE) t_{max}=260°C, Exp. graphite, bellows t_{max}=500°C		

Remark: For low operating temperatures (-200 to +250°C), it is possible to supply the valve RV / UV 230 with body material made of 1.4308 (cast stainless steel).

Kvs values and differential pressures

Δp_{max} value is the valve max. differential pressure when open--close function is always guaranteed. In regard of service life of seat and plug, it is recommended so that permanent differential pressure would not exceed 1.6 MPa. Otherwise it is suitable to use perforated plug or sealing surfaces of seat and plug with a hard metal overlay.

For further information on actuating, see actuators´ catalogue sheets

*) *Execution TANDEM*

											Pneumatic actuator	526 61				5222					
											Fail-safe action	direct		indirect		direct		indirect		indirect *)	
											Spring range	20-100 kPa		40-200 kPa		20-100 kPa		160-300 kPa		160-300 kPa	
											Spring setting	20-100 kPa		75-235 kPa		20-100 kPa		160-300 kPa		160-300 kPa	
											Feeding pressure	250 kPa		250 kPa		320 kPa		320 kPa		320 kPa	
											Specification No. of actuator	52661.x11x		52661.x22x		5222x011...		5222x092...		5222x192...	
											Marking in valve specification No.	PJA, PJB				PJE, PJF					
											Linear force	3,5 kN		1,88 kN		8,4 kN		6,3 kN		12,5 kN	
		Kvs [m³/hod.]										Δp_{max}		Δp_{max}		Δp_{max}		Δp_{max}		Δp_{max}	
DN	H	1	2	3	4	5	6	7	8	9		metal	PTFE	metal	PTFE	metal	PTFE	metal	PTFE	metal	PTFE
15	16	---	2.5 1)	1.6 1)	1.0 1)	0.6 1)	0.4 1)	0.25 1)	0.16 3)	0.1 3)		4.00	---	4.00	---	4.00	---	4.00	---	---	---
15		4.0 1)	---	---	---	---	---	---	---	---		4.00	---	4.00	---	4.00	---	4.00	---	---	---
20		---	---	2.5 1)	1.6 1)	1.0 1)	0.6 1)	---	---	---		4.00	---	4.00	---	4.00	---	4.00	---	---	---
20		---	4.0 1)	---	---	---	---	---	---	---		4.00	---	4.00	---	4.00	---	4.00	---	---	---
20		6.3 1)	---	---	---	---	---	---	---	---		4.00	---	2.70	---	4.00	---	4.00	---	---	---
25		---	---	---	2.5 1)	1.6 1)	---	---	---	---		4.00	---	4.00	---	4.00	---	4.00	---	---	---
25		10.0	6.3 2)	4.0 2)	---	---	---	---	---	---		4.00	4.00	1.60	2.00	4.00	4.00	4.00	4.00	---	---
32		---	---	---	4.0 1)	---	---	---	---	---		4.00	---	4.00	---	4.00	---	4.00	---	---	---
32		16.0	10.0	6.3 2)	---	---	---	---	---	---		2.70	3.00	0.90	1.20	4.00	4.00	4.00	4.00	---	---
40		25.0	16.0	10.0	---	---	---	---	---	---		1.70	1.90	0.50	0.77	4.00	4.00	3.82	4.00	---	---
50	25	40.0	25.0	16.0	---	---	---	---	---	---		0.96	1.15	0.26	0.46	3.14	3.33	2.25	2.44	---	---
65		63.0	40.0	25.0	---	---	---	---	---	---		0.55	0.70	0.12	0.27	1.88	2.03	1.33	1.49	---	---
80	40	100.0	63.0	40.0	---	---	---	---	---	---		---	---	---	---	1.17	1.30	0.79	0.92	1.91	2.03
100		160.0	100.0	63.0	---	---	---	---	---	---		---	---	---	---	0.73	0.84	0.49	0.59	1.21	1.32
125		250.0	160.0	100.0	---	---	---	---	---	---		---	---	---	---	0.46	0.54	0.30	0.38	0.77	0.85
150		360.0	250.0	160.0	---	---	---	---	---	---		---	---	---	---	0.31	0.38	0.20	0.27	0.52	0.60

1) parabolic plug
2) V-ported plug with linear characteristic, parabolic plug with equal-percentage, LDMspline® and parabolic characteristic.
3) valve with micro-throttling trim. Execution with Kvs 0.01 to 0.063 m³/hour is possible after agreement with the producer.

Equal-percentage, LDMspline® and parabolic characteristic available on condition : Kvs value ≧ 1.0

Perforated plug available only with Kvs values in shadowed frames ▭ with the following restrictions:

- Kvs values 2.5 to 1.6 m³/hour available with linear characteristic only.
- Perforated plug with Kvs value acc. to column No. 2 available with linear or parabolic characteristic only.

Max. differential pressure Δp for valves PN 16 must be 1.6 MPa.

metal - version with metal - metal seat sealing

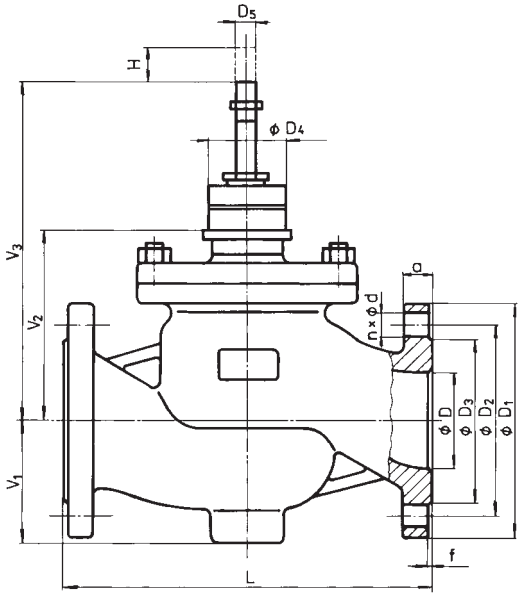
PTFE - version with metal - PTFE seat sealing (is not applicable to contoured plugs)

Max. differential pressures specified in table apply to PTFE and O-ring packing. Δp_{max} for bellows must be consulted with the producer. It applies to graphite packing as well especially when required Δp value is close to max. values specified in table.

Δp_{max} values are set for the most unfavourable pressure ratios on the valve PN 40, but in concrete cases the real Δp_{max} value can be higher than values specified in the table above.

Dimensions and weight for the type RV / UV 2x0 (Ex)

	PN 16					PN 40					PN 16, PN 40													
DN	D_1	D_2	D_3	d	n	D_1	D_2	D_3	d	n	D	f	D_4	D_5	L	V_1	V_2	$^{\#}V_2$	V_3	$^{\#}V_3$	a	m_1	m_2	$^{\#}m_v$
	mm	mm	mm	mm		mm	mm	mm	mm		mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	kg	kg	kg
15	95	65	45			95	65	45			15				130	51	90	257	220	387	16	4.5	5.5	3.5
20	105	75	58	14		105	75	58	14		20				150	54	90	257	220	387	18	5.5	6.5	3.5
25	115	85	68			115	85	68			25				160	58	100	267	230	397	18	6.5	8	3.5
32	140	100	78		4	140	100	78		4	32			M10x1	180	70	100	267	230	397	20	8	9.5	3.5
40	150	110	88			150	110	88			40				200	75	100	267	230	397	20	9	11	3.5
50	165	125	102			165	125	102	18		50	2	65		230	85	132	339	262	469	20	14	21	4
65	185	145	122	18	4[1)]	185	145	122			65				290	93	132	339	262	469	22	18	27	4
80	200	160	138			200	160	138			80				310	105	164	482	294	612	24	26	40	4.5
100	220	180	158		8	235	190	162	22	8	100			M16x1,5	350	118	164	482	294	612	24	38	49	4.5
125	250	210	188			270	220	188	26		125				400	135	183	501	313	631	26	58	82	5
150	285	240	212	22		300	250	218			150				480	150	200	518	330	648	28	78	100	5



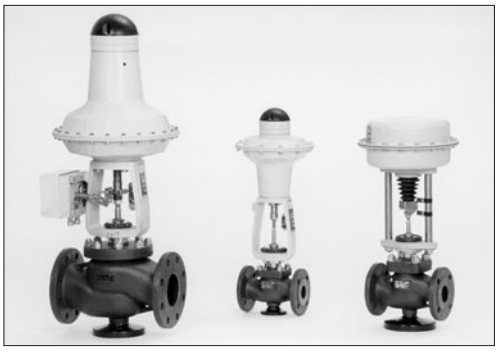
[1)] with regard of the standard previously in force, there is an option to have the number of connection bolts as stipulated in ČSN-EN 1092-1

[#)] - for valve with bellows packing

m_v - weight to be added to weight of valve equipped with bellows packing

m_1 - for valves RV / UV 210 (Ex)

m_2 - for valves RV / UV 220 and RV / UV 230 (Ex)



200 line

RV 2x2 P (Ex)

Control valves
DN 25 - 150, PN 16 and 40
with SPA Praha pneumatic actuators

Description

Control valves RV 212 (Ex), RV 222 (Ex) and RV 232 (Ex) [further only RV 2x2 (Ex)] are single-seated valves with pressure-balanced plug designed for regulation and shut-off of process medium flow. In regard of used actuators, the valves are suitable for regulation at high differential pressures with low-linear-force-actuators. Flow characteristics, Kvs values and leakage rates correspond to international standards.
Valves RV 2x2 (Ex) are especially designed for pneumatic actuators of SPA Praha.

Application

The valves series RV 2x2 are designed for applications in heating, ventilation, power generation and chemical processing industries. The valves RV / UV 2x2 Ex meet the requirements II II 1/2G IIB acc. to ČSN-EN 13 463-1 (9/2002) and ČSN EN 1127-1 (9/1998), and in connection with suitable actuators, they are also designed for applications in gas and chemical industries. Valve body can be optionally made of spheroidal cast iron, cast steel and stainless steel.
The materials selected correspond to recommendations stipulated by ČSN-EN 1503-1 (1/2002) (steels) and ČSN-EN 1503-3 (1/2002) (cast). The maximal permissible operating pressures in behaviour with types of material and temperature are specified in the table on page 25 of this catalogue.

Process media

Valves series RV 2x2 are designed for regulation of flow and pressure of liquids, gases and vapours without abrasive particles e.g. water, steam, air and other media compatible with material of the valve inner parts. The valves series RV 2x2 Ex are designed also for control and shut-off of the flow and pressure of technical and fuel gases and inflammable liquids. The usage of the valve made of spheroidal cast iron (RV 212) for steam is limited by the following parametres. The steam must be superheated (its dryness at valve outlet $x_1 \geq 0{,}98$) and inlet pressure $p_1 \leq 0{,}4$ MPa when differential pressure is of above-critical value, and $p_1 \leq 1{,}6$ MPa when differential pressure is of under-critical value. In case these two conditions are not kept, it is necessary to use the value made of cast steel (RV 222). To ensure a reliable regulation, the producers recommends to pipe a strainer in front of the valve into pipiline or ensure in any other way that process medium does not contain abrasive particles or impurities.

Installation

The valve is to be piped the way so that the direction of medium flow will coincide with the arrows on the body.
The valve can be installed in any position except position when the actuator is under the valve body. When medium temperature exceeds 150°C, it is necessary to protect the actuator against glowing heat from the pipeline e.g. by the means of proper insulating of the pipeline and valve or by tilting the valve away from the heat radiation.

Technical data

Series		RV 212 (Ex)	RV 222 (Ex)	RV 232 (Ex)
Type of valve		Two-way, single-seated, control valve with pressure-balanced plug		
Nominal size range		DN 25 to 150		
Nominal pressure		PN 16, PN 40		
Body material		Spheroidal cast iron EN-JS 1025 (EN-GJS-400-10-LT)	Cast steel 1.0619 (GP240GH) 1.7357 (G17CrMo5-5)	Stainless steel 1.4581 (GX5CrNiMoNb19-11-2)
Seat material :	DN 15 - 50	1.4028 / 17 023.6	1.4028 / 17 023.6	1.4571 / 17 347.4
DIN W.Nr./+ČSN	DN 65 - 150	1.4027 / 42 2906.5	1.4027 / 42 2906.5	1.4581 / 42 2941.4
Plug material :	DN 15 - 65	1.4021 / 17 027.6	1.4021 / 17 027.6	1.4571 / 17 347.4
DIN W.Nr./+ČSN	DN 80 - 150	1.4027 / 42 2906.5	1.4027 / 42 2906.5	1.4581 / 42 2941.4
Operating temperature range		-20 to 260°C	-20 to 260°C	-20 to 260°C
Face to face dimensions		Section 1 acc. to ČSN-EN 558-1 (3/1997)		
Connection flanges		Acc. to ČSN-EN 1092-1 (4/2002)		
Flange faces		Type B1 (raised-faced) or Type F (female) acc. to ČSN-EN 1092-1 (4/2002)		
Type of plug		V-ported, perforated		
Flow charakteristic		Linear, equal-percentage, LDMspline®, parabolic		
Kvs value		4 to 360 m^3/hour		
Leakage rate		Class III. acc. to ČSN-EN 1349 (5/2001) (<0.1% Kvs) for c. valves with metal-metal seat sealing		
		Class IV. acc. to ČSN-EN 1349 (5/2001) (<0.01% Kvs) for c. valves with metal-PTFE seat sealing		
Leakage rate for Ex version		Leakage rate 6 acc. to ČSN 13 3060 - section 2		
Rangeability r		50 : 1		
Packing		O - ring EPDM t_{max}=140°C, DRSpack® (PTFE) t_{max}=260°C, Exp. graphite, bellows t_{max}=500°C		

Remark: For low operating temperatures (-200 to +250°C), it is possible to supply the valve RV 232 with body material made of 1.4308 (cast stainless steel).

Kvs values and differential pressures

Δp_{max} value is the valve max. differential pressure when open--close function is always guaranteed. In regard of service life of seat and plug, it is recommended so that permanent differential pressure would not exceed 1.6 MPa. Otherwise it is suitable to use perforated plug or sealing surfaces of seat and plug with a hard metal overlay.

For further information on actuating, see actuators´ catalogue sheets

				Pneumatic actuator	526 61		5222	
				Actuator function	direct	indirect	direct	indirect
				Spring range	40 - 200 kPa		100 - 200 kPa	
				Spring setting	75 - 235 kPa		100 - 200 kPa	
				Feeding pressure	320 kPa		320 kPa	
				Specification No. of actuator	52661.x21x	52661.x22x	5222x051...	5222x052...
				Marking in valve spec.No.	PJA, PJB		PJE, PJF	
				Linear force	1,88 kN		4 kN	
		Kvs [m³/hour]			Δp_{max}		Δp_{max}	
DN	H	1	2	3	kov	PTFE	kov	PTFE
25	16	10	6.3[1)]	4.0[1)]	4.00	4.00	4.00	4.00
32		16.0	10.0	6.3[1)]	4.00	4.00	4.00	4.00
40		25.0	16.0	10.0	4.00	4.00	4.00	4.00
50	25	40.0	25.0	16.0	4.00	4.00	4.00	4.00
65		63.0	40.0	25.0	4.00	4.00	4.00	4.00
80	40	100.0	63.0	40.0	---	---	4.00	4.00
100		160.0	100.0	63.0	---	---	4.00	4.00
125		250.0	160.0	100.0	---	---	4.00	4.00
150		360.0	250.0	160.0	---	---	4.00	4.00

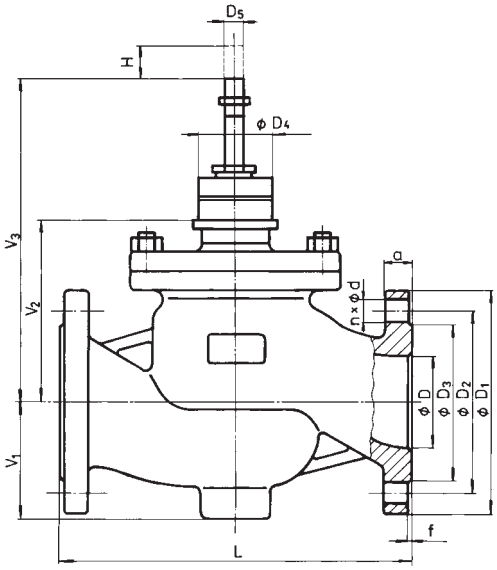
1) linear characteristic only
Max. differential pressures specified in table apply to PTFE and O-ring packing. Δp_{max} for bellows must be consulted with the producer.

Perforated plug available only with Kvs values in shadowed frames ▭ with the following restrictions :
- Perforated plug with Kvs value acc. to column No. 2 available with linear or parabolic characteristic only.

Max. differential pressure Δp for valves PN 16 must be 1.6 MPa.

Dimensions and weights for the type RV 2x2 (Ex)

	PN 16					PN 40					PN 16, PN 40													
DN	D_1	D_2	D_3	d	n	D_1	D_2	D_3	d	n	D	f	D_4	D_5	L	V_1	V_2	#V_2	V_3	#V_3	a	m_1	m_2	#m_v
	mm	mm	mm	mm		mm	mm	mm	mm		mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	kg	kg	kg
25	115	85	68	14		115	85	68	14		25				160	58	100	267	230	397	18	7	8.5	3.5
32	140	100	78			140	100	78		4	32			M10x1	180	70	100	267	230	397	20	8.5	10	3.5
40	150	110	88		4	150	110	88			40				200	75	100	267	230	397	20	8.5	10	3.5
50	165	125	102			165	125	102	18		50				230	85	132	339	262	469	20	14.5	21	4
65	185	145	122	18	4[1)]	185	145	122		8	65	2	65		290	93	132	339	262	469	22	18.5	27	4
80	200	160	138			200	160	138			80				310	105	164	482	294	612	24	27.5	42	4.5
100	220	180	158		8	235	190	162	22		100			M16x1,5	350	118	164	482	294	612	24	39	50	4.5
125	250	210	188			270	220	188	26		125				400	135	183	501	313	631	26	60	84	5
150	285	240	212	22		300	250	218			150				480	150	200	518	330	648	28	81	103	5



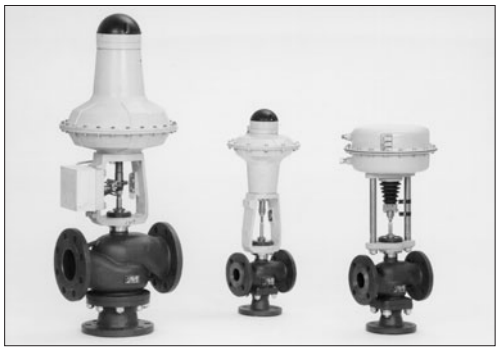
[1)] with regard of the standard previously in force, there is an option to have the number of connection bolts as stipulated in ČSN-EN 1092-1

[#)] - for valve with bellows packing

m_v - weight to be added to weight of valve equipped with bellows packing

m_1 - for valves RV 212 (Ex)

m_2 - for valves RV 222 (Ex) and RV 232 (Ex)



200 line

RV 2x4 P

Control valves
DN 15 - 150, PN 16 and 40
with SPA Praha pneumatic actuators

Description

Control valves RV 214, RV 224 and RV 234 (further only RV 2x4) are three-way valves with mixing or flow-diverting function. In regard of used actuators, the valves are suitable for regulation at low and medium high differential pressures. Flow characteristics, Kvs values and leakage rates correspond to international standards.

Valves RV 2x4 are especially designed for pneumatic actuators of SPA Praha.

Application

These valves have a wide range of application in heating, ventilation, power generation and chemical processing industries. Valve body can be optionally made of spheroidal cast iron, cast steel and austenitic stainless steel according to operating conditions.

The materials selected correspond to recommendations stipulated by ČSN-EN 1503-1 (1/2002) (steels) and ČSN-EN 1503-3 (1/2002) (cast). The maximal permissible operating pressures in behaviour with types of material and temperature are specified in the table on page 28 of this catalogue.

Process media

Valves series RV 2x4 are designed for regulation of flow and pressure of liquids, gases and vapours without abrasive particles e.g. water, steam, air and other media compatible with material of the valve inner parts. The usage of the valve made of spheroidal cast iron (RV 214) for steam is limited by the following parametres. The steam must be superheated (its dryness at valve outlet $x_1 \geq 0{,}98$) and inlet pressure $p_1 \leq 0{,}4$ MPa when differential pressure is of above-critical value, and $p_1 \leq 1{,}6$ MPa when differential pressure is of under-critical value. In case these two conditions are not kept, it is necessary to use the value made of cast steel (RV 224). To ensure a reliable regulation, the producers recommends to pipe a strainer in front of the valve into pipeline or ensure in any other way that process medium does not contain abrasive particles or impurities.

Installation

When the valve is used as mixing, it must be piped the way so that direction of process medium flow will coincide with the arrows on the body (inlet ports A, B and outlet port AB). When the valves is used as diverting, process medium flows through common valve port AB and split streams leave through valve ports A and B.). The valve can be installed in any position except position when the actuator is under the valve body. When medium temperature exceeds 150°C, it is necessary to protect the actuator against glowing heat from the pipeline; e.g. by the means of proper insulating of the pipeline and valve or by tilting the valve away from the heat radiation.

Technical data

Series		RV 214	RV 224	RV 234
Type of valve		Three-way, single-seated, reverse, control valve		
Nominal size range		DN 25 to 150		
Nominal pressure		PN 16, PN 40		
Body material		Spheroidal cast iron EN-JS 1025 (EN-GJS-400-10-LT)	Cast steel 1.0619 (GP240GH) 1.7357 (G17CrMo5-5)	Stainless steel 1.4581 (GX5CrNiMoNb19-11-2)
Seat material :	DN 15 - 50	1.4028 / 17 023.6	1.4028 / 17 023.6	1.4571 / 17 347.4
DIN W.Nr./+ČSN	DN 65 - 150	1.4027 / 42 2906.5	1.4027 / 42 2906.5	1.4581 / 42 2941.4
Plug material :	DN 15 - 65	1.4021 / 17 027.6	1.4021 / 17 027.6	1.4571 / 17 347.4
DIN W.Nr./+ČSN	DN 80 - 150	1.4027 / 42 2906.5	1.4027 / 42 2906.5	1.4581 / 42 2941.4
Operating temperature range		-20 to 300°C	-20 to 500°C	-20 to 400°C
Face to face dimensions		Section 1 acc. to ČSN-EN 558-1 (3/1997)		
Connection flanges		Acc. to ČSN-EN 1092-1 (4/2002)		
Flange faces		Type B1 (raised-faced) or Type F (female) acc. to ČSN-EN 1092-1 (4/2002)		
Type of plug		V-ported, contoured		
Flow charakteristic		Linear, equal-percentage in direct way		
Kvs value		1.6 to 360 m^3/hour		
Leakage rate		Class III. acc. to ČSN-EN 1349 (5/2001) (<0.1% Kvs) for c. valves with metal-metal seat sealing		
		Class IV. acc. to ČSN-EN 1349 (5/2001) (<0.01% Kvs) for c. valves with metal-PTFE seat sealing		
Regentability r		50 : 1		
Packing		O - ring EPDM t_{max}=140°C, DRSpack® (PTFE) t_{max}=260°C, Exp. graphite, bellows t_{max}=500°C		

Remark: For low operating temperatures (-200 to +250°C), it is possible to supply the valve RV 234 with body material made of 1.4308 (cast stainless steel).

Kvs values and differential pressures

Δp_{max} value is the valve max. differential pressure when open--close function is always guaranteed. In regard of service life of seat and plug, it is recommended so that permanent differential pressure would not exceed 1.6 MPa. Otherwise it is suitable to use perforated plug or sealing surfaces of seat and plug with a hard metal overlay.

For further information on actuating, see actuators´ catalogue sheets

Pneumatic actuator					526 61		5222	
Fail-safe action					direct	indirect	direct	indirect
Spring range					40-200 kPa		100 - 200 kPa	
Spring setting					75 - 235 kPa		100 - 200 kPa	
Feeding pressure					320 kPa		320 kPa	
Spec. No. of actuator					52661.x21x	52661.x22x	5222x051...	5222x052...
Mark in valve spec. No.					PJA, PJB		PJE, PJF	
Linear force					1,88 kN		4 kN	
		Kvs [m³/hour]			Δp_{max}		Δp_{max}	
DN	H	1	2	3	metal	PTFE	metal	PTFE
15	16	---	2.5[1]	1.6[1]	4.00	---	4.00	---
15		4.0[1]	---	---	4.00	---	4.00	---
20		---	---	2.5[1]	4.00	---	4.00	---
20		---	4.0[1]	---	4.00	---	4.00	---
20		6.3[1]	---	---	3.41	---	4.00	---
25		10	6.3[2]	4.0[2]	2.02	2.43	4.00	4.00
32		16.0	10.0	6.3[2]	1.15	1.47	3.49	3.81
40		25.0	16.0	10.0	0.68	0.94	2.19	2.44
50	25	40.0	25.0	16.0	0.36	0.54	1.27	1.46
65		63.0	40.0	25.0	0.18	0.34	0.74	0.89
80	40	100.0	63.0	40.0	---	---	0.37	0.50
100		160.0	100.0	63.0	---	---	0.22	0.32
125		250.0	160.0	100.0	---	--- [max]	0.12	0.21
150		360.0	250.0	160.0	---	---	0.07	0.14

1) parabolic plug in straight way, V-ported plug in angle way
2) V-ported plug in angle way, in straight way for linear characteristic V-ported plug and for equal-percentage characteristic parabolic plug.

Bellows packing can be used with V-ported plug only.

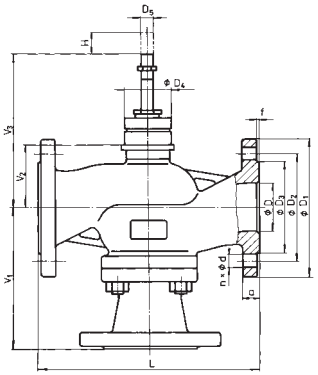
Max. differential pressure Δp for valves PN 16 must be 1.6 MPa.

metal - version with metal - metal seat sealing
PTFE - version with metal - PTFE seat sealing (is not applicable to contoured plugs)

Max. differential pressures specified in table apply to PTFE and O-ring packing. Δp_{max} for bellows must be consulted with the producer. It applies to graphite packing as well especially when required Δp value is close to max. values specified in table.

Dimensions and weights for the type RV 2x4

	PN 16					PN 40					PN 16, PN 40												
DN	D_1	D_2	D_3	d	n	D_1	D_2	D_3	d	n	D	f	D_4	D_5	L	V_1	V_2	$^{\#}V_2$	V_3	$^{\#}V_3$	a	m_1	m_2	$^{\#}m_v$
	mm	mm	mm	mm		mm	mm	mm	mm		mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	kg	kg	kg
15	95	65	45	14	4	95	65	45	14	4	15	2	65	M10x1	130	110	67	---	197	---	16	5.5	6	---
20	105	75	58			105	75	58			20				150	115	67	---	197	---	18	6.5	7	---
25	115	85	68			115	85	68			25				160	130	72	239	202	369	18	8.3	9.5	3.5
32	140	100	78	18		140	100	78	18		32				180	135	72	239	202	369	20	10.5	12	3.5
40	150	110	88			150	110	88			40				200	140	72	239	202	369	20	12	13.5	3.5
50	165	125	102			165	125	102			50				230	175	92	299	222	429	20	17	24	4
65	185	145	122		4[1]	185	145	122		8	65				290	180	92	299	222	429	22	22	31	4
80	200	160	138		8	200	160	138			80			M16x1,5	310	220	123	441	253	571	24	31	43	4.5
100	220	180	158			235	190	162	22		100				350	230	123	441	253	571	24	44	55	4.5
125	250	210	188			270	220	188	26		125				400	260	151	469	281	599	26	65	90	5
150	285	240	212	22		300	250	218			150				480	290	151	469	281	599	28	94	120	5



[1] with regard of the standard previously in force, there is an option to have the number of connection bolts as stipulated in ČSN-EN 1092-1
[#] - for valve with bellows packing
m_v - weight to be added to weight of valve equipped with bellows packing
m_1 - for valves RV / UV 214
m_2 - for valves RV / UV 224 and RV 234

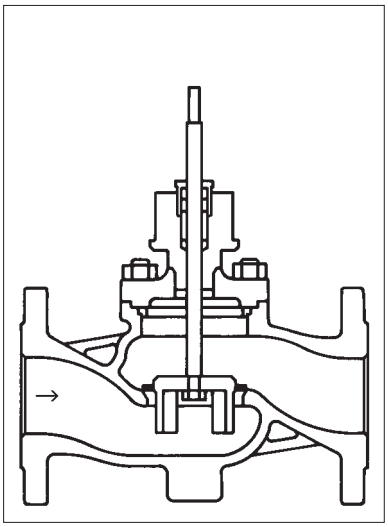
Valve complete specification No. for ordering RV / UV 2x0 (Ex), RV 2x2 (Ex), RV 2x4

		XX	X X X	X X X	X X X X	X X	-	XX	/	XXX	-	XXX	XX
1. Valve	Control valve	RV											
	Shut-off valve	UV											
2. Series	Valves made of spheroidal cast iron EN-JS 1025		2 1										
	Valves made of cast steel 1.0619, 1.7357		2 2										
	Valves made of stainless steel 1.4581		2 3										
	Direct valve		0										
	Pressure-balanced, direct valve		2										
	Mixing (diverting) valve		4										
3. Actuating	Pneumatic actuator			P									
	Pneu. actuator 526 61.xxx1			P J A									
	Pneu. actuator 526 61.xxx2 (w. corector)			P J B									
	Pneu. actuator 5222xxxx1xx			P J E									
	Pneu. actuator 5222xxxx2xx (w. corector)			P J F									
4. Connection	Raised flange				1								
	Female flange				2								
5. Body material	Cast steel 1.0619 (-20 to 400°C)				1								
	Sphr. cast iron EN-JS 1025 (-20 to 300°C)				4								
	CrMo steel 1.7357 (-20 to 500°C)				7								
(Operating temperature ranges	Stainless steel 1.4551 (-20 to 400°C)				8								
are specified in parentheses)	Other material on request				9								
6. Seat sealing	Metal - metal				1								
[1] *From DN 25; t_{max} = 260°C*	Soft sealing (metal - PTFE) [1]				2								
	Hard metal overlay on sealing surfaces				3								
7. Packing	O - ring EPDM [3]				1								
[2] *Not applicable to RV / HU 2x2*	DRSpack® (PTFE)				3								
[3] *Not applicable to Ex execution*	Graphite [2] [3]				5								
	Bellows				7								
	Bellows with safety PTFE packing				8								
	Bellows with safety Graphite packing [2] [3]				9								
8. Flow characteristic	Linear					L							
[4] *Applicable to UV 2x0 only*	Equal-percentage in straight way					R							
[5] *Not applicable to RV 2x4*	LDMspline® [5]					S							
	On-off [4]					U							
	Parabolic [5]					P							
	Linear - perforated plug [5]					D							
	Equa -percentage - perforated plug [5]					Q							
	Parabolic - perforated plug [5]					Z							
9. Kvs	Column No. acc. to Kvs values table					X							
10. Nominal pressure PN	PN 16							16					
	PN 40							40					
11. Max. operating temp. °C	O - ring EPDM									140			
	DRSpack® (PTFE), bellows									220			
	DRSpack® (PTFE), bellows									260			
	Exp. graphite; Bellows [2]									300			
	Exp. graphite; Bellows [2]									400			
	Exp. graphite; Bellows [2]									500			
12. Nominal size DN	DN											XXX	
13. Execution	Normal												
	Non - explosive												Ex

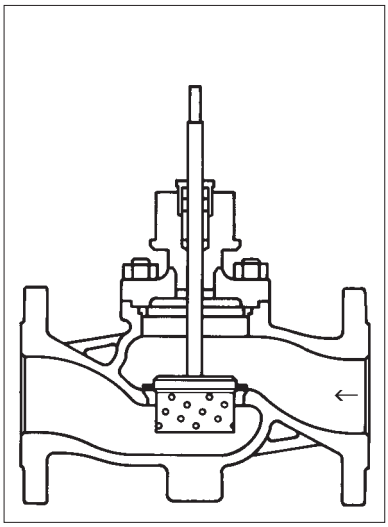
Ordering example: Two-way control valve DN 65, PN 40, with pneumatic actuator 526 63.2111, body material: spheroidal cast iron, flange with raised face, metal-PTFE seat sealing, PTFE packing, linear characteristic, Kvs = 63 m³/hour is specified as follows: **RV 210 PJC 1423 L1 40/220-65.**

Valves RV / UV 2x0 (Ex)

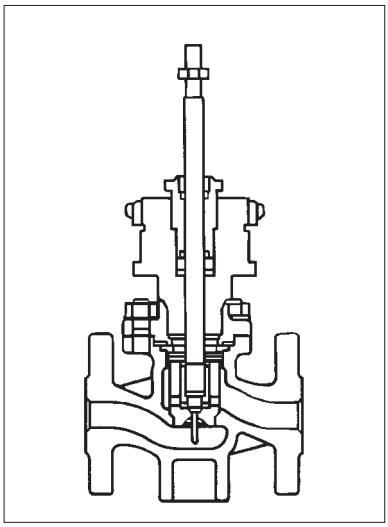
Section of valve with V-ported plug



Section of valve with perforated plug

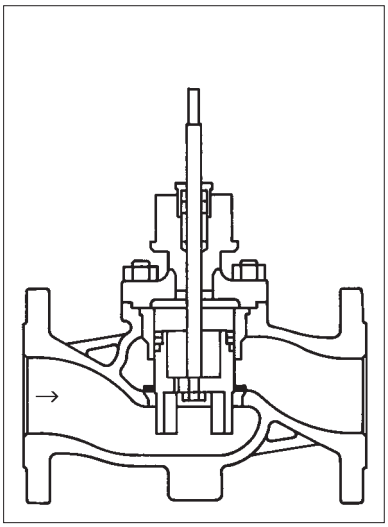


Section of valve with micro-throttling system

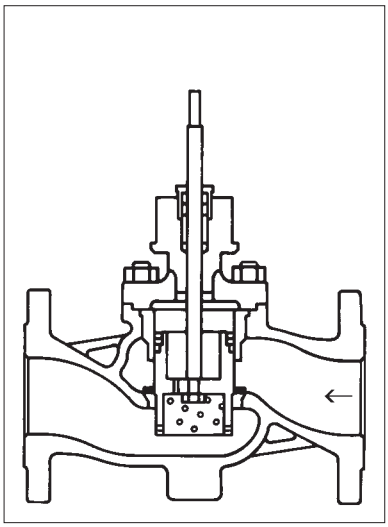


Valves RV 2x2 (Ex)

Section of pressure-balanced valve with V-ported plug

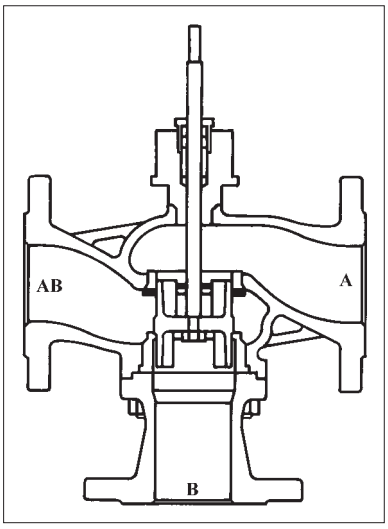


Section of pressure-balanced valve with perforated plug



Valves RV 2x4

Section of three-way valve with V-ported plug



PJA, PJB

Pneumatic actuators 526 61
SPA Praha

Technical data

Type	526 61	
Marking in valve specification No.	PJA (without corector)	
	PJB (with corector)	
Feeding pressure	max. 320 kPa	
Fail-safe action	direct	indirect
Control	ON - OFF	
	Pneumatic signal 20 - 100 kPa (with corector)	
	Current signal 4 - 20 mA (with E/P positioner)	
Nominal force	Acc. to execution of actuator	
Travel	16, 25 mm	
Enclosure	IP 53	
Process medium max. temperature	Acc. to used valve	
Ambient temperature range	-35 to 70°C	
Ambient humidity range	5 - 100 %	
Weight	14,5 kg (with corector)	
	12 kg (without corector)	

Accessories

Pneumatic corector	serves for adjusting of required stroke value with the aid of pneumatic signal 20 to 100kPa
Electropneumatic converter (type 121 14)	equipped with electric input 4 (0) to 20 mA and pneumatic output 20 to 100 kPa to control corector
Air set (type 357 18)	reduces control air pressure to required value
Elektropneumatic positioner (type 6503)	equipment with electric input 4 (0) to 20 mA and direct output of control air into actautor (corector is not required)
Signalisation switches	adjustable end position switches
Posittion transmitter	resistance output signal (0 to 1000 Ω)
	2 - wire output 4 - 20 mA

Operating conditions

Pneumatic actuators can be installed in open atmosphere. They can operate in explosive environment acc. to class SNV1 to SNV3. If there is any additional electric equipment used in actuator, then its application in environment SNV is limited by this additional equipment. Further they can operate at vibration of max. 55 Hz; 15 mm.

Direct and indirect functions

Direct function ensures that actuator stem (draw bar) retracts upon air supply failure (valve opens).
Indirect function ensures that actuator stem (draw bar) extends upon air supply failure (valve closes).

Notes

For version with corector, operating spring range can be altered by changing spring preloading for purpose to increase linear force in case of air supply failure. Changes are as follows:
- from 20 - 100 kPa to 60 - 140 kPa
- from 40 - 200 kPa to 80 - 240 kPa

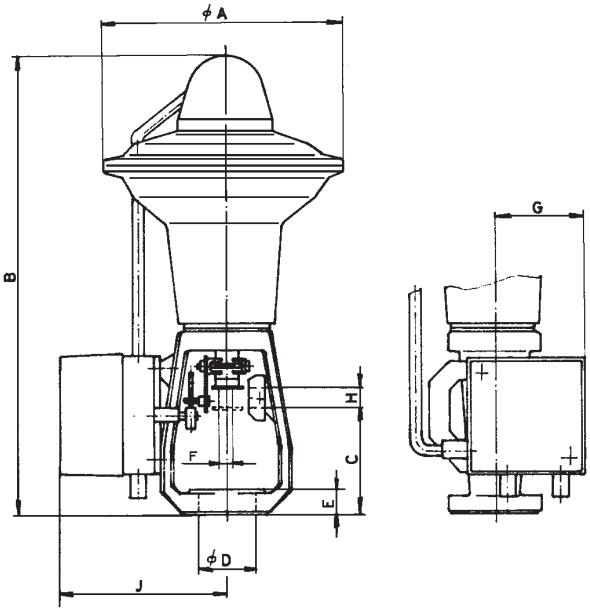
Feeding pressure must be increased proportionately to it. This pressure must not be higher than 320 kPa, otherwise an air set is required to be used.

Specification of actuators 526 61

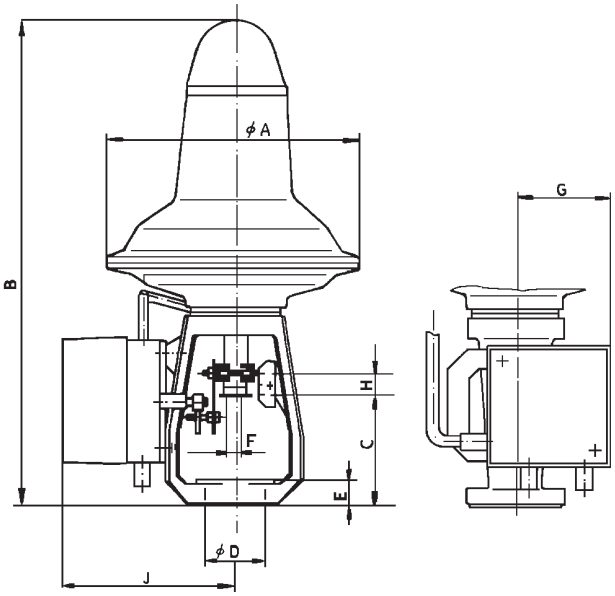
Pneumatic diaphragm servomotor, single acting, with clutch	526 6	X	.	X	X	X	X
Effective diaphragm area	250 cm²	1					
Travel	16 mm (type 562 61)			1			
	25 mm (type 526 61 and 526 63)			2			
Operating spring range	20 - 100 kPa				1		
	40 - 200 kPa				2		
Fail-safe action	Direct					1	
	Indirect					2	
Execution	Without corector						1
	With corector						2

Dimensions of actuators 526 61

Actuator with direct function



Actuator with indirect function



	A	B	C	D	E	F	G	H	J
526 61	250	487	110	65	25	M 10x1	113	16, 25	172

PJE, PJF

Pneumatic actuators 5222 SPA Praha

Technical data

Type	5222
Marking in valve specification No.	PJE (without corector)
	PJF (with corector)
Feeding pressure	max. 350 kPa
Fail-safe action	Direct and indirect
Control	ON - OFF
	Pneumatic signal 20 - 100 kPa (with positioner 6503)
	Current signal 4 - 20 mA (with positioner 6503)
Nominal force	acc. to used actuator
Travel	16, 25, 40 mm
Enclosure	IP 53
Process medium max. temperature	Acc. to used valve
Ambient temperature range	-25 to 70°C
Ambient humidity range	5 - 100 %
Weight	34,2 kg (with corector)
	31 kg (without corector)

Accessories

Pneumatic positioner (corector) (type 650 01)	serves for adjusting of required stroke value with the aid of pneumatic signal 20 to 100kPa
Position converter (type 650 11)	additional equipment for actuators without positioner or for actuators equipped with pneumatic positioner - adjustable end position signalization switches - resistance feedback of 1kΩ - two-wire current feedback 4 - 20mA of actuator position
Air set (type A3420)	reduces input pressure to 1,6 MPa to a free adjustable stabilized pressure ranging from 50 to 600 kPa
Electropneumatic positioner (type SPS2)	positioner controlled by microprocesor. Input signal 4-20mA It can include end position switches and feedback 4-20 mA
Electropneumatic positioner (type 6503)	serves as a proportional positioner. Input control pressure 4 - 20 mA. It may have the same output signals as position converter (type 650 11)
Signalisation switches	adjustable end position switches
Position transmitter	resistance output signal (0 to 1000 Ω)
	2 - wire output 4 - 20 mA
Selenoid valve	serves for direct control or to induce fail-safe action . If the chosen fail-safe action of actuator shall be preserved, it is necessary to choose a selenoid valve with NC fail-safe action
Manual operating	for fail to open (NO) or fail to close function (NC) of actuator

Operating conditions

Pneumatic actuators can be installed in open atmosphere. They can operate in explosive environment acc. to class SNV1 to SNV3. If there is any additional electric equipment used in actuator, then its application in environment SNV is limited by this additional equipment.

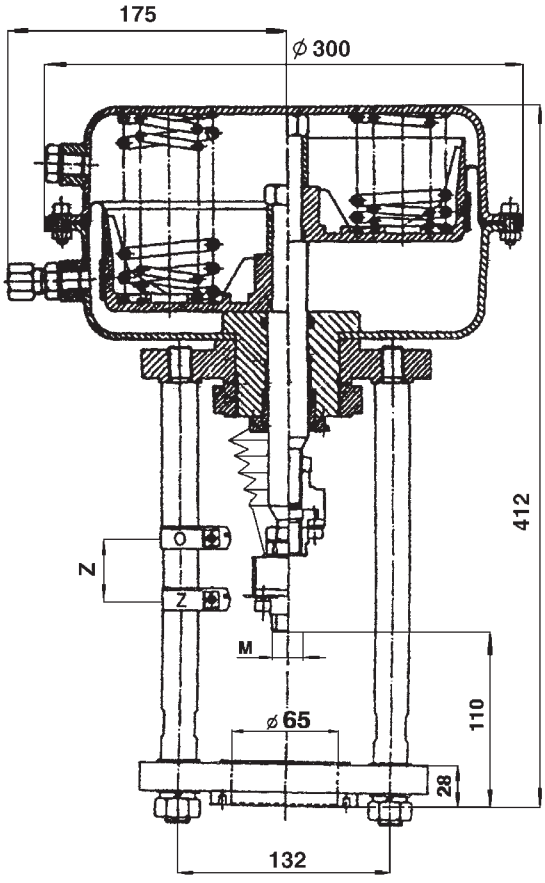
Direct and indirect functions

Direct function ensures that actuator stem (draw bar) retracts upon air supply failure (valve opens).
Indirect function ensures that actuator stem (draw bar) extends upon air supply failure (valve closes).

Specification of actuator 5222

Pneumatic diaphgram servomotor, single acting, with clutch		5222	X	X	X	X	X	X	X
Travel	16 mm		1						
	25 mm		2						
	40 mm		4						
Operating spring range	20 - 100 kPa (force 4 kN; 6,3 kN for NO fail-safe action)			0	1				
	100 - 200 kPa (force 4 kN, 2x4 kN for three-way valves)			0	5				
	160 - 300 kPa (force 6,3 kN for NC fail-safe action)			0	9				
	160 - 300 kPa TANDEM (force 12,5 kN for NC fail-safe action)			1	9				
Fail-safe action	Ditrect: NO					1			
	Indirect: NC					2			
Execution	Without corector						1		
	With corector						2		
Manual operating	Without manual operating							0	
	With manual operating							1	
Additional equipment	Without additional equipment								0
	With additional equipment to normal atmosphere								1
	With additional equipment to explosive surroundings of class SNV								3

Dimensions of actuator 5222



Maximal permissible operating pressures [MPa]

Material	PN	Temperature [°C]										
		120	150	200	250	300	350	400	450	500	525	550
Spheroidal cast iron EN-JS 1025	16	1,50	1,40	1,40	1,30	1,10	---	---	---	---	---	---
(EN-GJS-400-18LT)	40	4,00	3,88	3,60	3,48	3,20	---	---	---	---	---	---
Cast Steel 1.0619	16	1,60	1,50	1,40	1,30	1,10	1,00	0,80	---	---	---	---
(GP240GH)	40	4,00	4,00	3,90	3,60	3,20	2,70	1,90	---	---	---	---
Chrommolybden steel		---	---	---	---	---	---	---	---	---	---	---
1.7357 (G17CrMo5-5)	40	4,00	4,00	4,00	4,00	4,00	4,00	3,90	3,10	1,80	---	---
Stainless steel 1.4581	16	1,60	1,50	1,40	1,30	1,30	1,20	1,20	---	---	---	---
(GX5CrNiMoNb19-11-2)	40	4,00	3,80	3,50	3,40	3,30	3,10	3,00	---	---	---	---

Notes: