

	INSTRUCTION FOR INSTALLATION AND MAINTENANCE	RS 902
	STEAM - CONDITIONING STATION	PM - 216/16/01/GB

The instructions for installation and maintenance of valves RS 902 are binding for users to ensure proper function of valves. The user must keep the rules said here while installation, operation and maintenance. Technical details of individual type are specified in catalogue data sheets. If the usage of the valves is different from mentioned herein, the guarantee terms are not valid any more.

1. TECHNICAL DESCRIPTION AND VALVE FUNCTION

1.1 Description

Steam conditioning station RS 902 is single-seated control valve of a unit construction designed for water injection into the extended outlet. The pressure-balanced, multi-step throttling trim is designed to eliminate high differential pressures within the valve and ensure the low noisiness. It ensures 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. Cooling water is injected into the extended outlet with a specially designed nozzle (VH, VHP or CHR) with changeable flow.

The valve is equipped with "LIVE LOADING" packing.

The valves are supplied in angle way execution and with weld ends.

The valves are actuated with linear and rotational actuators. The connection is designed for both domestic and foreign actuators of the following producers: ZPA Pečky, Regada, Přešov, AUMA, Schiebel and Flowserve.

If short adjustment times are required, it is possible to use fast-acting electro-hydraulic actuators.

Used actuators allow 3-point controlling or controlling by signal 0(4)-20mA or 0-10V. They can be equipped with the signalization of end positions and transmitter of position.

1.2 Application

They are designed for reduction of pressure and temperature of water steam in the industrial applications such as power plants, heating plants and technological processes.

1.3 Recommended differential pressures

In regard to the pressure balancing of the plug and to linear forces of usable actuators, the valves' application in high differential pressures is not limited by the forces caused by process medium pressure but by the type of used throttling system. A recommended max. differential pressure for one step of multi-step pressure reduction is 5,0MPa when perforated plug and perforated cage are used. It is recommended to consult the concrete cases with the producer with regard to pressure ratio and parameters of other equipment.

1.4 Process media

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.

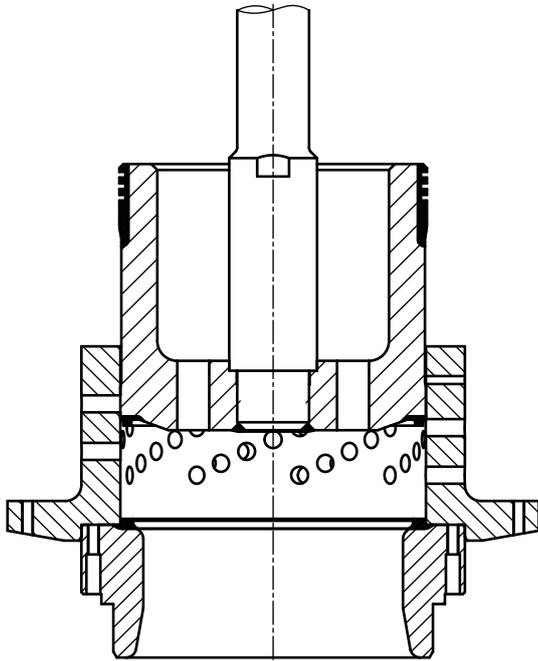
1.5 Technical data

Series	RS 902	
Type of valve	Control valve, single-seated, angle, with weld ends, with pressure-balanced plug, with extended outlet and orifice plate in extended outlet and with flange for connection injection equipment (VH, VHP or CHR)	
Nominal diameter DN	body: DN80, 150, 250; inlet: DN 50 to 250; outlet: DN 80 až 700	
Nominal pressure PN	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	
Shape of welding ends	Acc. to EN 12627 (8/2000)	
Control system	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, Execution with higher tightness - Class V	
Packing set	Graphite - Live Loading	

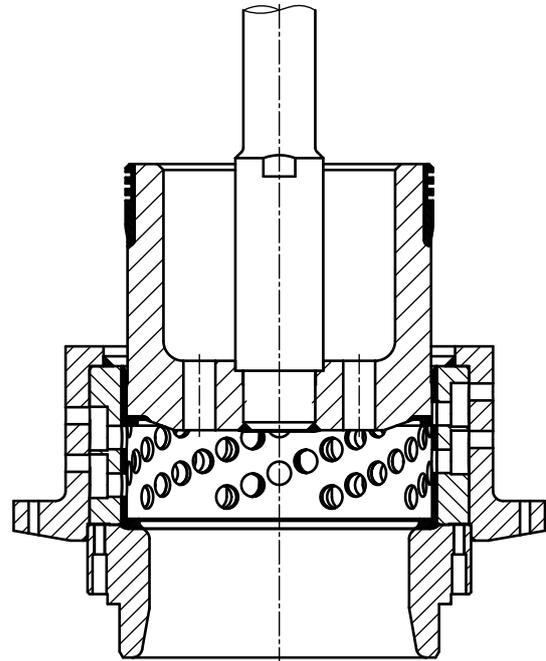
Maximum permissible working pressure according to EN 12516-1+A1

1.6 Application of multi-step pressure reduction

For valves working with above-critical differential pressure ($p_2/p_1 < 0.54$) or with pressure drop higher than recommended is useful to use two-step reduction to prevention of cavitation, lower noise and ensure long service life of valve inner parts.



One - step pressure reduction

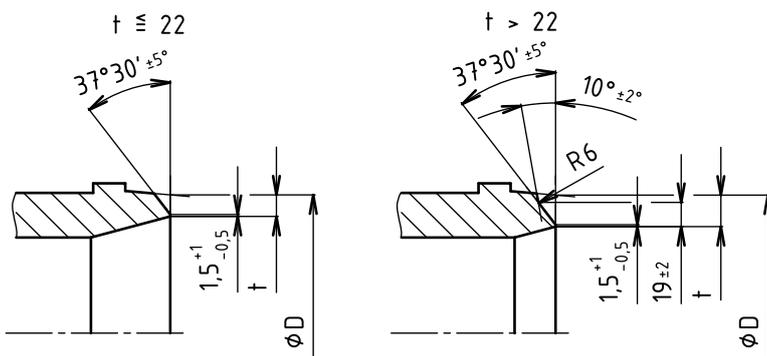


Two - step pressure reduction

1.7 Application of orifice plates

In case of above-critical flow, the producer recommends to install one or more orifice plates at the valve outlet to streamline the process medium flow and to lower the noisiness. The concrete valve execution (No. of orifice plates) is designed according to pressure ratio and it is recommended to consult it with the producer.

Connection acc. to EN 12627



Other shapes of weld ends according to customer requirements.

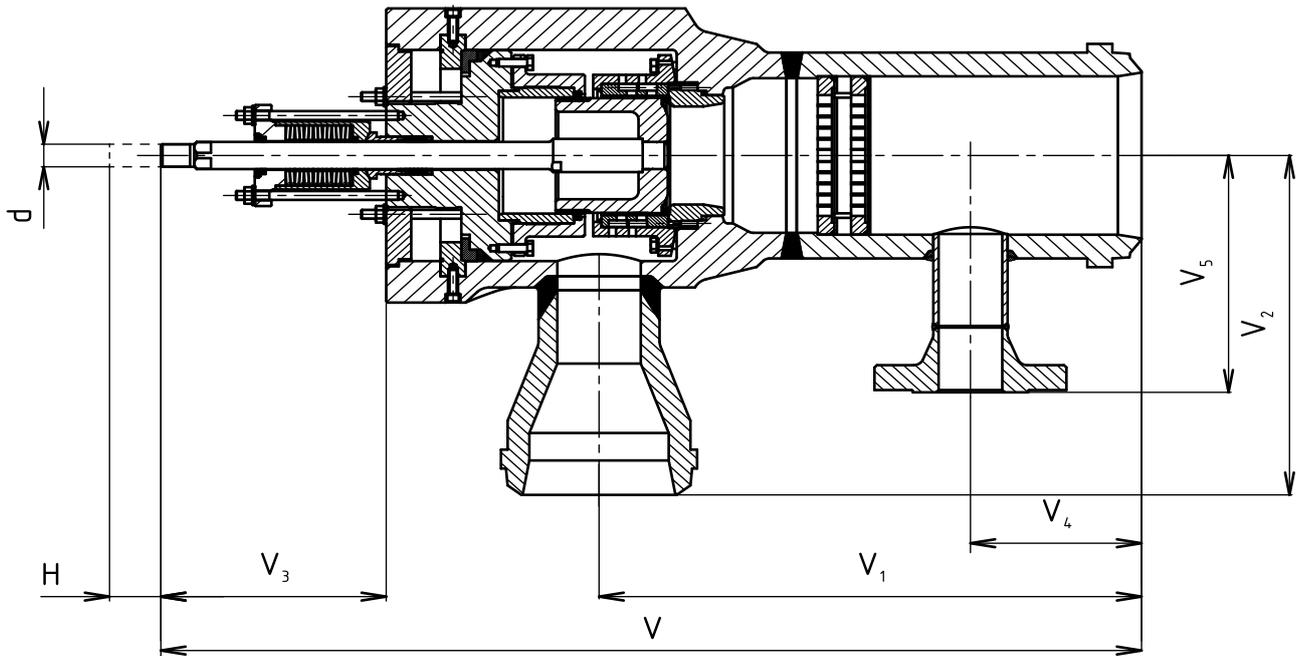
Weld ends connection dimensions

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

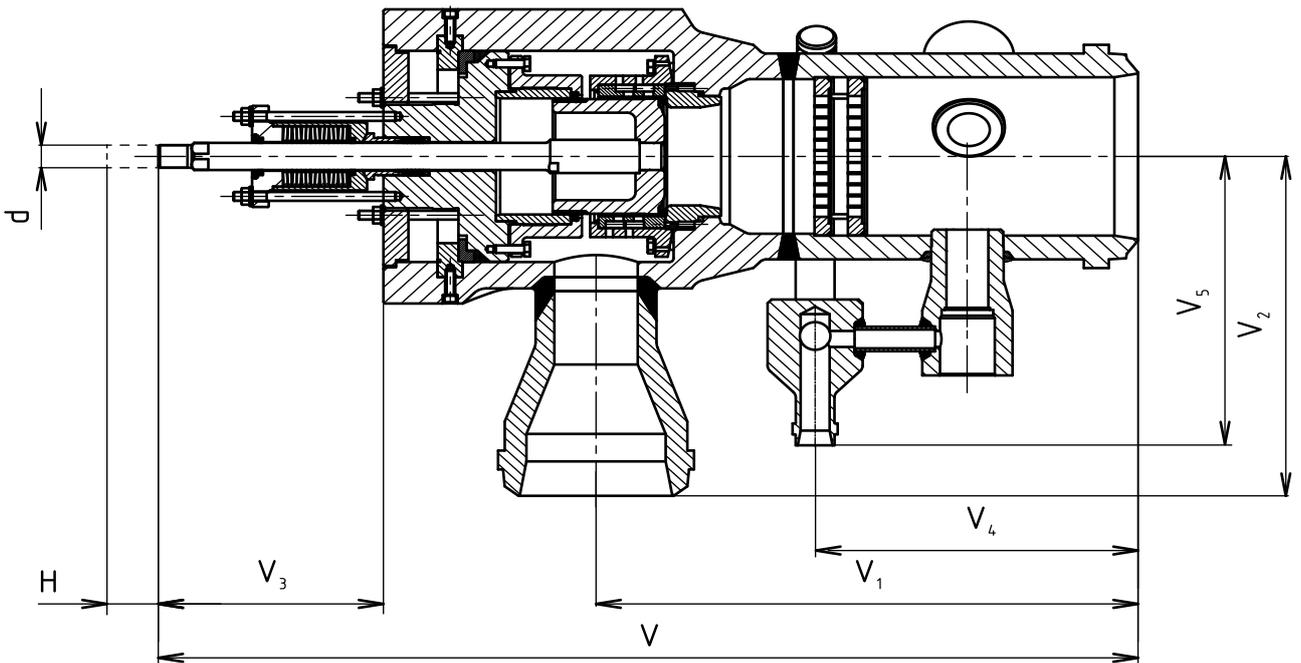
The dimensions of the welding ends are possible adapt to customer requirements.

Other DN and PN acc. to customer requirements.

Steam-conditioning station RS 902 /Ax
 - connection for VH or VHP (injection at the axis of outlet)



Steam-conditioning station RS 902 /Rx
 - connection for CHR (injection perpendicular to the axis of outlet)



Dimensions of valves RS 902 weld ends connection

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

Note.: Missing data will be specified later by the producer.
 Weight is approximate only.

2. DIRECTIONS FOR INSTALLATION AND OPERATING OF VALVE

2.1 Installation of valve

The valves are delivered from the company assembled, adjusted and tested. Before valve's installation into pipeline you must check the data on the name-plate with data mentioned in accompanying documentation. Then check if the valve or the actuator are not damaged and dirty. Pay attention especially to inner spaces and packing surfaces of valve.

The chemicals are applied during the manufacturing, to preserve the valves prior the corrosion. The protecting solution "Konkor" (oil base) is used at inner surface. The grease is applied at welding ends.

In case, the preserving agent should contaminate the medium, it is necessary to rinse/clean the valve with suitable cleaning agent/solution.

The welding ends must be prior the installation always degreased.

2.1.1 Installation of valve into pipeline

The valve must be installed in such direction, that the arrows on the valve body correspond to the process medium flow. The valve can be installed in horizontal or vertical pipeline.

The actuator can be positioned with the vertical or horizontal axis of the stem only, the position of the actuator under the valve is prohibited. To prevent condensate accumulating in the closed valve, it is recommended the piping be sloped away from the valve. If there is no possibility to slope the pipeline in proper way and the probability of condensate accumulation is high, the valve drainage or valve continual heating must be provided.

Protection of actuator against the radiant heat can be necessary in case of high temperature application. As a basic provision can be made pipeline insulation, actuator turning aside from vertical position, etc.. When the valve is installed into pipeline and actuator is turned aside from vertical position then it is necessary to ensure suitable supporting of actuator. Before welding the valve into the pipeline it is not necessary to disassemble the valve.

For proper function of control valve, below-mentioned instructions must be obeyed:

- no excessive forces can be transferred from pipeline to valve.
- the pipeline must be cleaned from dirt before valve installation.
- the valve can not be installed just behind the bend. Pipeline should be straight min. 6x DN in front of the valve. The length of straight outlet section shall be 20 times the outlet DN, but in all cases a minimum of 5m.
- the inlet valve DN 150 until 250 must be adapted to the space above the valve, so that it was possible to use the lifting device.
- it is recommended to keep clean space around the valve for easy manipulation and service.
- installation itself must be done precisely.

Recommended strainer dimensions:

For reliable function of the valves, the producer recommends to install the filter of mechanical impurities.

DN	Recommended maximum mesh size
DN 80,150	1,0 mm
DN 250	1,6 mm

2.1.2 Pipeline blow-out (rinsing)

In the case, the pipeline is cleaned with blow-out (rinsing) after the valve is welded in, the valve must be partially disassembled, i.e. all internal parts must be removed out. Before the back assembly, the internal surface of valve body must be carefully checked, removed all impurities/strange particles and repaired possible damage. To keep the guarantee, the disassembly and back assembly must be done by LDM (valve producer) authorized person.

2.1.3 Pipeline pressure test

The valve is designed to withstand the test pressure equal to 1,5 time of PN, for test medium temperature 10 - 40°C, without any damage. In case, the test pressure is higher than 300 bar, it is necessary to replace LIVE – LOADING packing with special test packing. In case, the test pressure is higher than 1,5 time of PN, it must be solved/discussed with valve manufacturer

2.1.4 Outlet pipeline dimensions

Regarding the cooling water injection into the outlet pipeline, it is recommended to use the tubes with higher wall thickness as corrosion allowance. The high effectiveness of cooling is taken into account when DN of outlet pipeline is designed. If bigger DN is required by customer/project, it is possible to place the pipe extension immediately behind the valve. The special care must be taken to minimize force and moment transfer from pipeline to valve in this case.

2.1.5 Drainage of pipeline

Regarding the cooling water injection, the outlet pipeline must be suitable drained. Presence of water/condensate level can cause as damage of the pipeline as the temperature measurement error.

2.1.6 Temperature sensor

Minimum distance between the valve and temperature sensor is pointed in the RS 902 quotation. It is recommended to arrange at least one pipe bend between the injection nozzle and temperature sensor. In case of horizontal steam pipeline, it is recommended to place the temperature sensor in its upper half. Also recommended is the placement of the sensor into protective well, regarding the possibility of fault measurement caused by water droplets.

2.1.7 Actuator's connection to electric network

These works can be done only by the experienced workers. It is necessary to keep all safety rules. It is also necessary to follow instructions for installation, operating and service of electric actuator published by producer. Transmitter of position and signalization switches are placed under the cover of actuator, in the case they are as part of the delivery.

In regard of the valve being delivered assembled together with its actuator from the company, basic adjusting and setting of actuator is carried out. The valve is adjusted in closed position by torque switch (so that the valve will be really tight closed) meanwhile the switching off the actuator is adjusted in open position by limit switch. In case the actuator is dismantled from the valve body for any reason such as the valve installation into pipeline etc., it is necessary to check the setting again after the assembly possibly to carry out the complete setting of actuator again. Producer does not take over the guarantee if the damage was caused by improper setting or adjusting of the actuator. In case of need, it is possible to ask for such service from service organization of the producer.

The length of the cables to actuator should be selected so that the actuator could be disassembled from the valve without any need for the cables unplugging from the actuator's terminal board.

WARNING: It's necessary to observe the mechanical stroke indicator placed at actuator's yoke or directly at the electromotor, if the valve is operated (opened or closed) by hand wheel. The extra care must be taken near to OPEN and CLOSE position. Neither position nor torque switches are in function in such case and there is a danger of valve or actuator serious damage. It's strongly prohibited to use any mechanical tools (force boosters) for hand wheel operation.

2.1.8 Pneumatic actuator connection

These work may be carried out by trained personnel only. It is necessary to follow instructions for installation, operation and maintenance of pneumatic actuators issued by the producer of the actuator.

Connection of pneumatic actuator to air supply is done by plastic, copper or stainless-steel tubes, recommended dimension is 12x1 mm.

Before valve commissioning, the data, given in the actuator and positioner ID plate (especially air supply maximum pressure), should be checked/compared with given specification. If the pressure of air supply is higher, the pressure reduction valve must be used.

As the valve is supplied with actuator as a complete, the basic setting is also carried out. In case the actuator was removed from the valve, it is necessary to check this setting or set the actuator once again. The producer does not take over the damage caused by wrong setting of the actuator. In case of need, the assistance of our subsidiary LDM Service can be required.

In case of pressure air regulator (air supply to pneumatic actuator) fixed directly on the valve/actuator yoke, the regulator must be placed in vertical position (draincock/draincup down), see picture. If the valve mounting position is known during the valve-actuator assembly, the right position is set on the production line/during final test.

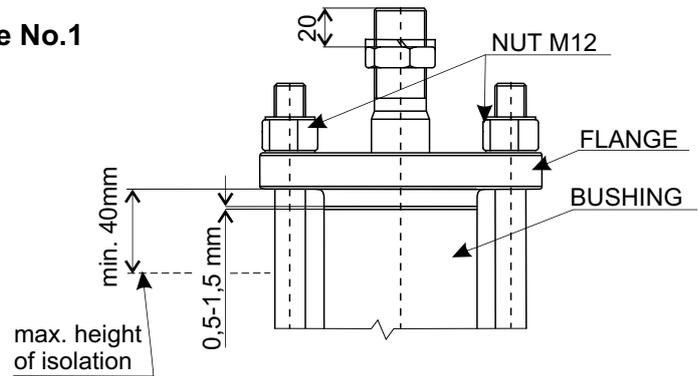
2.1.9 Checking after installation

Piping system should be pressured after valve installation and then checked if there is no leak. Check the packing set tightness as well. Then check the proper function of actuator by doing a few strokes.

2.2 Operating and Service

The valves are equipped with graphite packing rings. The packing set is loaded with system of disc springs "LIVE LOADING". During the operation, it is **necessary** to maintain the gap between the flange and packing bushing in the range **0,5 - 1,5mm** (pic. No.1). From the factory, the value of 0,5 mm is set. The tightening is carried out by four nuts M12. The producer recommends to check this value more often (about twice a month) after starting new packing set. Later, once a half of year is enough.

Picture No.1



2.2.1 Exchange of packing set

If there is a need to exchange the packing because of worse tightness, it's recommended to ask LDM service company for technical instructions for dismantling and assembly of the "LIVE LOADING" packing or to ask them for a exchange of it.

2.2.2 Actuators

Actuators have to be operated according to instructions given in „Actuator manual“. In case of malfunction of actuator, see the instructions or ask for professional repair man.

2.2.3 Warming-through and putting fittings out of operation

Warming-through fittings:

Fittings have to be filled and warmed-through by regulating the steam supply and drainage so that the trend of the temperature increase is observed, i.e. so that the increase in the temperature of fittings does not exceed the given temperature jump per minute (see the table). After the required temperature is reached, the operation of the steam piping is regulated depending on the need of the given appliance.

Valve	Carbon material of body	Alloy and stainless material of body
DN 80-150 PN 16-160	6°C/min	4°C/min
DN 80-150 PN 250-630, DN250	5°C/min	3°C/min

If the required temperature of the fitting needs to be reached faster, it is necessary to secure permanent warming-through, e.g. by means of a by-pass.

Putting fittings out of operation:

If possible, the decline of the temperature of alloy steel fittings that are cooling down is to be as slow as the temperature increase in warming-through. If a faster temperature decline is detected, the decline has to be slowed down until the temperature drops to 300 °C; then the piping is let cool down without any intervention. The cooling rate does not have to be monitored in fittings made of carbon steels.

2.2.4 Thermal and acoustic insulation

The type and dimensions of the insulation are as stated in the design. Only the insulation above the cover of the fitting has to have its height adjusted to provide a free access for monitoring the compression of the packing or for tightening (see point 2.2, pic. 1).

2.3 Elimination of defects and malfunctions

If a defect is detected on the valve (leakage, leakage of packing or bonnet sealing, etc.), it is necessary to ensure its repair immediately otherwise a permanent damage may occur to sealing surfaces and other parts exposed to effects of leaking medium. Defects on the cooling system solve according to the instructions of the respective system.

Prior to any repair work on the valve, make sure that piping system is free of pressure!

Defect	Possible cause	Elimination of defect
Valve leakage	- insufficient linear force of the actuator	- check the function and setting of the actuator possibly positioner
	- seizure of impurity in seat area	- open and close the valve fully
	- damaged sealing surfaces of the plug and seat	- it is necessary to lap plug and seat or replace damaged parts - requires trained personnel
Packing leakage	- sealing force of packing is too low	- tighten the graphite packing or add another sealing ring
	- packing is worn or damaged	- change the whole packing set (see 2.2.1) - requires trained personnel
	- damaged stem	- replace packing and stem - requires trained personnel
Leakage of bonnet	- damaged gasket	- to change bonnet gasket - requires trained personnel
Leakage of body	- damage caused by aggressiveness, abrasion, or erosion of media	- it si need to change of body - trained personnel required
Increased noise	- exceeding of operating parameters - presence of undesirable particle in throttling system	- must be consulted with the producer - it is necessary to disassemble valve, clean the throttling system, eventually change the damaged parts - requires trained personnel
Stem won't move	- no supply to actuator (electric or pneumatic)	- electric actuators: check supply and feeding voltage - pneumatic actuators: check supply and feeding pressure
	- actuator control signal failure	- measure the value of input control signal
	- the defect of actuator or its accessories	- follow the instructions for actuator or require trained personnel
	- packing tightened too much	- loosen the packing and retighten it just to ensure tightness
	- seizure inside the valve due to impurities	- it is necessary to dismantle the valve and replace damaged parts - trained personnel required
Stem jerky movement	- insufficient actuator force	- compare parametres of the product with the real parametres - if OK, ensure responsible service personnel
	- damaged positioner	- follow the instructions issued by its producer, possibly ensure trained service personnel
	- packing tightened too much	- loosen the packing and retighten it just to ensure tightness
Valve won't move in full range of its stroke	- wrong setting of end position switches	- check the setting of the switches
	- pneumatic and electrohydraulic actuators: hand wheel got stuck in wrong position	- adjust the hand wheel into its basic position
	- pneumatic actuators: feeding pressure is too low	- ensure the required pressure of supply air
	- pneumatic actuators wrongly adjusted or defected positioner	- readjust the positioner acc. to instructions issued by its producer
	- impurities inside the valve	- close and open the valve fully, possibly ensure trained service personnel

If the valve is in guarantee period, it is necessary to ensure authorised service for all service except tightening of packing!

2.4 Spare parts

Spare parts are not part of valve delivery. They must be ordered separately. For the spare parts order, following data must be written: type of a valve, nominal diameter DN, Serial valve's number, name of a spare part acc. to document B.

Recommend spare parts for 3 and 5 years of operation:

Parts for 3 years of operation	Additional parts for 5 years of operation *)
<ul style="list-style-type: none"> - packing set (stuffing box complete) - bonnet gasket - seat gasket - plug's sealing rings - sealing(wiping rings) 	<ul style="list-style-type: none"> - plug with stem (welded assembly) - seat - insert - metal U-ring seal

*) It's recommended for 5-years spare parts ordering to order 2 sets for 3-years operation and 1 set of additional parts for 5-years operation.

2.5 Guarantee conditions

The producer does not guarantee the operation and safety of the product under conditions different from data given in the catalogue data sheet. Any using of the valve under different conditions shall be consulted with the producer. Defects of the valve caused by impurities in process medium shall be considered as out of guarantee terms. The producer does not take over the guarantee if any change was made by the user without prior written consent from the producer (except the packing tightening).

2.6 Transportation and storage

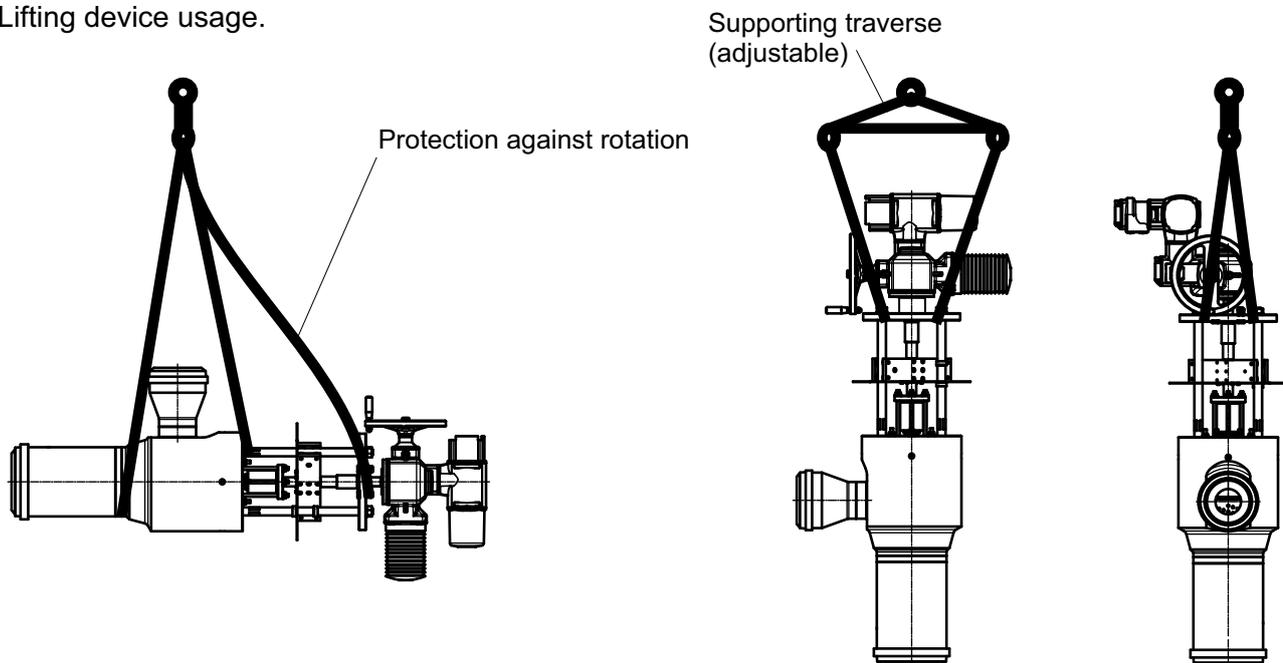
During transport and storage, the valve must not be exposed to water or placed in environment with relative humidity exceeding 90 %.

With respect to used actuators, the temperature during transport and storage shall be within the range of -20 to 55°C. Weld ends must be protected with blinds (these are part of delivery) .

Suitable tools/devices should be used for valve lifting during the transport and installation. E.g. lifting harness.

If the valves are stored for more than 3 years, the producer recommends to carry out professional inspection of the valves.

Lifting device usage.



It is necessary to make sure the valve can not be damaged during transport. **Special attention shall be paid to the valve stem, stroke indicator and outside accessories fixed to the actuator. Never lift the valve by the lifting device fixed on the actuator only!**

2.7 Waste disposal

Packaging and the valves (after their scrapping) shall be disposed off in the common way, e.g. by handing over to a specialized company for a disposal (body and metal parts - metal scrap, packaging + other non-metallic parts - communal waste).

Valve complete specification No. for ordering RS 902

		XX	XXX	XXX	XXXX	XX	XX	/	XXX	-	XXX	x	XXX	x	XXX	/	XXX
1. Valve	Steam conditioning station	RS															
2. Type of valve	Control valve, angle with extended outlet and water injection		902														
3. Actuator	Electric actuator				E												
1) only for body DN80	Pneumatic actuator				P												
	El. actuator Modact MTR ¹⁾				EPD												
	El. actuator Modact MTN Control ¹⁾				EYA												
	El. actuator Modact MTP Control ¹⁾				EYA												
	El. actuator Modact MTNED ¹⁾ , MTPED ¹⁾				EYA												
	El. actuator Modact MTN ¹⁾ , MTP ¹⁾				EYB												
	El. actuator Regada STR 2 ¹⁾ , STR 2PA ¹⁾				EPM												
	El. actuator Auma SAR 7.6 ¹⁾				EAG												
	El. actuator Auma SAR Ex 7.6 ¹⁾				EAH												
	El. actuator Auma SAR 10.2				EAJ												
	El. actuator Auma SAR Ex 10.2				EAK												
	El. actuator Auma SAR 14.2				EAM												
	El. actuator Auma SAR Ex 14.2				EAM												
	El. actuator Auma SAR 14.6				EAO												
	El. actuator Auma SAR Ex 14.6				EAP												
	El. actuator Schiebel rAB5				EZG												
	El. actuator Schiebel exrAB5				EZH												
	El. actuator Schiebel rAB8				EZK												
	El. actuator Schiebel exrAB8				EZL												
	Pneum. actuator Flowserve PO 1502 ¹⁾				PFD												
4. Connection	Weld ends				4												
5. Body material	Cast steel 1.0426 (20 to 500°C)				1												
	Stainless steel 1.4903 (20 to 600°C)				5												
	Alloy steell 1.7383 (20 to 600°C)				6												
	Alloy steel 1.7335 (20 to 550°C)				7												
	Other material acc. to request				9												
6. Packing set	Graphite - Live Loading				5												
7. Multi-step pressure reduction	One-step pressure reduction				1												
	Two-step pressure reduction				2												
8. Flow characteristic	Linear - leakage class III.					L											
	Linear - leakage class V.					D											
	Equal percentage - leakage class III.					R											
	Equal percentage - leakage class V.					Q											
9. No. of orifice plates	Max. 2					X											
10. Nominal pressure PN	PN inlet/outlet	PN16	0					XX									
	(example of marking: 54 = PN160 / PN100)	PN25	1														
		PN40	2														
		PN63	3														
		PN100	4														
		PN160	5														
		PN250	6														
		PN320	7														
		PN400	8														
		PN630	9														
11. Operating tem. °C	Acc. to process medium								XXX								
12. Nominal diameter DN	DN	Inlet								XXX							
		Body									XXX						
		Outlet										XXX					
13. Accessories	Connection to VH / VHP																A
	Connection to CHR																R
	Number of cooling inputs																X
	Body warming-through connection																H
	Body drainage																D

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**

Note:

PN and DN outlet, No. multi-step pressure reduction, No. of orifice plates, another type of control is chosen in agreement with the manufacturer.

Type injection head (VH) acc. to catalog sheet 02-03.2, steam atomizing injection head (VHP) acc. to catalog sheet 02-03.3, radial desuperheater (CHR) acc. to catalog sheet 02-03.7.



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