The installation and maintenance instructions for the RD212 and RD213 direct acting pressure regulators are binding on the user to ensure the correct operation of the regulator. The user is obliged to observe the principles stated herein during maintenance, installation, dismantling and operation. The technical data of the individual versions are given in the product data sheets. Use of the product in violation of these instructions and the information in the product data sheet will void the manufacturer's warranty obligations.

These instructions are for the following product types
RD 212 D...Direct acting differential pressure regulator
RD 212 P... Direct acting differential pressure regulator with flow limiter
RD 212 V... Direct acting outlet pressure regulator
RD 213 R... Direct acting relief valve
RD 213 S... Direct acting inlet pressure regulator

1. TECHNICAL DESCRIPTION AND VALVE FUNCTION

1.1 Description

The direct acting differential pressure regulator RD 212 D is a valve designed to maintain a constant pressure difference at a given device. This is ensured by a diaphragm, which is affected by the pressure difference between the inlet and outlet of the protected pipe section. The diaphragm deflection is transferred to the cone and **the valve closes when the pressure difference increases**.

In addition to the basic function of maintaining the pressure difference**, the RD 212 P direct acting differential pressure regulator with flow limiter** ensures the requirement of limiting the maximum flow through the equipment. This is made possible by a second, user-adjustable cone to the desired flow limitation value.

The RD 212 V direct acting outlet pressure regulator is a valve designed to reduce the pressure of the medium downstream of the valve and maintain it at the set value. This is ensured by a diaphragm exposed to the effects of the outlet pressure in the pipe and actuated from the other side by a spring. The diaphragm deflection is transferred to the cone and **the valve closes when the outlet pressure increases.**

The direct action relief valve RD 213 R is a valve designed to overflow the medium when the set pressure difference on the device is exceeded. This is ensured by a diaphragm, which is affected by the pressure difference between the inlet and outlet of the protected pipe section. The diaphragm deflection is transferred to the cone and **the valve opens when the pressure difference increases**.

The RD 213 S direct acting inlet pressure regulator is a valve designed to limit the maximum pressure of the medium in the controlled part of the system. In this case, the diaphragm is loaded with a controlled pressure in the pipe and **when this pressure increases above the set value, the valve opens.**

In cases where the value of the required working pressure is in the area where the ranges of individual springs overlap, it is preferable to select a spring with a lower range for greater regulator sensitivity. Thanks to the pressure-balanced cone, the value of the controlled pressure is not influenced by the pressure ratios in the valve.

1.2 Application

The valves are designed for operation in conventional hot water control circuits in the heating industry as well as in applications with certain media characteristics, such as refrigeration and air conditioning. The maximum differential pressure at the valve must not exceed 1,6 MPa. The use in the throttling area with cavitation in the liquid is permissible, but increased wear of the throttling organ must be taken into account.

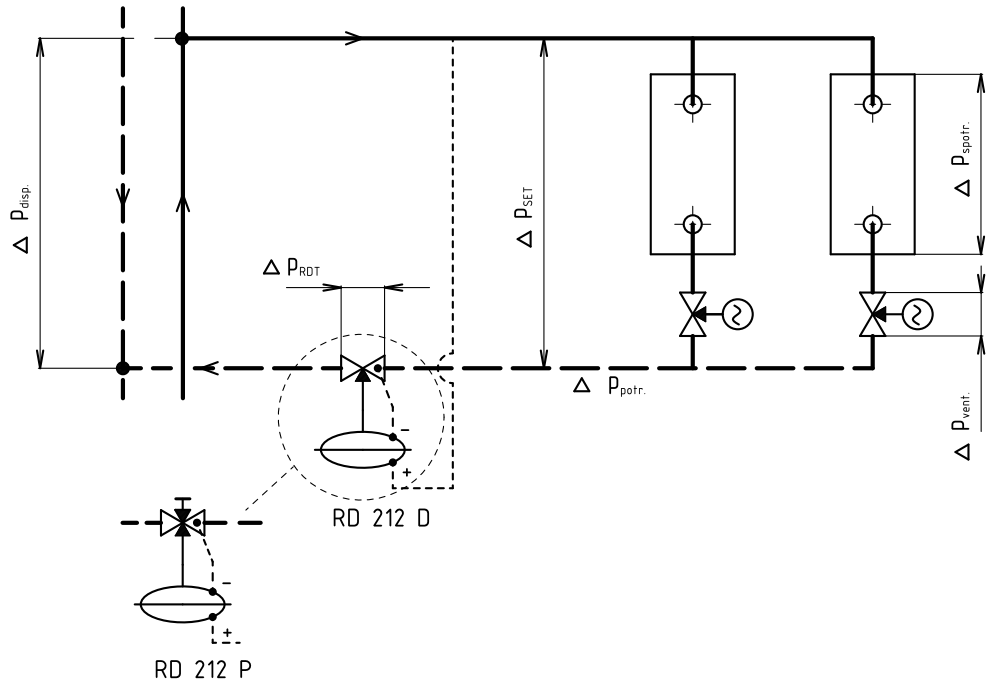
1.3 Working media

Valves RD 2xx are suitable for use in applications where the controlled medium is water, air or steam up to 1.0 MPa. They are also suitable for cooling mixtures and other non-aggressive liquid and gaseous media in the temperature range
+2°C to +150°C, or in special versions with cooling condensation sumps up to +180°C. The sealing surfaces of the throttling system are resistant to common sludge and medium impurities, however, in the presence of abrasive impurities, a filter must be placed in the piping upstream of the valve to ensure long-term reliable operation and tightness.

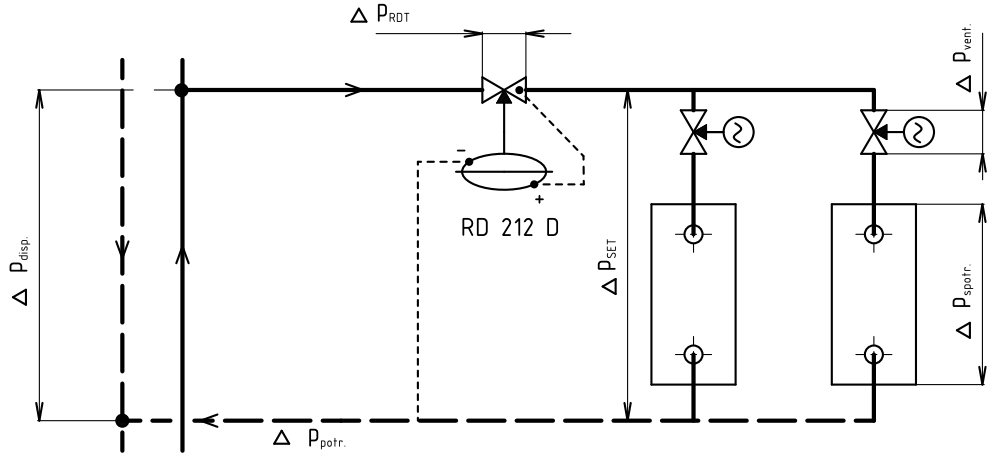
1.4 Schematic diagrams

Examples of RD212 D; P; V pressure regulators (valve closes with increasing pressure / pressure difference)

Schematic diagram of the control circuit with differential pressure regulator RD 212D (P) in the return line

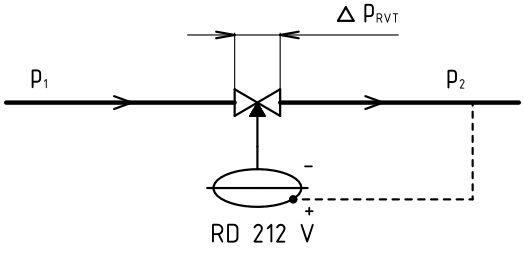


Schematic diagram of the control circuit with differential pressure regulator RD 212 D on the inlet branch

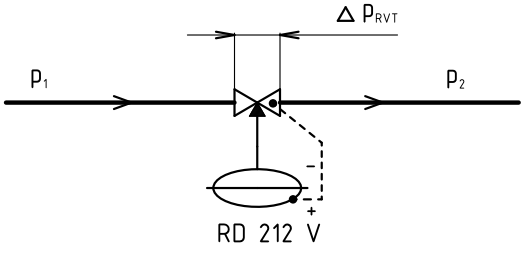


Basic schematic diagrams of the output pressure regulator RD 212 V

- with reduced pressure inlet from the tap in the pipeline

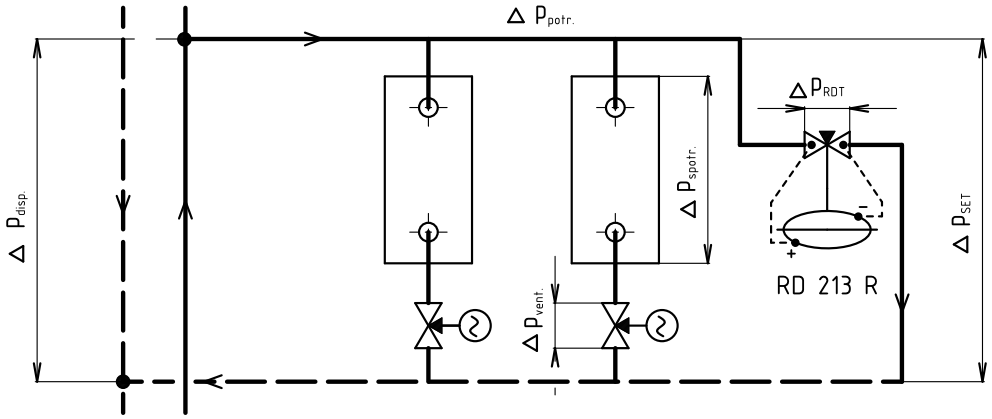


- with reduced pressure inlet from the tap at the valve



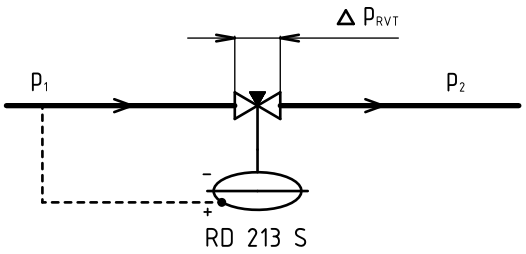
Examples of use of pressure regulators RD213 R; S
(the valve opens with increasing pressure / pressure difference)

Schematic diagram of the circuit with the relief valve RD 213 R in short circuit

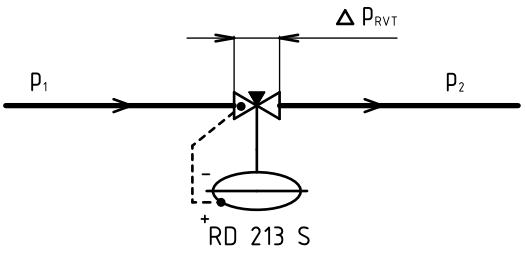


Basic schematic diagrams of the RD 213 S inlet pressure regulator

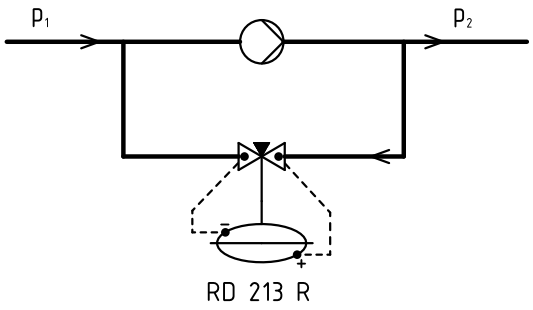
- with reduced pressure inlet from the tap in the pipeline



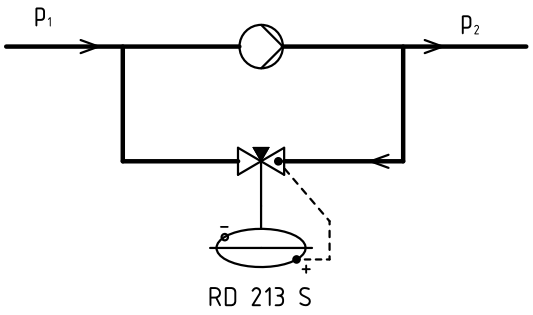
- with reduced pressure inlet from the tap at the valve



Schematic diagram of the relief valve RD 213 R in the pump bypass



Schematic diagram of the RD 213 S inlet pressure regulator in the pump bypass



2. DIRECTIONS FOR INSTALLATION AND OPERATING OF VALVE

2.1 Installation of the valve in the pipe

The valve must be installed and commissioned by a qualified person! Qualified person means a person familiar with the installation, commissioning and handling of this product and who is appropriately qualified in the relevant field. They must also be trained in occupational health and safety.

2.1.1. Mounting positions

The basic working position of the regulator is with the valve body up and the control head down. This position must be observed especially when reducing the steam pressure and at temperatures above 90°C. For liquids and gaseous media at temperatures up to 90°C, the regulator can also be mounted in a vertical pipe or in a horizontal pipe with the head lined up to the side. The direction of flow must match the arrows on the body.
The head of the regulator can be rotated around the vertical axis after installation in the pipe according to the layout needs of the piping system. The piping system must not be under pressure when handling the head.

2.1.2 Preparation before installation

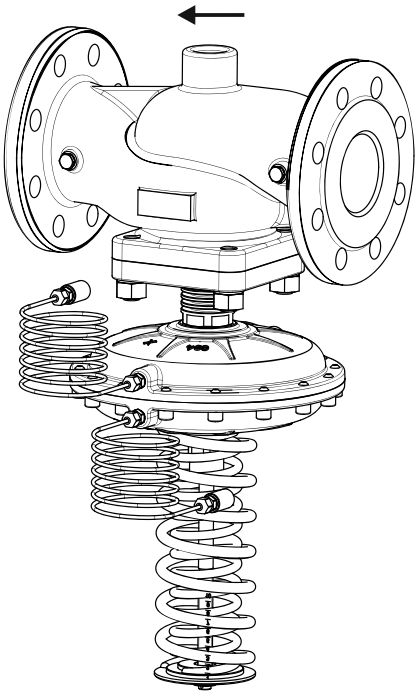
The valves are delivered from the factory fully assembled and tested. Before the actual installation into the piping, it is necessary to compare the data on the label with the data in the accompanying documentation. The flange protection caps must be removed. The valves must be inspected for mechanical damage or contamination, paying particular attention to the internal spaces and sealing rails. The piping system must also be free of any impurities that could cause damage to the sealing surfaces or clogging of pressure pulses in operation. If impurities are present, a reliable filter must be placed in the pipe upstream of the valve.

2.1.3 Instructions for the installation procedure

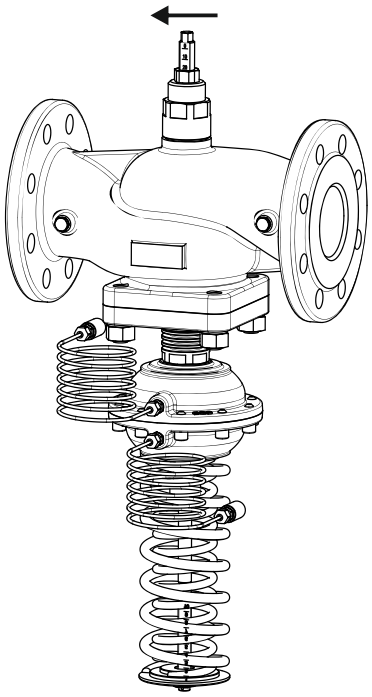
For proper functioning and low noise levels, it is recommended to leave a straight pipe section before the valve with a minimum length of 6x DN.
Any pipe reductions upstream and downstream of the valve must be gradual (recommended angle of inclination of the wall of the cone transition to the pipe axis is 12 to 15°) and the valve shall not be less than 2 dimensions from the inlet pipe. The flange gasket must be clean and undamaged, the inner diameter of the gasket must not be smaller than the inner diameter of the flange.
The sealing surfaces must be clean and free from damage, if necessary clean with brass tools (brush, scraper) in the direction of the circumferential grooves. It is imperative that the pipe flanges are aligned with the valve flanges and that the sealing surfaces of the flanges are parallel to each other.
Apply a suitable anti-seize lubricant to the threads of the bolts and the underside of the nuts. The type of lubricant must be selected according to the bolt material used and its operating temperature range must correspond to the temperature limits of the process.
The actual assembly must be carried out carefully, with alternate tightening of the flange bolts to avoid tension. Cross tightening should be done in several steps, first tightening by hand, then gradually tightening to approx. 30%, 60% and 100% of the required tightening pressure. Finally, tighten the bolts once more to 100% of the tightening torque in a clockwise direction.

Recommended tightening torques for standard connections [Nm]:

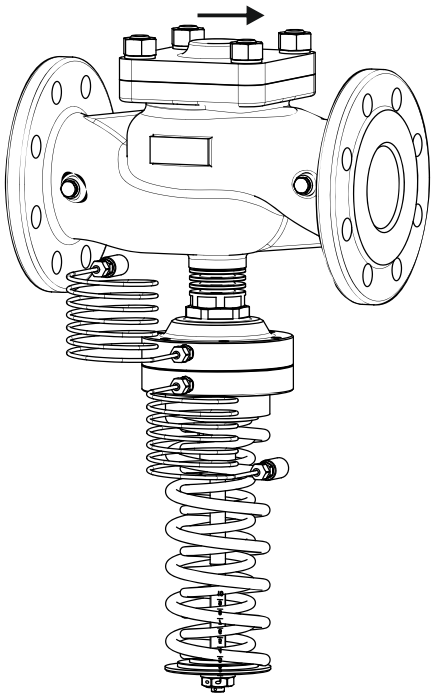
DN	PN16		PN25	
	M	Nm	M	Nm
65	16	150	16	150
80	16	150	16	150
100	16	150	20	290
125	16	150	24	500
150	20	290	24	500



RD212 D (chamber 240 cm^2)



RD212 P (chamber 64 cm^2)

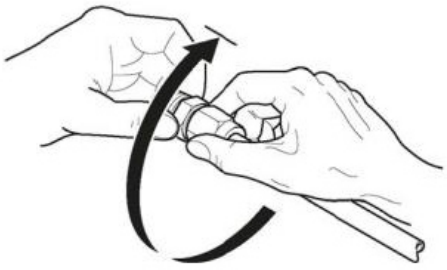


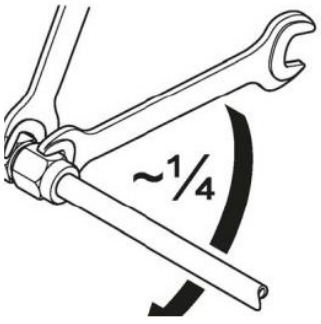
RD213 R (chamber 36 cm^2)

2.2 Connecting the impulse pipeline

The connection of the diaphragm compartment to the piping system is made by copper tubes connected by fittings. The tubes are included in the valve delivery. Valve bodies are equipped with tapping points for connecting pressure pulses at the inlet and outlet channels of the valve. The appropriate connection of the pressure impulses must be made in accordance with the schematic diagrams given in paragraph 1.4, with the possibility of using pressure taps either on the valve body or at suitable points on the piping.

Screw the swivel nut onto the neck and tighten by hand onto the contact. Tighten the nut with a wrench approximately 1/4 turn.



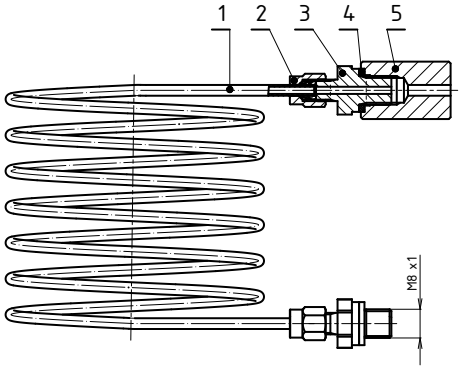


The position of the pressure tap on the pipe is recommended to be on the side to prevent dirt and sediment from the bottom of the pipe from entering the impulse tube and to prevent aeration. The version for up to 180°C is equipped with condensing cooling sumps. They are installed in front of the impulse inlets to the house and must be installed in a vertical position.

Accessories

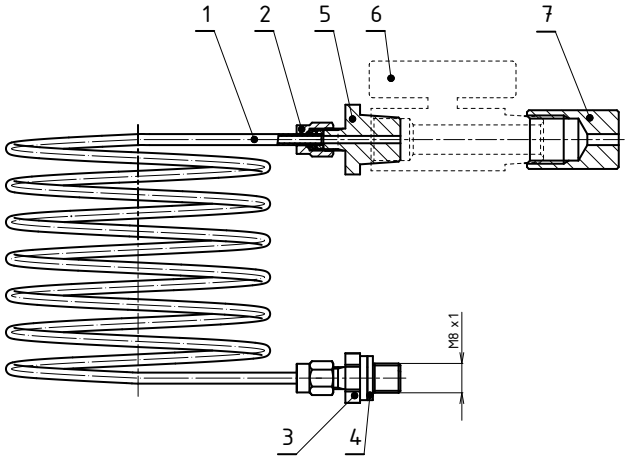
Standard impulse line for supplying a pressure impulse to the regulator

(It is included as standard.)



1. impulse pipeline
2. swivel nut with ring
3. threaded pipe fitting
4. gasked
5. weld female connector

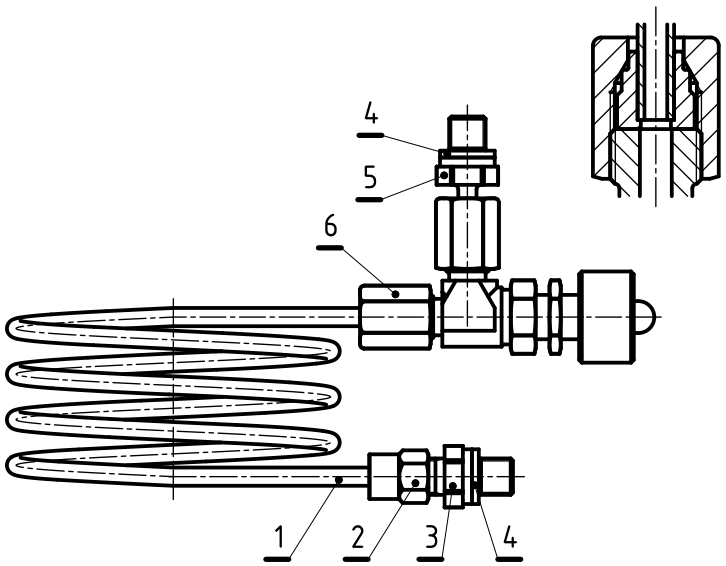
Impulse pipe with stopcock and 1/4" connection thread



1. impulse pipeline
2. swivel nut with ring
3. threaded pipe fitting on the side of regulator
4. gasket
5. threaded pipe fitting R1/4
6. shut-off cock valve
7. weld female connector G1/4

Integral connection of impulse piping with stopcock

Connection of pressure taps using tapping points on the body with a corner stopcock.



1. impulse pipeline
2. swivel nut with ring
3. threaded pipe fitting on the side of regulator
4. gasket
5. hreaded pipe fitting to body
6. shut-off cock valve

To use the tapping point on the body, the blanking screw on the side of the valve must be removed according to the schematic diagrams in section 1.4. Remove the used gasket from the blanking screw and replace it with a new one (pos. 4) is included in the delivery. Fit the neck into the body (pos. 5) and tighten. Ball valve (pos. 6) should be mounted so that its outlet is directed towards the regulator head. Attach the ball valve with the nut to the neck in the valve, tighten the nut by hand and tighten with a wrench by ¼ turn.

In case of leakage, tighten the nuts by ¼ turn.

Cooling condensate well

It is a standard part of the valve delivery in the version for up to 180°C.

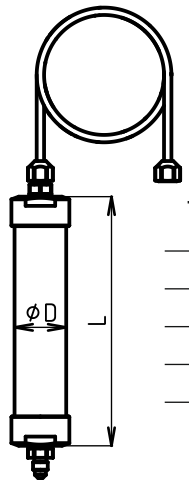


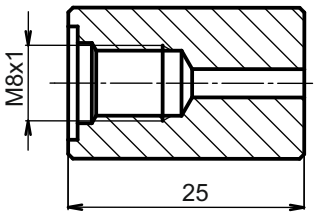
Table of dimensions of condensation sumps

Membrane	L	∅ D
240 cm^2	440	42
64 cm^2	140	42
36 cm^2	135	28

Welding sleeve for the insertion of the impulse tube

It is included as standard.

Material: 1.0036 / 11 373.0
Ordering code: VM 43 0046

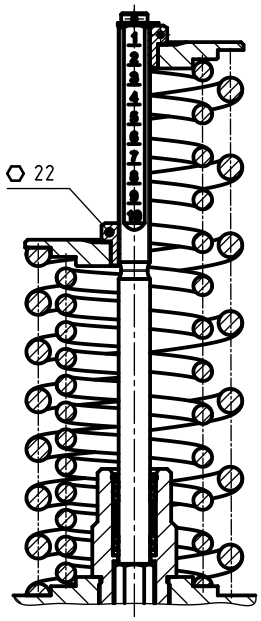


2.2 Post-assembly inspection

After filling the pipeline with service fluid (for liquid media), the impulse tubes and diaphragm chambers must be vented using the connection fittings. When using cooling condensation sumps, it is recommended to fill the sumps with condensate or clean water before the first steam is introduced. Then the piping system must be pressurised and all joints checked for leaks.

2.3 Working pressure adjustment Δp_{set}

The adjustment of the working pressure is done by changing the spring tension using the adjusting nut.



- turning to the right ... the working pressure increases
- turning to the left ... the working pressure decreases

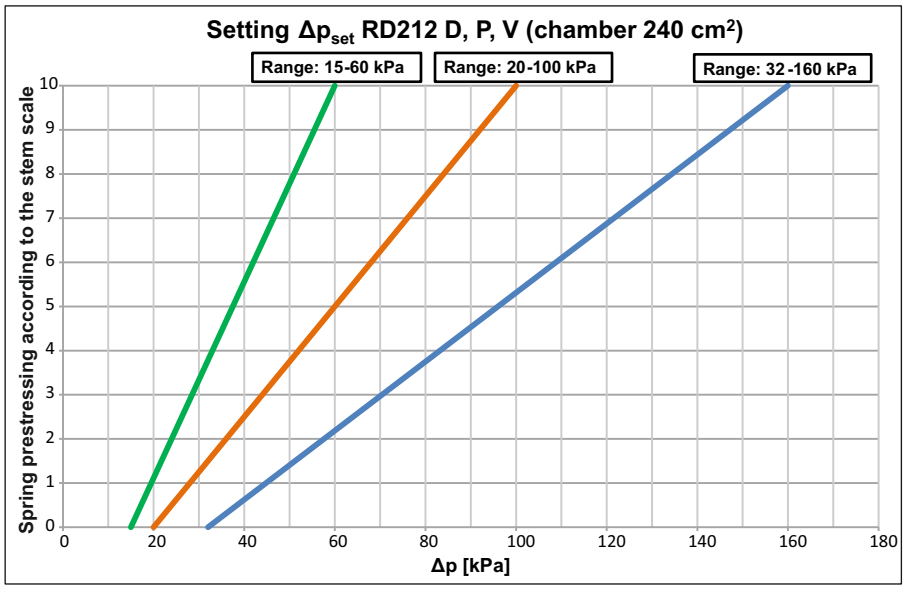
There are two ways to adjust the working pressure:
A) **Setting the zero flow working pressure** according to the scale on the head rod, depending on the desired value according to the diagrams for each range. With this setup, the regulator will operate with a one-way proportional pressure deviation increasing with increasing flow rate. This setting may be suitable for RD212 V and RD213 S versions.

B) **Working pressure setting at nominal operating flow**. It is carried out during operation of the equipment at the required flow rate, according to the pressures observed on the manometers on the pipeline or on the regulator. With this method of adjustment, the working deviation from the set pressure will vary in plus and minus values according to the instantaneous flow rate. This is recommended for RD212 D, P and RD213 R.

After setting the working pressure / pressure difference to the desired value, the adjusting nut can be secured in position by sealing.

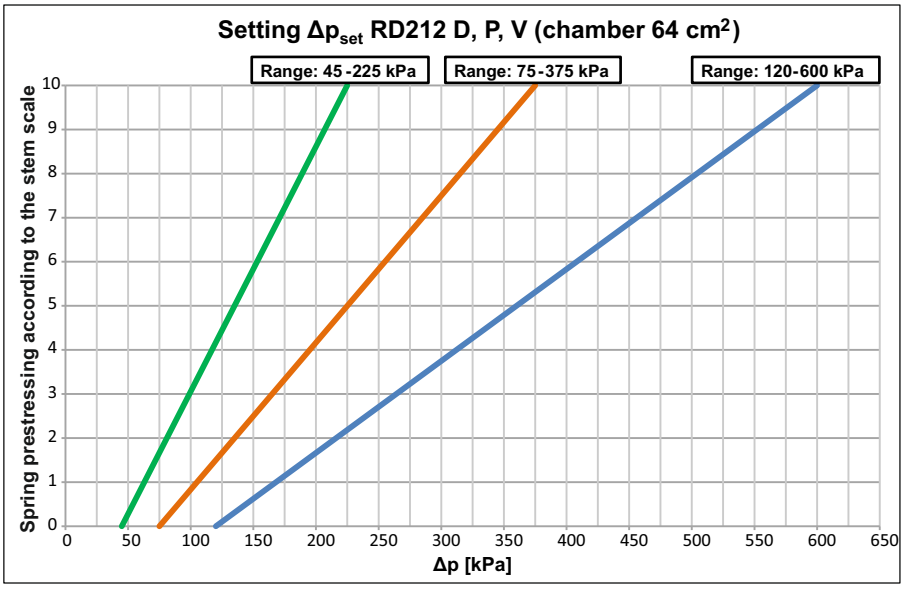
Values of set differential pressure for RD212 D, P, V can be read from mentioned charts according to the value on the head rod scale:

The curves show the pressure value at which the regulator will close for a given setting.



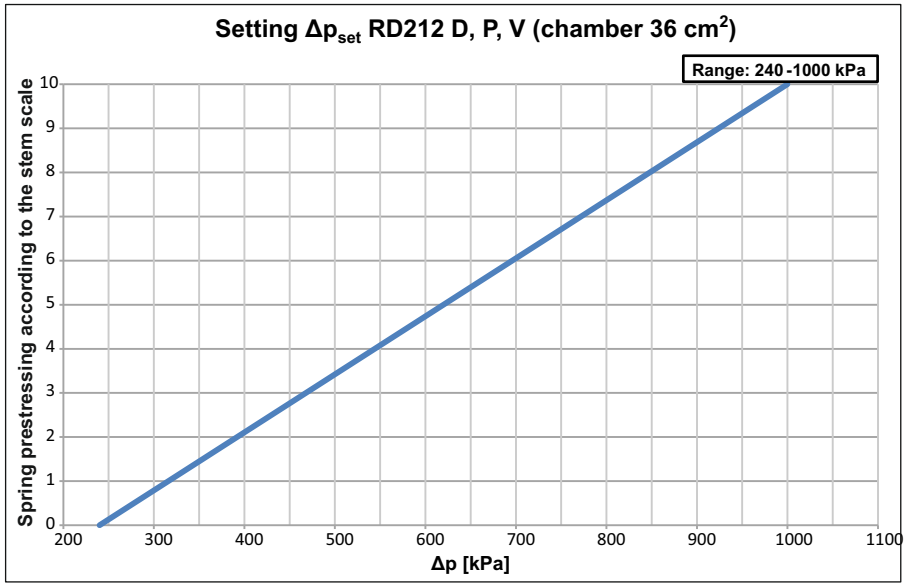
Change the setting to one revolution:

Range 15-60 kPa : Δp = 0,9 kPa
Range 20-100 kPa : Δp = 1,6 kPa
Range 32-160 kPa : Δp = 2,56 kPa



Change the setting to one revolution:

Range 45-225 kPa : Δp = 3,6 kPa
Range 75-375 kPa : Δp = 6 kPa
Range 120-600 kPa : Δp = 9,6 kPa

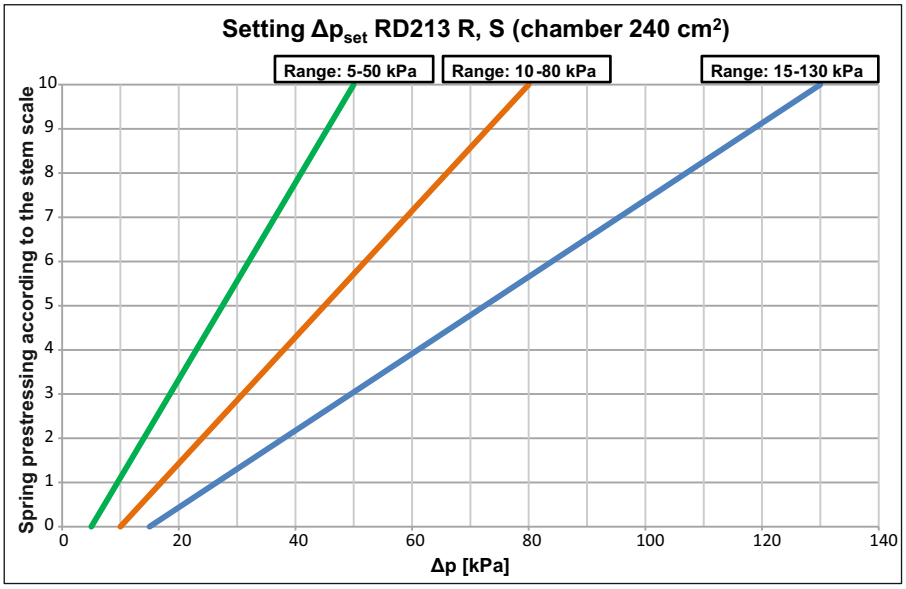


Change the setting to one revolution:

Range 240-1000 kPa : Δp = 15,2 kPa

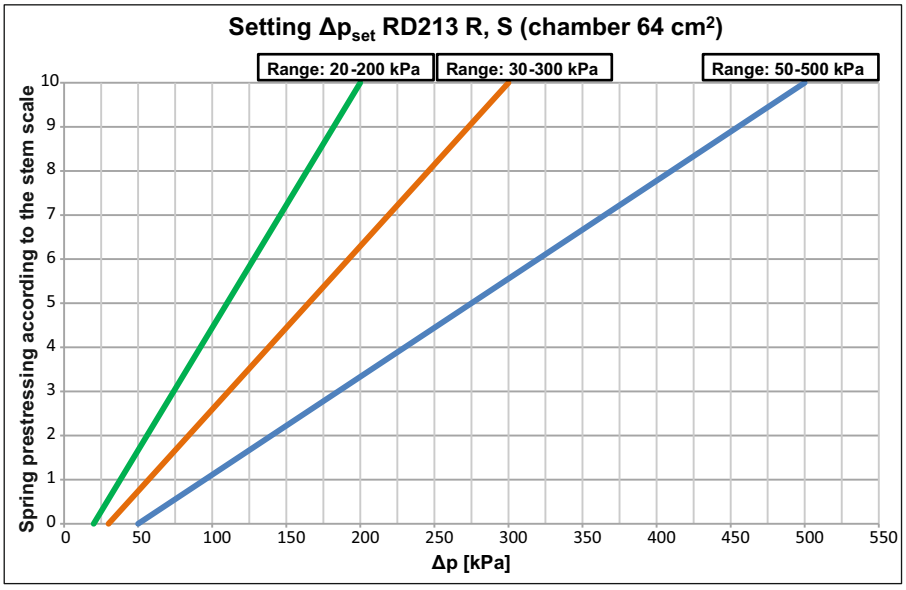
Values of set differential pressure for RD213 R, S can be read from mentioned charts according to the value on the head rod scale:

The curves show the pressure value at the start of the opening for a given setting.



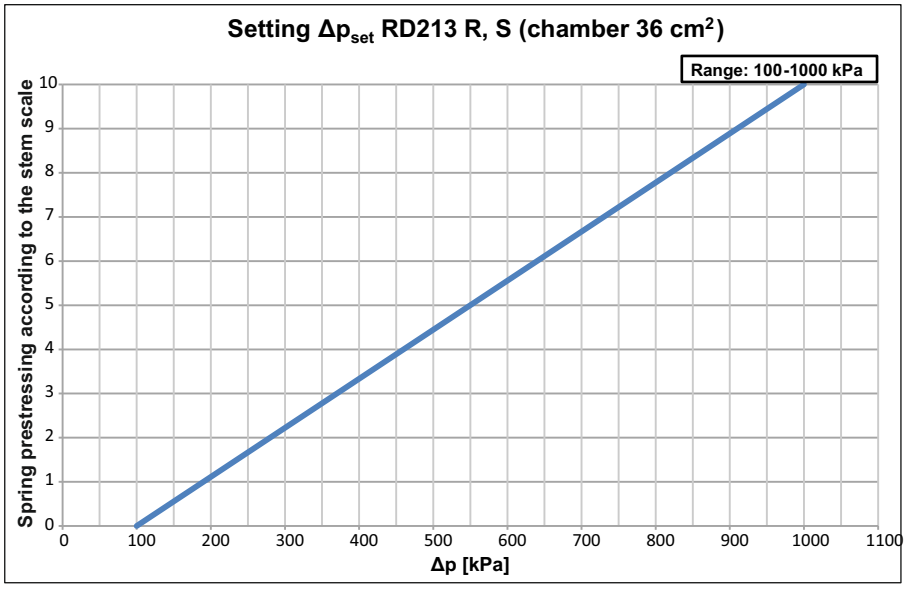
Change the setting to one revolution:

Range 5-50 kPa : Δp = 0,9 kPa
Range 10-80 kPa : Δp = 1,4 kPa
Range 15-130 kPa : Δp = 2,3 kPa



Change the setting to one revolution:

Range 20-200 kPa : Δp = 3,6 kPa
Range 30-300 kPa : Δp = 5,4 kPa
Range 50-500 kPa : Δp = 9 kPa

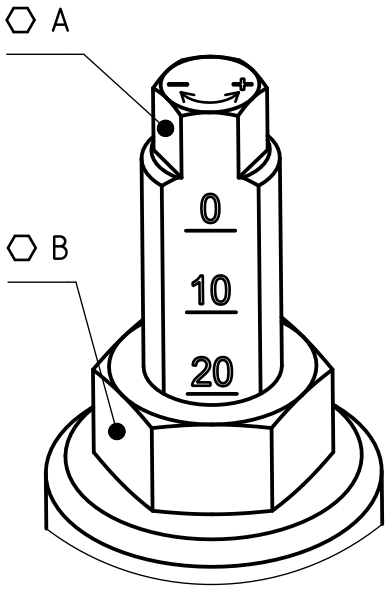


Change the setting to one revolution:

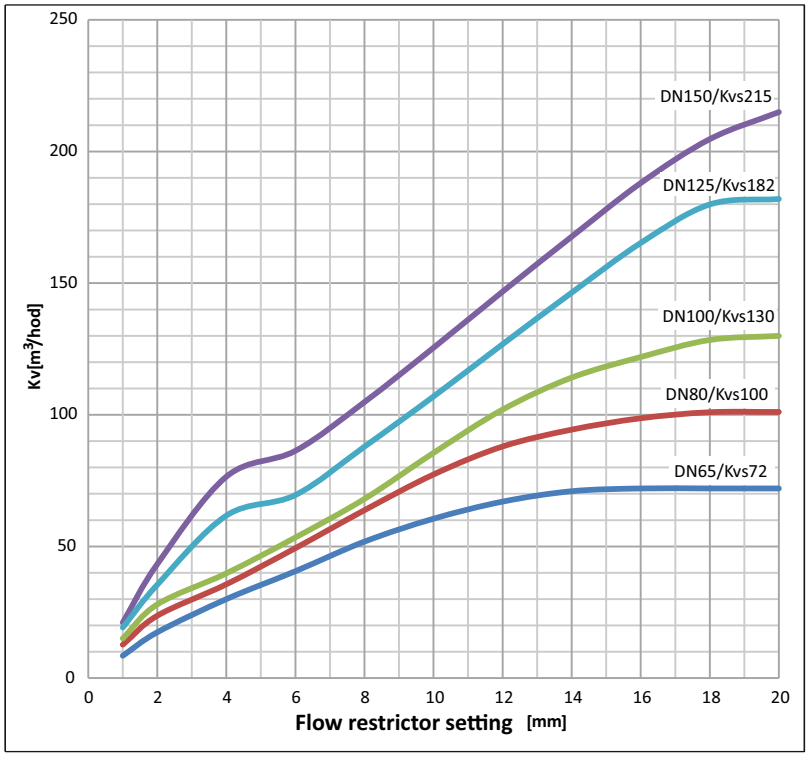
Range 100-1000 kPa : Δp = 18 kPa

2.5 Flow limiter adjustment (RD 212P)

The adjustment of the maximum flow limiter is done with the limiter rod. Loosen the locking nut to allow the rod to move in a rotary motion. Turning to the right (in the - direction) or to the left (in the + direction) decreases or increases the Kvs value, respectively. The desired Kvs value is achieved by setting the rod to the value according to the diagram above. After repositioning the limiting cone, secure it in position by retightening the lock nut.



	A	B
DN 65 (M14x2)	10	22
DN 80-150 (M24x2)	19	36



3. MAINTENANCE

The valves are maintenance-free, no preventive revisions or service interventions are requested for them.

3.1 Failures and their removal

Failure demonstrations	Failure cause	Localization and the way of removal
The controller works in a wrong way or does not work at all.	Impulse pipe choke	After impulse pipe loosening no working medium runs off from the tube. It is necessary to dismount impulse pipe and to secure its throughput.
	Penetration of undesirable impurities to the throttling valve system.	After valve dismounting impurities are visible in the throttling valve system. It is necessary to check and clean the area between the cone and the seat of the valve.
	Cracked or in other way broken membrane.	RD 21x D, P, R - After unscrewing the pressure impulse working medium constantly runs off from the membrane area. It is necessary to exchange the membrane.
		RD 21x V, S - Working medium is constantly dripping or leaking from the diaphragm space through the ventilation screw. It is necessary to exchange the membrane.

Within warranty time no action on the fitting may be done except differential pressure setting and flow reduction. Before any action on the fitting the pipe system must be depressurized. The person who makes the action must be trained about the product. Further safety schooling and health work protection schooling must be done for him.

4. GUARANTEE CONDITIONS

The product is under warranty provided by the producer for 24 months after delivery date. If the warranty is accepted, the producer pays the repair cost or the product replacement and its transport back to the customer. If the customer asks for a service action directly in the application place, he pays necessary transport cost. If the warranty is not accepted, the customer pays all incurred costs.
The producer does not guarantee product operation and safety under different conditions than they are stated in these assembly and maintenance instructions and in the product catalogue sheet. Any use of the product under other conditions must be consulted with the producer. Valve failures caused by medium impurity are not considered as under guarantee.

5. TRANSPORT AND STORAGE

During transport and storage, the valves must not be exposed to direct water and must be placed in an environment where the relative humidity does not exceed 90%. With regard to the materials used, the temperature during transport and storage must be between -20 and 55°C. The inlet flanges must be protected by covers (these are included in the delivery).
Suitable tie-downs, e.g. tie-down straps, must be used for lifting the valves during packing, loading and unloading and handling on site. These should be wrapped around the valve flanges. **The valve must never be lifted by the control head!**
Care must be taken to prevent damage to the valve during transport and handling. **In particular, the control head rod, impulse pipe connection sockets and pressure gauges require special care.**
If the valves are stored for more than 3 years under the above conditions, the manufacturer recommends a professional inspection before using the product.

6. 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).

7. MAXIMUM PERMISSIBLE PRESSURE VALVUES acc. to ČSN EN 1092-2

ADDRESS OF FACTORY

LDM, spol. s r.o.
Litomyšlská 1378
560 02 Česká Třebová
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fax: +420 465 533 101
E-mail: sale@ldm.cz
http://www.ldmvalves.com

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tel.: +420 241087360
fax: +420 241087192
E-mail: sale@ldm.cz

LDM, spol. s r.o.
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