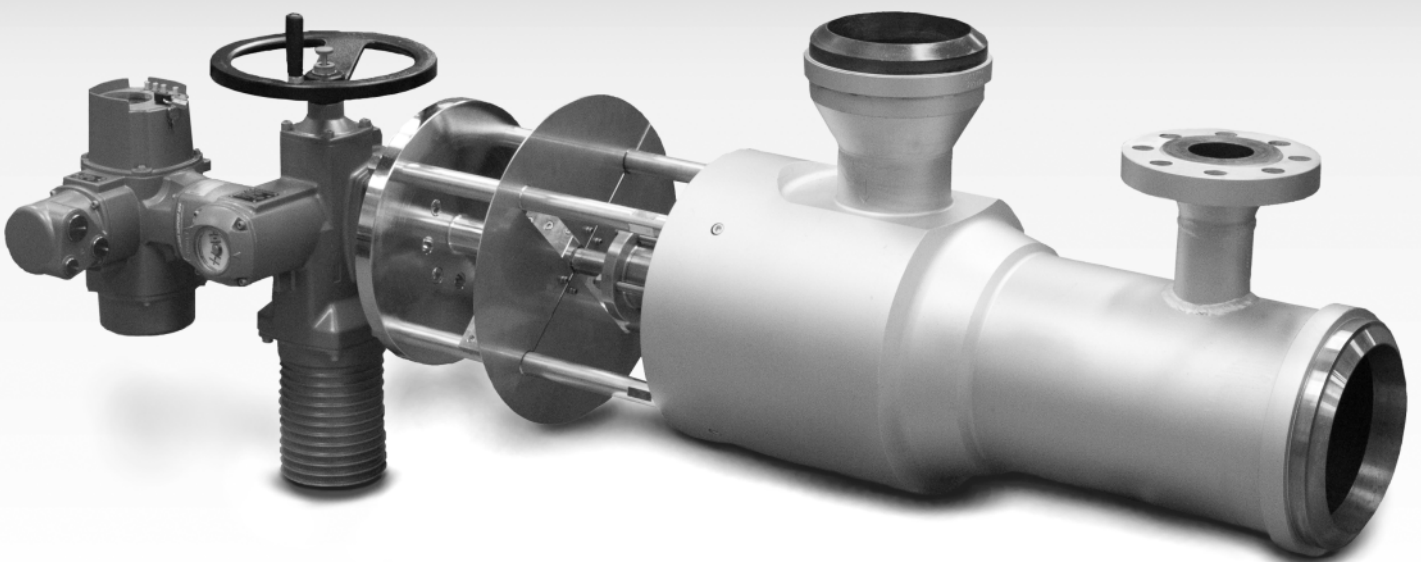




**02 - 02.1**  
01.16.GB

# CONTROL VALVES AND STEAM-CONDITIONING STATION IN ANGLE WAY EXECUTION

## **900 line**



# 9000 line

## Control valves RV 902

**The valves with extended outlet** of series RV902 are single seated control valves of a unit construction designed to fit in all demands of an appliance the valve is designed for.

## Steam-conditioning station RS 902

**Steam conditioning stations** of series RS902 are single-seated control valves of a unit construction designed for water injection into the extended outlet. Cooling water is injected into the extended outlet behind the throttling trim through a specially designed nozzle (VH, VHP or CHR) with changeable flow.

The pressure-balanced, multi-step throttling trim is designed to eliminate high differential pressures within the valve and ensure the low noisiness. It ensure a high resistance to wearing caused by medium flow and to effects of the expanding steam. A low noisiness level can be also eliminated with orifice plates in extended outlet.

### Control

The valves are actuated with both electric and pneumatic actuators. The connection is designed for using actuators of the following producers: **ZPA Pečky, Regada Prešov, Auma, Schiebel** and **Flowserve**. It is also possible to use fast acting electrohydraulic actuators for quick closing or opening

### Application

**RV 902** - designed for industry applications such as heating plants, power plants or regulation of technological processes

**RS 902** - designed for simultaneous pressure and temperature reduction of steam. They are especially designed for industrial applications such as low-pressure steam production in heating, steam circuit in power plants, bypass stations or technological processes.

The max. permissible operating pressure values correspond to EN 12 516-1 see page 12 of this catalogue

### Process media

The valves are especially designed for the flow and pressure control of the process medium without impurities, however they can be used for gases and vapours when inlet and outlet flow velocities are kept within the permissible range. The common process media are for example water, steam and other media with no special demands on the used type of material of the valve. The producer recommends to pipe a strainer into pipeline in front of the valve when impurities are present. Impurities can affect the quality and reliability of regulation and can cause a reduction of the valve service life. The valve application for any other media should be consulted with the producer because of the type of material that is in contact with the process medium.

## 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 and then it is convenient to use a throttling system ensuring low noisiness (multi-step pressure reduction, damping orifice plate at outlet).

## Rangeability

Rangeability is the ratio of the biggest value of flow coefficient to the smallest value. In fact it is the ratio (under the same conditions) of highest regulated flow rate value to its lowest value.

The lowest or minimal regulated flow rate is always higher than 0.

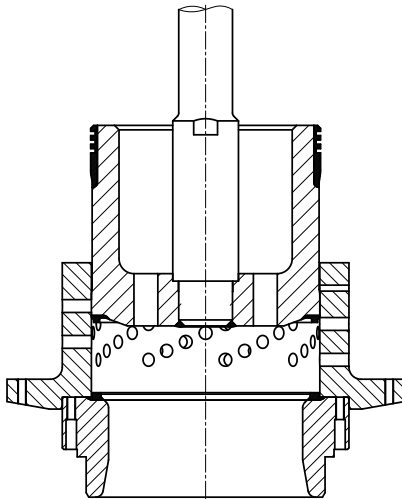
## Cavitation

Cavitation is a phenomenon when there are steam bubbles creating and vanishing in shocks - generally at the narrowest section of flowing due to local pressure drop.

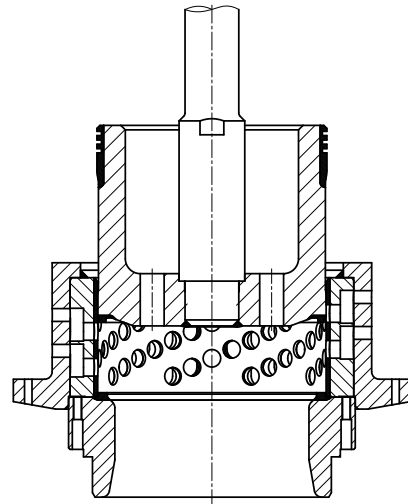
## Application of multi-step pressure reduction

When the valves are designed for operation in above-critical differential pressure ( $p_2/p_1 < 0.54$  when throttling steam and gases), or when diff. pressure value is higher than the recommended service diff. pressure, it is effectual to use a throttling system in two or three steps to prevent the cavitation from creating and to ensure both a

One-step pressure reduction



Two-step pressure reduction





# RV 902

Control valve  
angled

**Inlet DN 50 to 250**  
**Outlet DN 80 to 700**  
**PN 80 to 700**

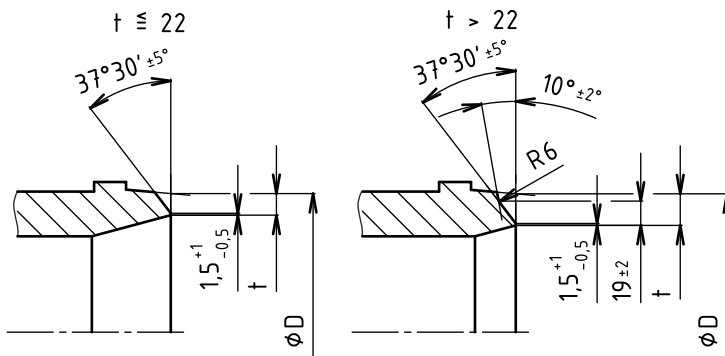
## Technické parametry

Series	RV 902
Type of valve	<b>Control valve, single-seated, angle, with weld ends, with pressure-balanced plug, with extended outlet and orifice plate in extended outlet</b>
Nominal size range	body: DN80, 150, 250; inlet: DN 50 to 250; outlet: DN 80 to 700
Nominal pressure	inlet PN 100 to 630; outlet PN 16 to 400
Body material (including weld ends)	1.0426 (P 280 GH) ... 20 to 500°C 1.7335 (13CrMo4-5) ... 20 to 550°C 1.7383 (11CrMo9-10) ... 20 to 600°C 1.4903 (P91, X10CrMoVNb 9-1) ... 20 to 600°C
Seat material	1.4923 + hard metal overlay
Plug material	1.4923 + hard metal overlay
Weld ends	According to ČSN EN 12627 (8/2000)
Trim	One or two step pressure reduction, optionally with orifice plates in outlet
Flow characteristic	Linear, equal-percentage
Leakage rate	Acc. to EN 1349 (5/2001) Class III, IV, execution with higher tightness - Class V
Packing	Grafit - Live Loading

Range of Kvs values			
DN (body)	80	150	250
No. of step reduct.	Kvs values [m <sup>3</sup> /hod] - linear flow characteristic		
<b>1</b>	8.0 - 80	16 - 250	40 - 500
<b>2</b>	8.0 - 40	16 - 125	40 - 250
No. of step reduct.	Kvs values [m <sup>3</sup> /hod] - equal-percentage flow characteristic		
<b>1</b>	16 - 50	25 - 125	50 - 250
<b>2</b>	16 - 25	25 - 63	50 - 125

Nominal values of Kvs are understood as multiples of 10 of the progression of selected numbers R10 (1.0; 1.25; 1.6; 2.0; 2.5; 3.2; 4.0; 5.0; 6.3; 8.0; 10.0). They are specified individually for every valve acc. to the customer's requirements and value within the appropriate range shown in the table above.

### Connection acc. to ČSN EN 12627



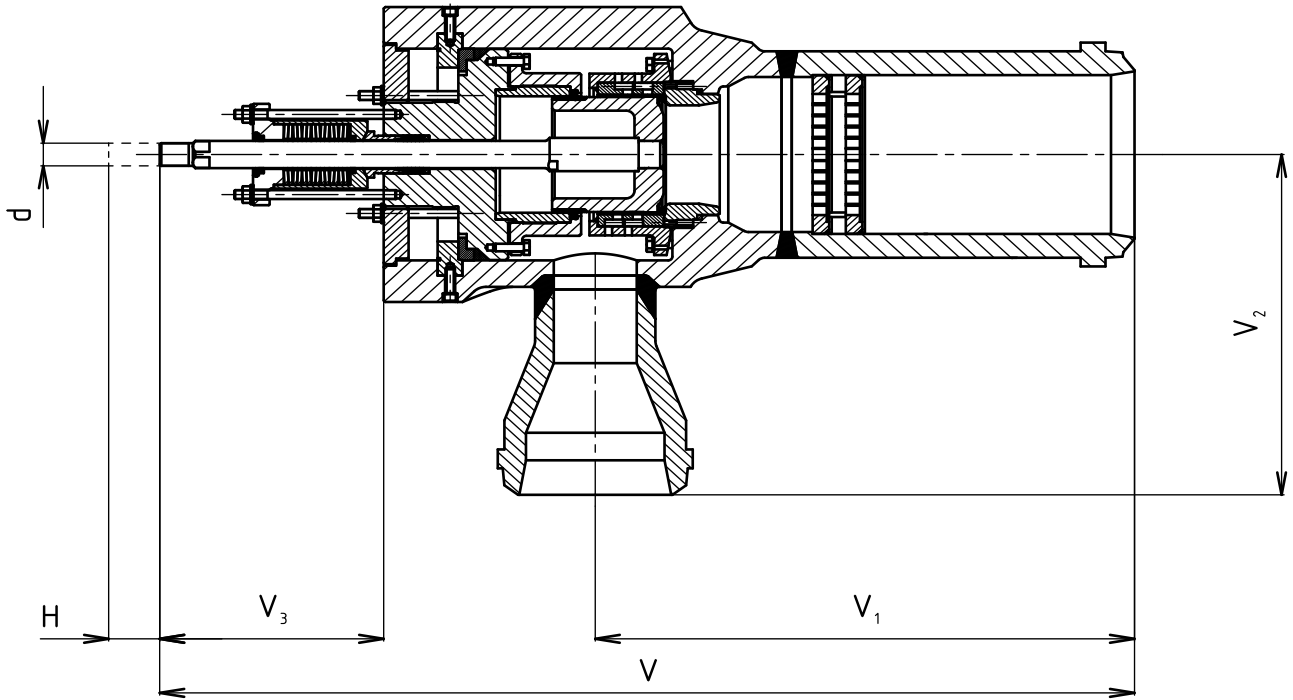
Other shapes of weld ends after agreement with producer

Dimensions of weld ends						
DN	PN					
	16-40	63	100	160	250	16-250
	t	t	t	t	t	D
	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
<b>50</b>	2.9	3.2	4.5	6.3	8	60.3
<b>65</b>	3.2	3.6	5	7	10	76.1
<b>80</b>	3.6	4	5.6	8	12.5	88.9
<b>100</b>	4	5	7	10	14	114.3
<b>125</b>	4.5	5.6	8	12.5	18	139.7
<b>150</b>	5	7	10	14	20	168.3
<b>200</b>	6.3	8	12.5	18	25	219.1
<b>250</b>	7	10	16	22	32	273
<b>300</b>	8	12.5	18	25	-	323.9
<b>350</b>	9	12.5	20	28	-	355.6
<b>400</b>	11	14	20	32	-	406.4
<b>500</b>	14	18	25	-	-	508
<b>600</b>	18	23	-	-	-	610
<b>700</b>	23	-	-	-	-	721

Connecting dimensions of weld ends can be modified on request by the customer.

Further DN and PN according to customer requirements.

## Control valve RV 902



### Dimensions and weights of RV 902 with weld ends

Body	DN Inlet	Outlet	V [mm]	V <sub>1</sub> [mm]	V <sub>2</sub> [mm]	V <sub>3</sub> [mm]	H [mm]	d	m [kg]
80	50-100	80-200 300					40	M20x1,5	
150	80-200	150-400	1175	650	400	270	63	M30x2	450
		500-700	1325	800	400	270			
250	150-250	250-500 700					100	M42x2	

Note: Missing data on request. The values of weight are approximate (depends on diameter of weld ends).

## The valve complete specification No. for ordering RV 902

		XX	XXX	XXX	XXXX	XX	XX /	XXX	-	XXX	x	XXX	x	XXX	/	X
<b>1. Type of valve</b>	Regulační ventil	RV														
<b>2. Series</b>	Control valve, angle, extended outlet		902													
<b>3. Type of actuating</b>	Electric actuator															
	Pneumatic actuator															
	Electric actuator Modact MTR <sup>1)</sup>															
	Electric actuator Modact MTN Control <sup>1)</sup>															
	Electric actuator Modact MTP Control <sup>1)</sup>															
	Electric actuator Modact MTNED <sup>1)</sup> , MTPED <sup>1)</sup>															
	Electric actuator Modact MTN <sup>1)</sup> , MTP <sup>1)</sup>															
	Electric actuator Regada STR 2 <sup>1)</sup> , STR 2PA <sup>1)</sup>															
	Electric actuator Auma SAR 7.6 <sup>1)</sup>															
	Electric actuator Auma SAR Ex 7.6 <sup>1)</sup>															
	Electric actuator Auma SAR 10.2															
	Electric actuator Auma SAR Ex 10.2															
	Electric actuator Auma SAR 14.2															
	Electric actuator Auma SAR Ex 14.2															
	Electric actuator Auma SAR 14.6															
	Electric actuator Auma SAR Ex 14.6															
	Electric actuator Schiebel rAB5															
	Electric actuator Schiebel exrAB5															
	Electric actuator Schiebel rAB8															
	Electric actuator Schiebel exrAB8															
	Pneumatic actuator Flowsolve PO 1502 <sup>1)</sup>															
<b>4. Connection</b>	Weld ends				4											
<b>5. Body material</b>	Cast steel 1.0426 (20 to 500 °C)				1											
	Stainless steel 1.4903 (20 to 600 °C)				5											
	Alloy steel 1.7383 (20 to 600 °C)				6											
	Alloy steel 1.7335 (20 to 550 °C)				7											
	Other material acc. to request				9											
<b>6. Packing</b>	Graphite - Live Loading				5											
<b>7. Multi-step pressure reduction</b>	One-step pressure reduction				1											
	Two-step pressure reduction				2											
<b>8. Flow characteristic</b>	Linear - Leakage rate class III.				L											
	Linear - Leakage rate class IV.				N											
	Linear - Leakage rate class V.				D											
	Equal-percentage - Leakage rate class III.				R											
	Equal-percentage - Leakage rate class IV.				E											
	Equal-percentage - Leakage rate class V.				Q											
<b>9. No. of orifice plates</b>	Max. 3						X									
<b>10. Nominal pressure</b>	PN inlet / outlet	PN16	0					XX								
		PN25	1													
	(example of marking: 54 = PN160 / PN100)	PN40	2													
		PN63	3													
		PN100	4													
		PN160	5													
		PN250	6													
		PN320	7													
		PN400	8													
		PN630	9													
<b>11. Operating temp. °C</b>	Acc. to process medium								XXX							
<b>12. Nominal size</b>	DN	inlet								XXX						
		body									XXX					
		outlet										XXX				
<b>13. Accessories</b>	Body warming-through connection															H
	Body drainage															D

### Order example:

Two-way, control valve DN 80/150, body: DN80, PN 160/100, with electric actuator Modact MTN Control, body material: cast steel, weld ends, packing Graphite, two-step pressure reduction, linear flow characteristic is specified as follows: **RV902 EYA 4152 L1 54/400-080x080x150**

**Note:** PN and DN of outlet, multi-step pressure reduction No. of orifice plate possibly different type of actuating is possible after the agreement with the producer.



# RS 902

Steam conditioning  
station

**Inlet DN 50 to 250**  
**Outlet DN 150 to 700**  
**PN 16 to 630**

Technical data	
Series	<b>RS 902</b>
Type of valve	<b>Control valve, single-seated, angle, with weld ends, with pressure-balanced plug, with extended outlet, orifice plate, connection to injection head (VH, VHP or CHR)</b>
Nominal size range	body: DN80, 150, 250; inlet: DN 50 to 250; outlet: DN 80 to 700
Nominal pressure	inlet PN 100 to 630; outlet PN 16 to 400
Body material (including weld ends)	1.0426 (P 280 GH) ... 20 to 500°C 1.7335 (13CrMo4-5) ... 20 to 550°C 1.7383 (11CrMo9-10) ... 20 to 600°C 1.4903 (P91, X10CrMoVnb 9-1) ... 20 to 600°C
Seat material	1.4923 + hard metal overlay
Plug material	1.4923 + hard metal overlay
Weld ends	Acc. to ČSN EN 12627 (8/2000)
Trim	One or two step pressure reduction, optionally with orifice plates in outlet
Flow characteristic	Lineární, rovnoprocentní
Leakage rate	Acc. to ČSN EN 1349 (5/2001) Class III, IV, execution with higher tightness - Class V
Packing	Graphite - Live Loading

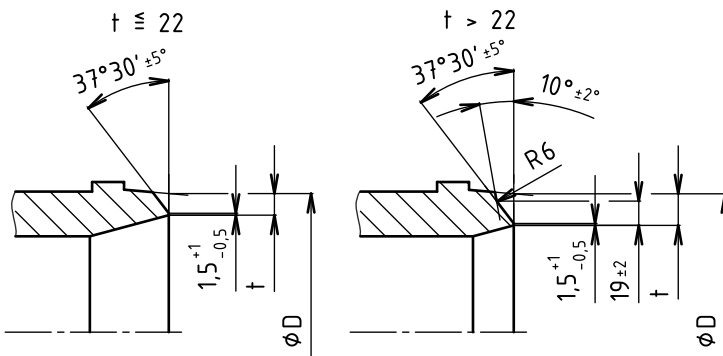


### Range of Kvs values

DN (body)	80	150	250
No. of step reduct.	Kvs values [m <sup>3</sup> /hod] - linear flow characteristic		
<b>1</b>	8.0 - 80	16 - 250	40 - 500
<b>2</b>	8.0 - 40	16 - 125	40 - 250
No. of step reduct.	Kvs values [m <sup>3</sup> /hod] - equal-percentage flow characteristic		
<b>1</b>	16 - 50	25 - 125	50 - 250
<b>2</b>	16 - 25	25 - 63	50 - 125

Nominal values of Kvs are understood as multiples of 10 of the progression of selected numbers R10 (1.0; 1.25; 1.6; 2.0; 2.5; 3.2; 4.0; 5.0; 6.3; 8.0; 10.0). They are specified individually for every valve acc. to the customer's requirements and value within the appropriate range shown in the table above.

### Connection acc. to ČSN EN 12627



Other shapes of weld ends after agreement with producer

### Dimensions of weld ends

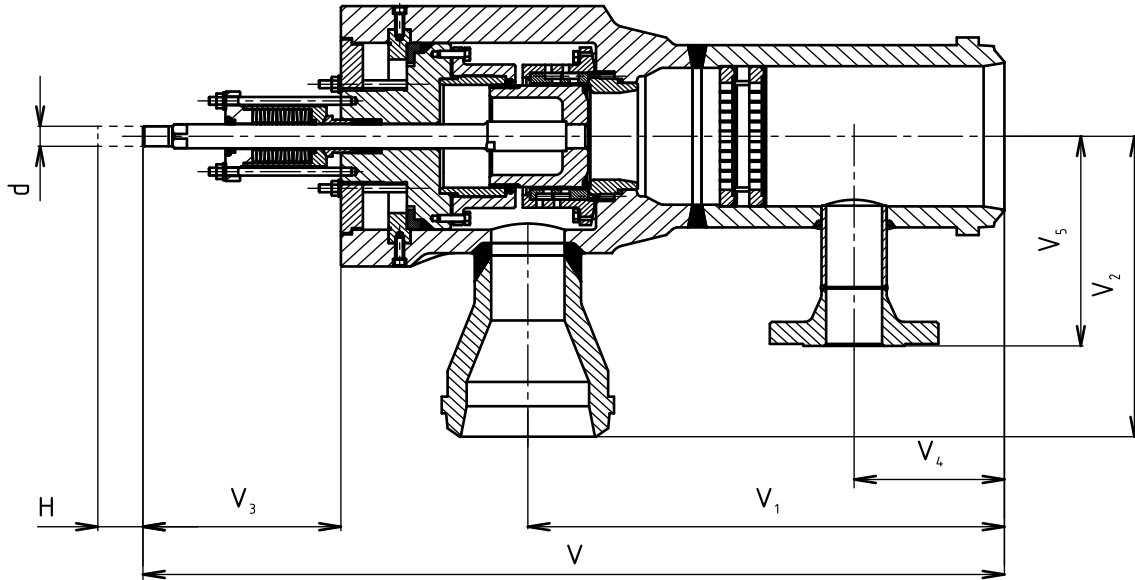
DN	PN					
	16-40	63	100	160	250	16-250
	t	t	t	t	t	D
	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
<b>50</b>	2.9	3.2	4.5	6.3	8	60.3
<b>65</b>	3.2	3.6	5	7	10	76.1
<b>80</b>	3.6	4	5.6	8	12.5	88.9
<b>100</b>	4	5	7	10	14	114.3
<b>125</b>	4.5	5.6	8	12.5	18	139.7
<b>150</b>	5	7	10	14	20	168.3
<b>200</b>	6.3	8	12.5	18	25	219.1
<b>250</b>	7	10	16	22	32	273
<b>300</b>	8	12.5	18	25	-	323.9
<b>350</b>	9	12.5	20	28	-	355.6
<b>400</b>	11	14	20	32	-	406.4
<b>500</b>	14	18	25	-	-	508
<b>600</b>	18	23	-	-	-	610
<b>700</b>	23	-	-	-	-	721

Connecting dimensions of weld ends can be modified on request by the customer.

Further DN and PN according to customer requirements.

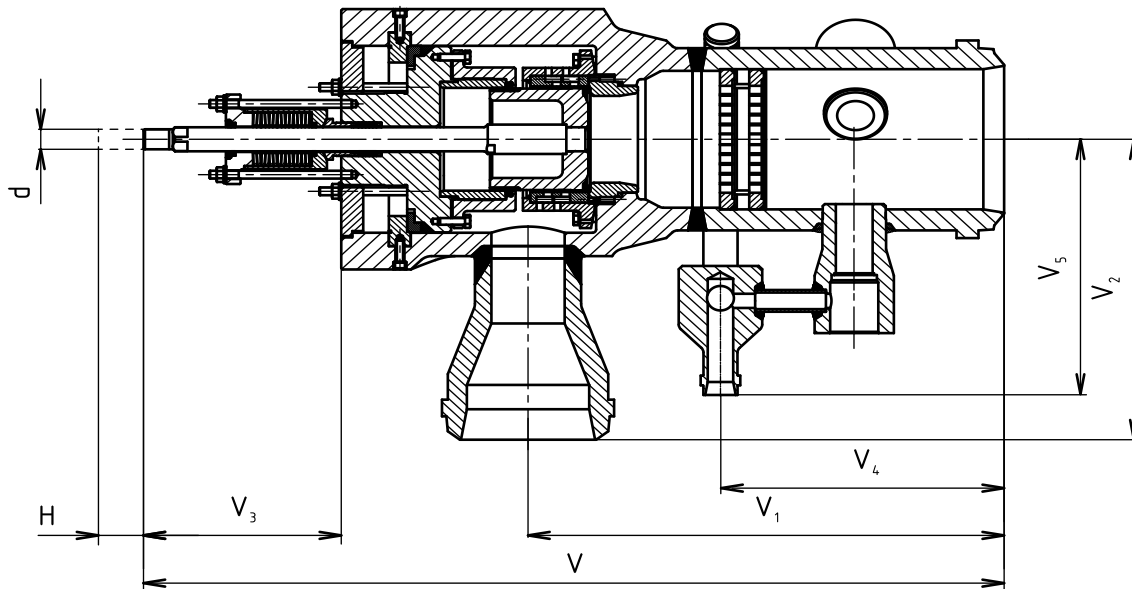
## Steam conditioning station RS 902 / Ax

- connection to VH or VHP (injection at the axis of outlet)



## Steam conditioning station RS 902 / Rx

- connection to CHR (injection perpendicular to the axis of outlet)



### Dimensions and weights of RS 902 with weld ends

Body	DN Inlet	Outlet	V [mm]	V <sub>1</sub> [mm]	V <sub>2</sub> [mm]	V <sub>3</sub> [mm]	V <sub>4</sub> [mm]	H [mm]	d	m [kg]
80	50-100	150-200 300						40	M20x1,5	
150	80-200	150-400	1175	650	400	270	205	63	M30x2	460
		500-700	1325	800	400	270				
250	150-250	250-500 700						100	M42x2	

Poznámka: Chybějící údaje upřesní výrobce. Hmotnost pouze orientační, přesná hmotnost závisí na DN a PN konců

## The valve complete specification No. for ordering RS 902

		XX	XXX	XXX	XXXX	XX	XX /	XXX	-XXX	x	XXX	x	XXX	/	XXX
<b>1. Type of valve</b>	Steam-conditioning station	<b>RS</b>													
<b>2. Series</b>	Control valve, angle, extended outlet with cooling water connection		<b>902</b>												
<b>3. Type of actuating</b>	Electric actuator														
	Pneumatic actuator														
	El. actuator Modact MTR <sup>1)</sup>														
	El. actuator Modact MTN Control <sup>1)</sup>														
	El. actuator Modact MTP Control <sup>1)</sup>														
	El. actuator Modact MTNED <sup>1)</sup> , MTPED <sup>1)</sup>														
	El. actuator Modact MTN <sup>1)</sup> , MTP <sup>1)</sup>														
	El. actuator Regada STR 2 <sup>1)</sup> , STR 2PA <sup>1)</sup>														
	El. actuator Auma SAR 7.6 <sup>1)</sup>														
	El. actuator Auma SAR Ex 7.6 <sup>1)</sup>														
	El. actuator Auma SAR 10.2														
	El. actuator Auma SAR Ex 10.2														
	El. actuator Auma SAR 14.2														
	El. actuator Auma SAR Ex 14.2														
	El. actuator Auma SAR 14.6														
	El. actuator Auma SAR Ex 14.6														
	El. actuator Schiebel rAB5														
	El. actuator Schiebel exrAB5														
	El. actuator Schiebel rAB8														
	El. actuator Schiebel exrAB8														
	Pneu. actuator Flowserve PO 1502 <sup>1)</sup>														
<b>4. Connection</b>	Weld ends														
<b>5. Body material</b>	Cast steel 1.0426 (20 to 500 °C)														
	Stainless stel 1.4903 (20 to 600 °C)														
	Alloy steel 1.7383 (20 to 600 °C)														
	Alloy steel 1.7335 (20 to 550 °C)														
	Other material acc. to request														
<b>6. Packing</b>	Graphite - Live Loading														
<b>7. Multi-step pressure reduction</b>	One-step pressure reduction														
	Two-step pressure reduction														
<b>8. Flow characteristic</b>	Linear - Leakage rate class III.														
	Linear - Leakage rate class IV.														
	Linear - Leakage rate class V.														
	Equal-percentage - Leakage rate class III.														
	Equal-percentage - Leakage rate class IV.														
	Equal-percentage - Leakage rate class V.														
<b>9. No. of orifice plates</b>	Max. 3														
<b>10. Nominal pressure</b>	PN inlet / outlet														
	PN16 0														
	PN25 1														
	PN40 2														
	PN63 3														
	PN100 4														
	PN160 5														
	PN250 6														
	PN320 7														
	PN400 8														
	PN630 9														
<b>11. Operating temp. °C</b>	Acc. to process medium														
<b>12. Nominal size</b>	DN														
	Input														
	Body														
	Output														
<b>13. Accessories</b>	Connection to VH/VHP														
	Connection to CHR														
	Number of cooling inputs														
	Body warming-through connection														
	Body drainage														

Note: PN and DN of outlet, multi-step pressure reduction No. of orifice plate possibly different type of actuating is possible after the agreement with the producer. Type of mechanical injection head (VH) acc. to catalogue sheet 02-03.2 or drive-steam injection head (VHP) acc. to catalogue sheet 02-03.3.

**Ordering example:**

Steam conditioning station DN 80/150, body DN80, PN 160/100, with electric actuator Modact MTN Control, body material: cast steel, weld ends, packing: Graphite - Live Loading, two-step pressure reduction, one orifice plate at outlet, linear characteristic, adapted to connection on one VH and with body warming is specified as follows: **RS902 EYA 4152 L1 54/400-080x080x150/A1H**

## Data for an actuator specification

The valves are designed to be actuated with linear or multi-turn electric actuators of the following producers as Auma, Schiebel, ZPA Pečky, Regada Prešov or pneumatic actuators Flowserve. In case of request for quick running they could be also equipped with fast acting electrohydraulic actuators. Valves are adjusted with actuators so that in the closed position, i.e. when closing to the seat, the torque switch turns off. In the open position they are adjusted so that the position switch turns off (the torque switch for open position is adjusted as a safety switch to protect the valve against its damage only). Connecting flange of an actuator is designed to allow rotation of the drive of 45°.

Assigning of multi-turn actuators to a valve						
DN	Stroke [mm]	RPM /stroke [n]	Min. modulating torque [Nm]	Max. tripping torque [Nm]	Trapezoidal thread	Valve attachment acc. to ČSN EN ISO 5210
80	40	10	30	60	Tr 20x4 LH	F10 / type A
150	63	10,5	75	250	Tr 36x6 LH	F14 / type A
250	100	14,3	120	500	Tr 40x7 LH	F14 / type A

Assigning of linear actuators to a valve				
DN	Stroke [mm]	Min. nominal thrust [kN]	Max. tripping thrust [kN]	Thread of stem
80	40	15	30	M20x1,5

Maximal permissible overpressures [Mpa]												
Material	PN	Temperature [ °C ]										
		100	150	200	250	300	350	400	450	500	550	600
Cast steel 1.0426	100	10,0	10,0	10,0	9,70	8,88	8,16	7,44	4,53	2,19	---	---
	160	16,0	16,0	16,0	15,5	14,2	13,0	11,9	7,2,6	3,50	---	---
	250	25,0	25,0	25,0	24,2	22,2	20,4	18,6	11,3	5,47	---	---
	320	32,0	32,0	32,0	31,0	28,4	26,1	23,8	14,5	7,0	---	---
	400	40,0	40,0	40,0	38,8	35,5	32,6	29,7	18,1	8,75	---	---
Alloy steel 1.7335	630	63,0	63,0	63,0	61,1	55,9	51,4	46,9	28,6	13,8	---	---
	100	10,0	10,0	10,0	10,0	10,0	9,31	8,53	7,89	6,24	2,93	---
	160	16,0	16,0	16,0	16,0	16,0	14,9	13,6	12,6	9,99	4,70	---
	250	25,0	25,0	25,0	25,0	25,0	23,2	21,3	19,7	15,6	7,34	---
	320	32,0	32,0	32,0	32,0	32,0	29,8	27,3	25,2	19,9	9,39	---
Alloy steel 1.7383	400	40,0	40,0	40,0	40,0	40,0	37,2	34,1	31,5	24,9	11,7	---
	630	63,0	63,0	63,0	63,0	63,0	58,7	53,8	49,7	39,3	18,5	---
	100	10,0	10,0	10,0	10,0	10,0	9,38	8,53	7,89	6,58	3,52	1,49
	160	16,0	16,0	16,0	16,0	16,0	15,0	13,6	12,6	10,5	5,63	2,39
	250	25,0	25,0	25,0	25,0	25,0	23,4	21,3	19,7	16,4	8,80	3,73
Stainless steel 1.4903	320	32,0	32,0	32,0	32,0	32,0	30,0	27,3	25,2	21,0	11,2	4,78
	400	40,0	40,0	40,0	40,0	40,0	37,5	34,1	31,5	26,3	14,0	5,98
	630	63,0	63,0	63,0	63,0	63,0	59,1	53,8	49,7	41,5	22,2	9,40
	100	10,0	10,0	10,0	10,0	10,0	9,38	8,53	7,89	6,58	5,82	5,0
	160	16,0	16,0	16,0	16,0	16,0	15,0	13,6	12,6	10,5	9,32	8,0
	250	25,0	25,0	25,0	25,0	25,0	23,4	21,3	19,7	16,4	14,5	12,5
	320	32,0	32,0	32,0	32,0	32,0	30,0	27,3	25,2	21,0	18,6	16,0
	400	40,0	40,0	40,0	40,0	40,0	37,5	34,1	31,5	26,3	23,3	20,0
	630	63,0	63,0	63,0	63,0	63,0	59,1	53,8	49,7	41,5	36,7	31,5



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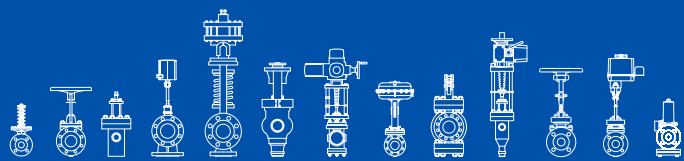
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