

**01 - 02.5**

09.04.GB

**Control valves**  
**Control valves with flow limitation**  
**BEE line**



## 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 rate can be even regulated or not.

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

Because of possible 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

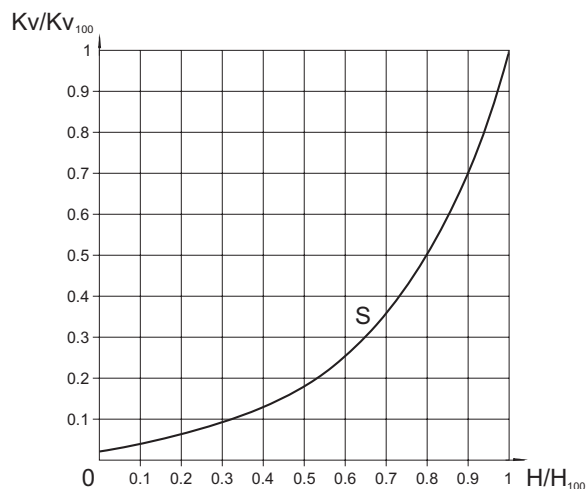
		Pressure drop $p_2 > p_1/2$ $\Delta p < p_1/2$	Pressure drop $\Delta p \geq p_1/2$ $p_2 \leq p_1/2$
Kv =	Liquid	$\frac{Q}{100} \sqrt{\frac{\rho_1}{\Delta p}}$	$\frac{2 \cdot Q_n}{5141 \cdot p_1} \sqrt{\rho_n \cdot T_1}$
	Gas	$\frac{Q_n}{5141} \sqrt{\frac{\rho_n \cdot T_1}{\Delta p \cdot p_2}}$	$\frac{2 \cdot Q_n}{5141 \cdot p_1} \sqrt{\rho_n \cdot T_1}$

## 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

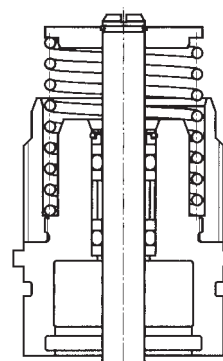


S - LDMspline® characteristic

$$Kv/Kv_{100} = 0.0183 + 0.269 \cdot (H/H_{100}) - 0.380 \cdot (H/H_{100})^2 + 1.096 \cdot (H/H_{100})^3 - 0.194 \cdot (H/H_{100})^4 - 0.265 \cdot (H/H_{100})^5 + 0.443 \cdot (H/H_{100})^6$$

## Packing - O-ring EPDM

Well proven type of packing with sealing elements made of high quality EPDM is suitable for operating with temperature of, +2 to +150 °C. The packing excels with its reliability and long time tightness. Its properties ensure safe usage in no-maintenance applications. Main preferences of the packing is low frictional forces, sealing capability in both ports (even when there is underpressure in the valve) and service life exceeding 1 000 000 cycles.



## Dimensions and units

Marking	Unit	Name of dimension
Kv	m <sup>3</sup> ·h <sup>-1</sup>	Flow coefficient under conditions of units of flow
Kv <sub>100</sub>	m <sup>3</sup> ·h <sup>-1</sup>	Flow coefficient at nominal stroke
Kv <sub>min</sub>	m <sup>3</sup> ·h <sup>-1</sup>	Flow coefficient at minimal flow rate
Kvs	m <sup>3</sup> ·h <sup>-1</sup>	Valve nominal flow coefficient
Q	m <sup>3</sup> ·h <sup>-1</sup>	Flow rate in operating conditions (T <sub>1</sub> , p <sub>1</sub> )
Q <sub>n</sub>	Nm <sup>3</sup> ·h <sup>-1</sup>	Flow rate in normal conditions (0°C, 0.101 Mpa)
p <sub>1</sub>	MPa	Upstream absolute pressure
p <sub>2</sub>	MPa	Downstream absolute pressure
p <sub>s</sub>	MPa	Absolute pressure of saturated steam at given temperature (T <sub>1</sub> )
Δp	MPa	Valve differential pressure (Δp = p <sub>1</sub> - p <sub>2</sub> )
ρ <sub>1</sub>	kg·m <sup>-3</sup>	Process medium density in operating conditions (T <sub>1</sub> , p <sub>1</sub> )
ρ <sub>n</sub>	kg·Nm <sup>-3</sup>	Gas density in normal conditions (0°C, 0.101 Mpa)
T <sub>1</sub>	K	Absolute temperature at valve inlet (T <sub>1</sub> = 273 + t <sub>1</sub> )
r	1	Rangeability

## Simplified procedure for designing of two-way control valve

Given: medium water, 115°C, static pressure at piping spot 600 kPa (6 bar),  $\Delta p_{AVAIL} = 40$  kPa (0,4 bar),  $\Delta p_{PIPELINE} = 7$  kPa (0,07 bar),  $\Delta p_{APPLIANCE} = 15$  kPa (0,15 bar), nominal flow rate  $Q_{NOM} = 3,5$  m<sup>3</sup>.h<sup>-1</sup>, minimal flow rate  $Q_{MIN} = 0,4$  m<sup>3</sup>.h<sup>-1</sup>.

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

$$\Delta p_{VALVE} = \Delta p_{AVAIL} - \Delta p_{APPLIANCE} - \Delta p_{PIPELINE} = 40 - 15 - 7 = 18 \text{ kPa (0,18 bar)}$$

$$Kv = \frac{Q_{NOM}}{\sqrt{\Delta p_{VALVE}}} = \frac{3,5}{\sqrt{0,18}} = 8,25 \text{ m}^3 \cdot \text{h}^{-1}$$

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

$$Kvs = (1,1 \text{ to } 1,3) \cdot Kv = (1,1 \text{ to } 1,3) \cdot 8,25 = 9,1 \text{ to } 10,7 \text{ m}^3 \cdot \text{h}^{-1}$$

Now we choose the nearest Kvs value from those available in our catalogue, i.e.  $Kvs = 10$  m<sup>3</sup>.h<sup>-1</sup>. This value corresponds to nominal size of DN 25. Then if we choose threaded valve PN 16 made of spheroidal cast iron, we will get the following specification No.:

**RV 122 2431 25/150-25/T**

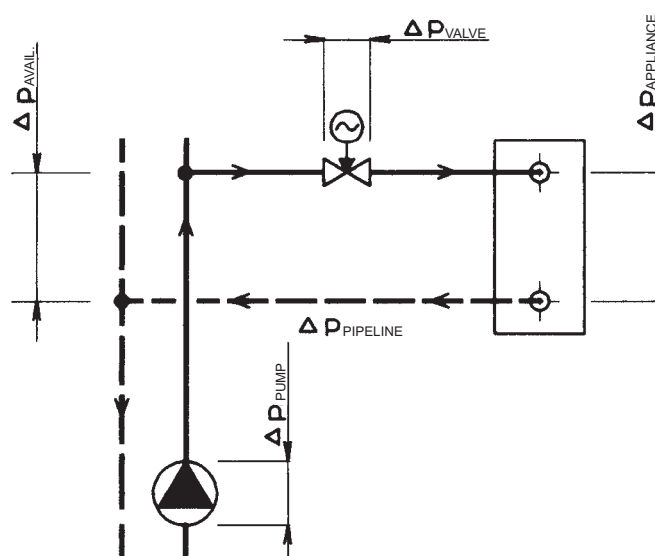
Then we select an appropriate actuator according to the regulation demands.

## Determination of real pressure drop value of a chosen valve at fully open with given flow rate

$$\Delta p_{VALVE H100} = \left( \frac{Q_{NOM}}{Kvs} \right)^2 = \left( \frac{3,5}{10} \right)^2 = 0,123 \text{ bar (12,3 kPa)}$$

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

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 mentioned above apply in a simplified way to water. To reach optimum results, we recommend to use original calculation programme VALVES which is available on request free of charge.

## Determination of valve's real authority

$$a = \frac{\Delta p_{VALVE H100}}{\Delta p_{VALVE H0}} = \frac{12,3}{40} = 0,31$$

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  $\Delta p_{PUMP}$ , 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  $Q_{MIN} = 0,4$  m<sup>3</sup>.h<sup>-1</sup>. Because the pressure losses of the stable shorts reduce to the second power of the flow rate, the following differential pressure values correspond to the min. flow rate:  $\Delta p_{PIPELINE QMIN} = 0,23$  kPa,  $\Delta p_{APPLIANCE QMIN} = 0,49$  kPa.  $\Delta p_{VALVE QMIN} = 40 - 0,23 - 0,49 = 39,28 = 39$  kPa.

$$Kv_{MIN} = \frac{Q_{MIN}}{\sqrt{\Delta p_{VALVE QMIN}}} = \frac{0,4}{\sqrt{0,39}} = 0,64 \text{ m}^3 \cdot \text{h}^{-1}$$

Necessary rangeability value

$$r = \frac{Kvs}{Kv_{MIN}} = \frac{10}{0,64} = 15,6$$

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

## BEE line

### RV 122

**Control valves  
DN 15 - 50, PN 25**



## Description

Valves series RV 122 BEE are control valves of a compact construction with pressure-balanced plug and externally threaded coupling. The valves' execution enables their application with low-linear force actuators for high differential pressures. They excel with minimum dimensions and weight, quality control features and a high tightness in closed position. Thanks to a unique LDMspline® flow characteristic which has been optimized for thermodynamic processes control, the valves are ideal for applications in heating and air-conditioning. In regard of a sophisticated design of internal parts and long service life of the packing, the valves fulfill every demand for a long-time service without necessary maintenance. The valve is, owing to its compact execution, a basic element of a unit-type valve series BEE line.

Within the scope of delivery of the valves, we deliver connection couplings enabling the valve to be connected to pipeline either with threads, flanges or weld unions, providing so quick and trouble-free piping.

Assembled with LDM actuators, the valves can be controlled with either 3-position or continuous signal.

## Application

Used materials for throttling trim which consist of plug made of high-quality stainless steel and soft sealing elements, ensure a hermetic tightness in both ports and enable the valves to be used not only in common warm-water and hot-water regulation

circuits in heating but also in applications with special characteristic features of process medium such as in refrigerating industry and air-conditioning. Maximal permissible operating pressures in behaviour with process medium temperature are mentioned in table on page 10 of this catalogue.

## Process media

The valve series RV 122 are suitable for applications where process medium is water or air. Further they can be used for refrigerating media and other non-aggressive liquids or gases with temperature ranging +2°C to +150°C. Sealing surfaces of control trim are resistant to common sludge or water impurities. Yet it is recommended to pipe a strainer in front of valve to ensure a reliable function and tightness in case there are abrasive particles present.

## Installation

The valves can be installed in any position except position when the actuator is under the valve body. The flow direction is indicated by the arrows positioned in the horizontal line of the valve body.

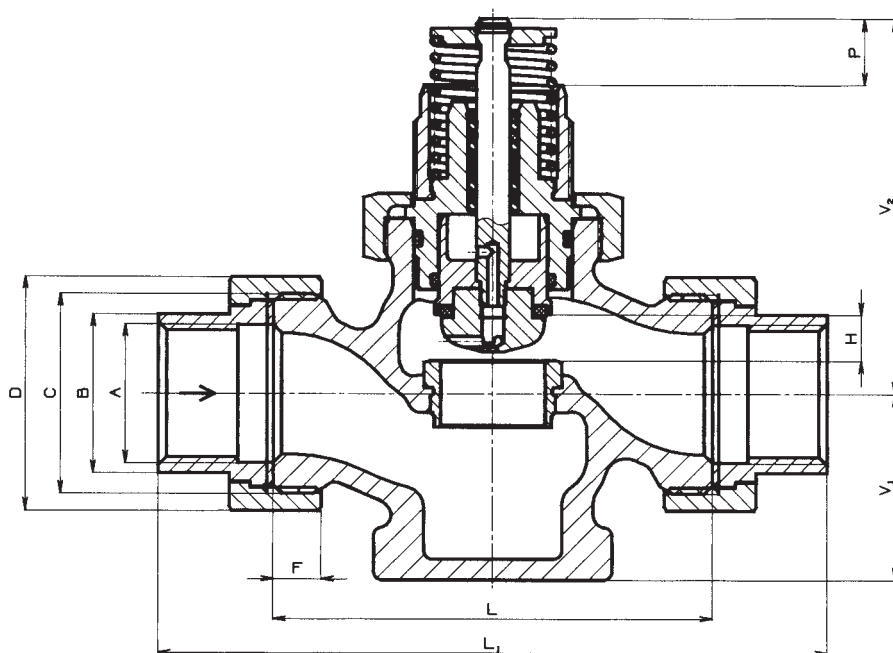
## Technical data

Series	RV 122
Execution	Two-way, pressure-balanced, straight-through control valve
Nominal diameter range	DN 15 to 50
Nominal pressure	PN 25
Body material	Spheroidal cast iron EN-JS1030
Plug material	Stainless steel 1.4006 / 17 027.6
Seat material	Stainless steel 1.4021 / 17 022.6
Stem material	Stainless steel 1.4305
Seat sealing	EPDM
Packing	EPDM
Operating temperature range	+2 to +150°C
Connection	Externally threaded coupling + screw joints Flanges with raised faces Externally threaded coupling + weld unions
Material of weld unions	DN 15 to 32 ... 1.0036 / 11 373.0 DN 40 and 50 ... 1.0308 / 11 353.0
Plug type	Contoured with soft seat sealing
Flow characteristic	LDMspline®
Kvs value	0.16 to 40 m <sup>3</sup> /hour
Leakage rate	Class IV. - S1 acc. to ČSN-EN 1349 (5/2001) (<0.0005 % Kvs)
Rangeability r	min 50 : 1

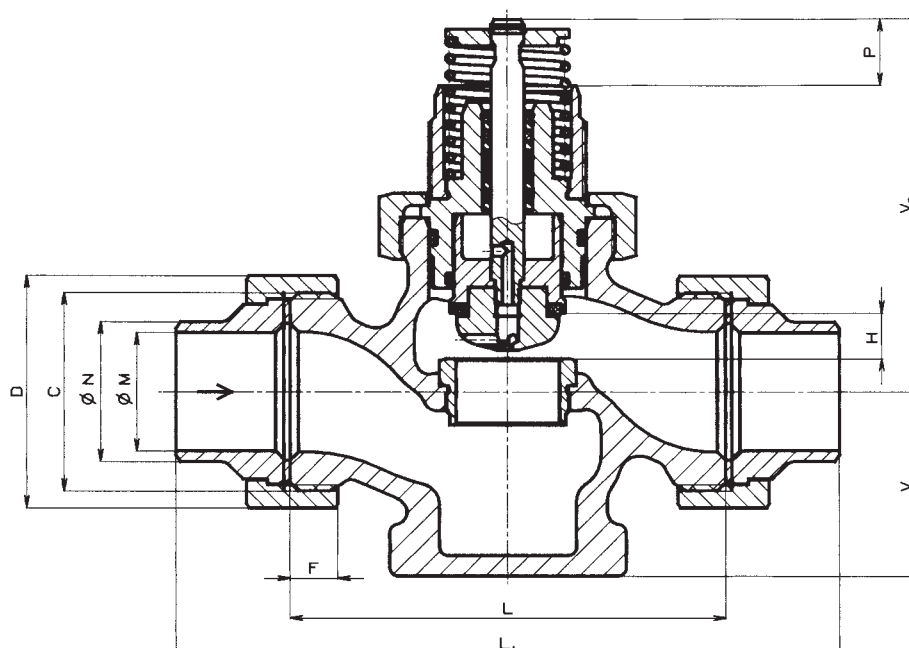
## Dimensions and weights of RV 122/T with threaded connection and RV 122/W with welded unions

DN	L	L <sub>1</sub>	V <sub>1</sub>	V <sub>2</sub>	A	B	C	D	ØM	ØN	F	H	P	m 122/T	m 122/W
	mm	mm	mm	mm		mm		mm	mm	mm	mm	mm	mm	kg	kg
15	100	146	44.5	90	Rp 1/2	25	G 1	41	16.1	21.3	9	11	16	1.7	1.7
20	100	149			Rp 3/4	32	G 1 1/4	51	21.7	26.9	10			2.0	1.9
25	105	160			Rp 1	38	G 1 1/2	56	29.5	33.7	11			2.3	2.3
32	130	193	63	110.4	Rp 1 1/4	47	G 2	71	37.2	42.4	12			3.7	3.6
40	140	207			Rp 1 1/2	53	G 2 1/4	76	43.1	48.3	14			4.6	4.5
50	160	233			Rp 2	66	G 2 3/4	91	54.5	60.3	16			6.7	6.5

Valves RV 122/T with threaded connection



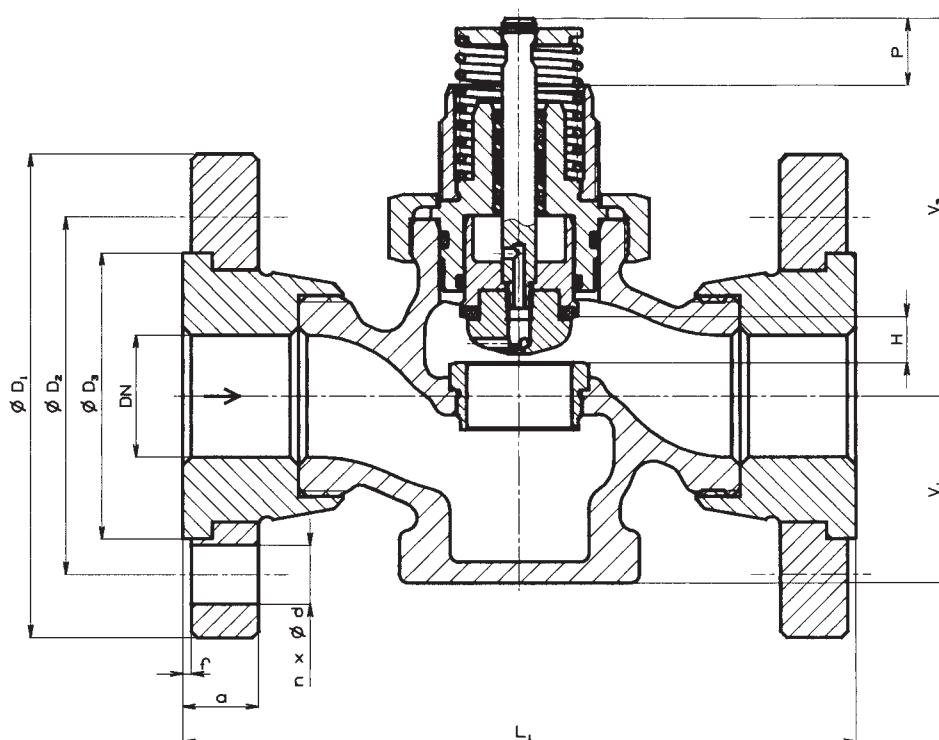
Valves RV 122/W with weld unions



## Dimensions and weights of RV 122/F with flanges

DN	$L_1$	$V_1$	$V_2$	$\varnothing D_1$	$\varnothing D_2$	$\varnothing D_3$	a	f	n	$\varnothing d$	H	P	m 122/F
	mm	mm	mm	mm	mm	mm	mm	mm		mm	mm	mm	kg
15	130	44.5	90	95	65	45	16	2	4	14	11	16	2.8
20	150			105	75	58	16	2	4	14			3.5
25	160			115	85	68	18	2	4	14			4.4
32	180	63	110.4	140	100	78	18	2	4	18			6.5
40	200			150	110	88	19	3	4	18			8.0
50	230			165	125	102	19	3	4	18			10.9

Valves RV 122/F with raised-faced flanges



## BEE line

## RV 122 P



### Control valves with flow limitation DN 15 - 50, PN 25

## Description

Valves series RV 122 P BEE are control valves of a compact construction with pressure-balanced plug and externally threaded coupling and flow limitation mechanism. The valves' execution enables their application with low-linear force actuators for high differential pressures. They excel with minimum dimensions and weight, quality control features and a high tightness in closed position. Thanks to a unique LDMspline® flow characteristic which has been optimized for thermodynamic processes control, the valves are ideal for applications in heating and air-conditioning. In regard of a sophisticated design of internal parts and long service life of the packing, the valves fulfill every demand for a long-time service without necessary maintenance. The valve is, owing to its compact execution, a basic element of a unit-type valve series BEE line.

Within the scope of delivery of the valves, we deliver connection couplings enabling the valve to be connected to pipeline either with threads, flanges or weld unions, providing so quick and trouble-free piping.

Assembled with LDM actuators, the valves can be controlled with either 3-position or continuous signal.

## Application

Used materials for throttling trim which consist of plug made of high-quality stainless steel and soft sealing elements, ensure a hermetic tightness in both ports and enable the valves to be

used not only in common warm-water and hot-water regulation circuits in heating but also in applications with special characteristic features of process medium such as in refrigerating industry and air-conditioning and where there is necessity for precise setting of flow. The flow limitation enables precise setting of flow independently on Kvs value. Maximal permissible operating pressures in behaviour with process medium temperature are mentioned in table on page 10 of this catalogue.

## Process media

The valve series RV 122 P are suitable for applications where process medium is water or air. Further they can be used for refrigerating media and other non-aggressive liquids or gases with temperature ranging +2°C to +150°C. Sealing surfaces of control trim are resistant to common sludge or water impurities. Yet it is recommended to pipe a strainer in front of valve to ensure a reliable function and tightness in case there are abrasive particles present.

## Installation

The valves can be installed in any position except position when the actuator is under the valve body. The flow direction is indicated by the arrows positioned in the horizontal line of the valve body.

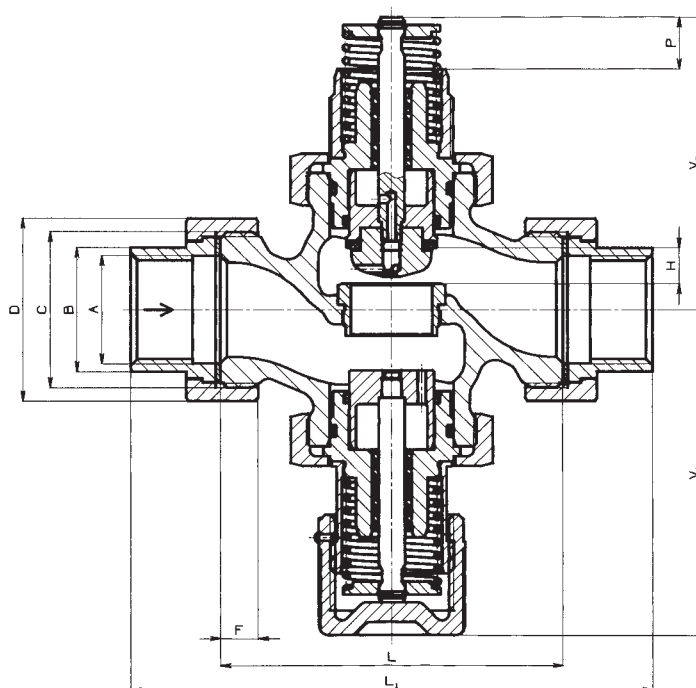
## Technical data

Series	RV 122 P
Execution	Two-way, pressure-balanced, straight-through control valve with flow limitation
Nominal diameter range	DN 15 to 50
Nominal pressure	PN 25
Body material	Spheroidal cast iron EN-JS1030
Plug material	Stainless steel 1.4006 / 17 027.6
Seat material	Stainless steel 1.4021 / 17 022.6
Stem material	Stainless steel 1.4305
Seat sealing	EPDM
Packing	EPDM
Operating temperature range	+2 to +150°C
Connection	Externally threaded coupling + screw joints Flanges with raised faces Externally threaded coupling + weld unions
Material of weld unions	DN 15 to 32 ... 1.0036 / 11 373.0 DN 40 and 50 ... 1.0308 / 11 353.0
Plug type	Contoured with soft seat sealing
Flow characteristic	LDMspline®
Kvs value	0.16 to 35 m <sup>3</sup> /hour
Leakage rate	Class IV. - S1 acc. to ČSN-EN 1349 (5/2001) (<0.0005 % Kvs)
Rangeability r	min 50 : 1

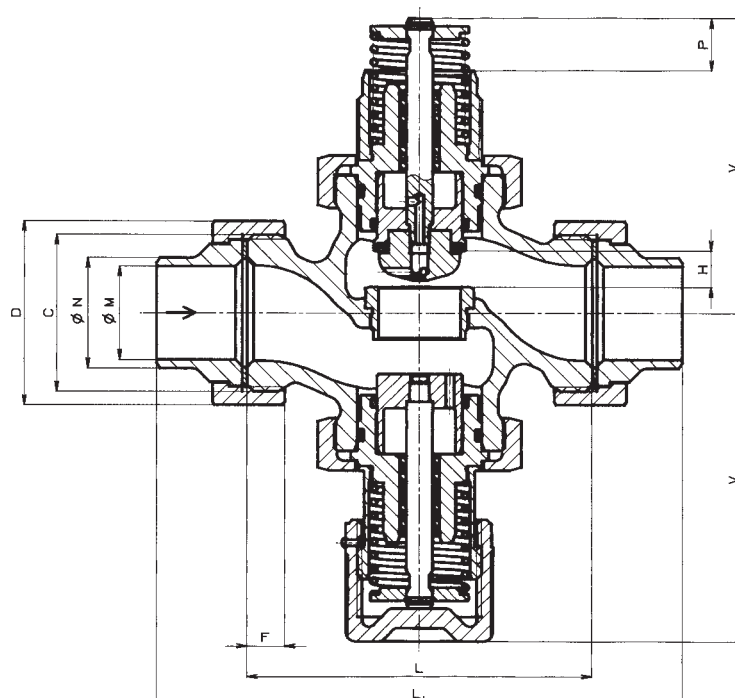
## Dimensions and weights of RV 122 P../T with threaded connection and RV 122 P../W with weld unions

DN	L	L <sub>1</sub>	V <sub>1</sub>	V <sub>2</sub>	A	B	C	D	ØM	ØN	F	H	P	m	
														122 P../T	122 P../W
	mm	mm	mm	mm		mm		mm	mm	mm	mm	mm	mm	kg	kg
15	100	146	100	90	Rp 1/2	25	G 1	41	16.1	21.3	9	11	16	2.1	2.1
20	100	149			Rp 3/4	32	G 1 1/4	51	21.7	26.9	10			2.4	2.3
25	105	160			Rp 1	38	G 1 1/2	56	29.5	33.7	11			2.7	2.7
32	130	193	119	110.4	Rp 1 1/4	47	G 2	71	37.2	42.4	12			4.5	4.4
40	140	207			Rp 1 1/2	53	G 2 1/4	76	43.1	48.3	14			5.5	5.4
50	160	233			Rp 2	66	G 2 3/4	91	54.5	60.3	16			8.0	7.8

Valves RV 122 P../T with threaded connection



Valves RV 122 P../W with weld unions

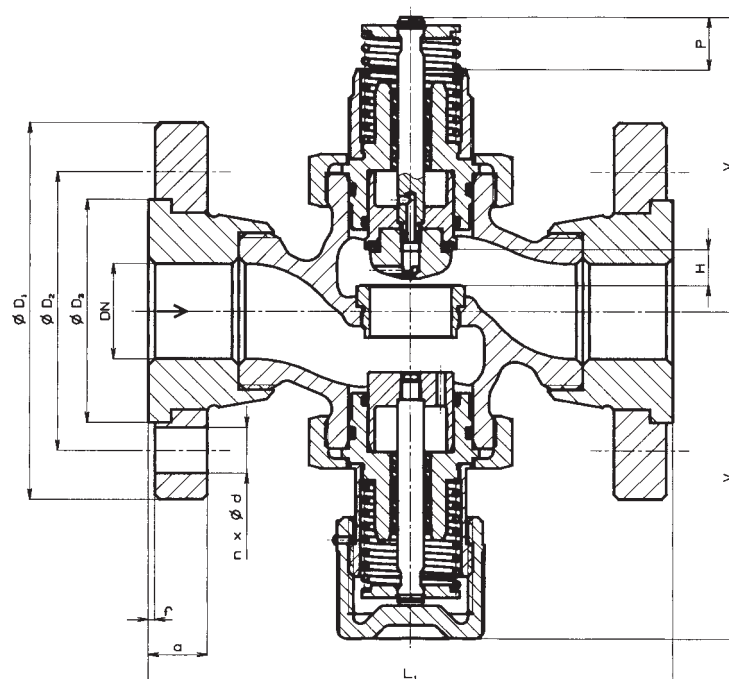




## Dimensions and weights of RV 122 P../F with flanges

DN	$L_1$	$V_1$	$V_2$	$\varnothing D_1$	$\varnothing D_2$	$\varnothing D_3$	a	f	n	$\varnothing d$	H	P	m 122 P../F
	mm	mm	mm	mm	mm	mm	mm	mm		mm	mm	mm	kg
15	130	100	90	95	65	45	16	2	4	14	11	16	3.2
20	150			105	75	58	16	2	4	14			3.9
25	160			115	85	68	18	2	4	14			4.8
32	180	119	110.4	140	100	78	18	2	4	18			7.3
40	200			150	110	88	19	3	4	18			8.9
50	230			165	125	102	19	3	4	18			12.2

Valves RV 122 P../F with raised-faced flanges



## Valve complete specification No. for ordering RV 122 (BEE)

		XX	XXX	X	X X	X X	XX	/	XXX	-	XX	/	X
1. Type of valve	Control valve	RV											
2. Series	Pressure-balanced valve with external thread		122										
3. Function	Control valve			R									
	Control valve with flow limitation			P									
4. Execution	Two-way				2								
5. Body material	Spheroidal cast iron EN-JS1030				4								
6. Flow characteristic	LDMspline®					3							
7. Kvs	No. of the column acc. to the table of Kvs values						X						
8. Nominal pressure	PN 25							25					
9. Max. temperature °C	150 °C								150				
10. Nominal size	DN 15 to 50										XX		
11. Connection	Threaded												T
	Flange PN 25 with raised face												F
	Weld unions												W

Remark: Connection dimensions of flanges for PN 25, PN 16 and PN 10 are for DN 15 to 50 the same.

**Ordering example :** RV 122 R 2431 25/150-25/T

Due to an uniqueness of each version, the valves can be ordered with a simplified code as follows:

Example: **BEE DN 25/T** two-way valve DN 25 with threaded connection  
**BEE DN 32/F** two-way valve DN 32 with flanges  
**BEE DN 32P/F** two-way valve with flow limitation DN 32 with flanges  
**BEE DN 15-1.6/W** two-way valve DN 15 with weld unions

## Kvs and differential pressure values

DN	Kvs [m <sup>3</sup> /hour]								$\Delta p_{max}$ MPa
	1	2	3	4	5	6	7	8	
15	4.0	2.5	1.6	1.0	0.63	0.4	0.25	0.16	2.5
20	6.3	---	---	---	---	---	---	---	2.5
25	10.0	---	---	---	---	---	---	---	2.5
32	16.0	---	---	---	---	---	---	---	2.5
40	25.0 (22.0)*	---	---	---	---	---	---	---	2.5
50	40.0 (35.0)*	---	---	---	---	---	---	---	2.5

\* The values in the parentheses apply to the version with flow limitation.

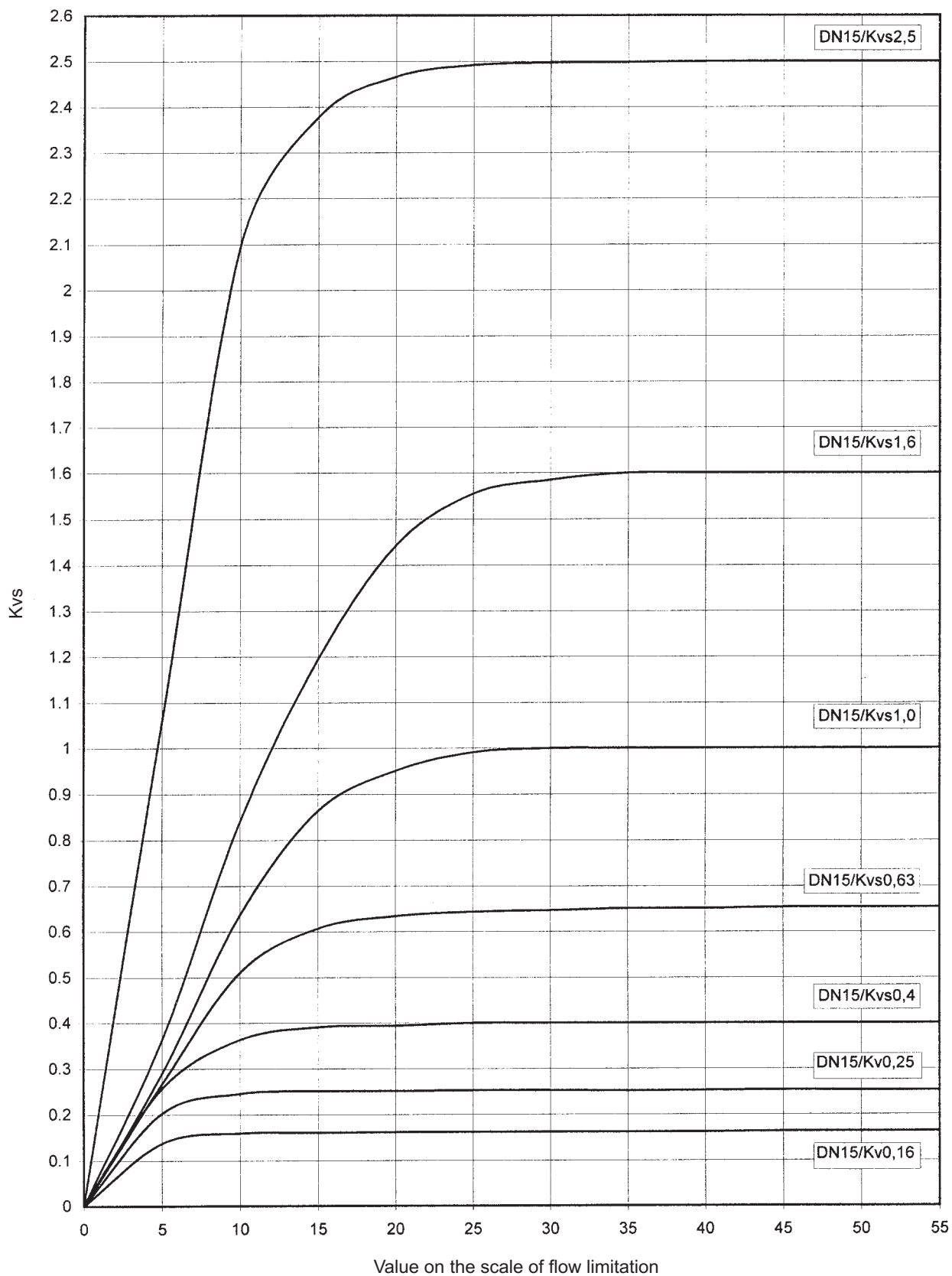
## Available actuators

LDM	Electric actuator ANT11	AC 24 and 230 V, 3-position control and 0-10V DC
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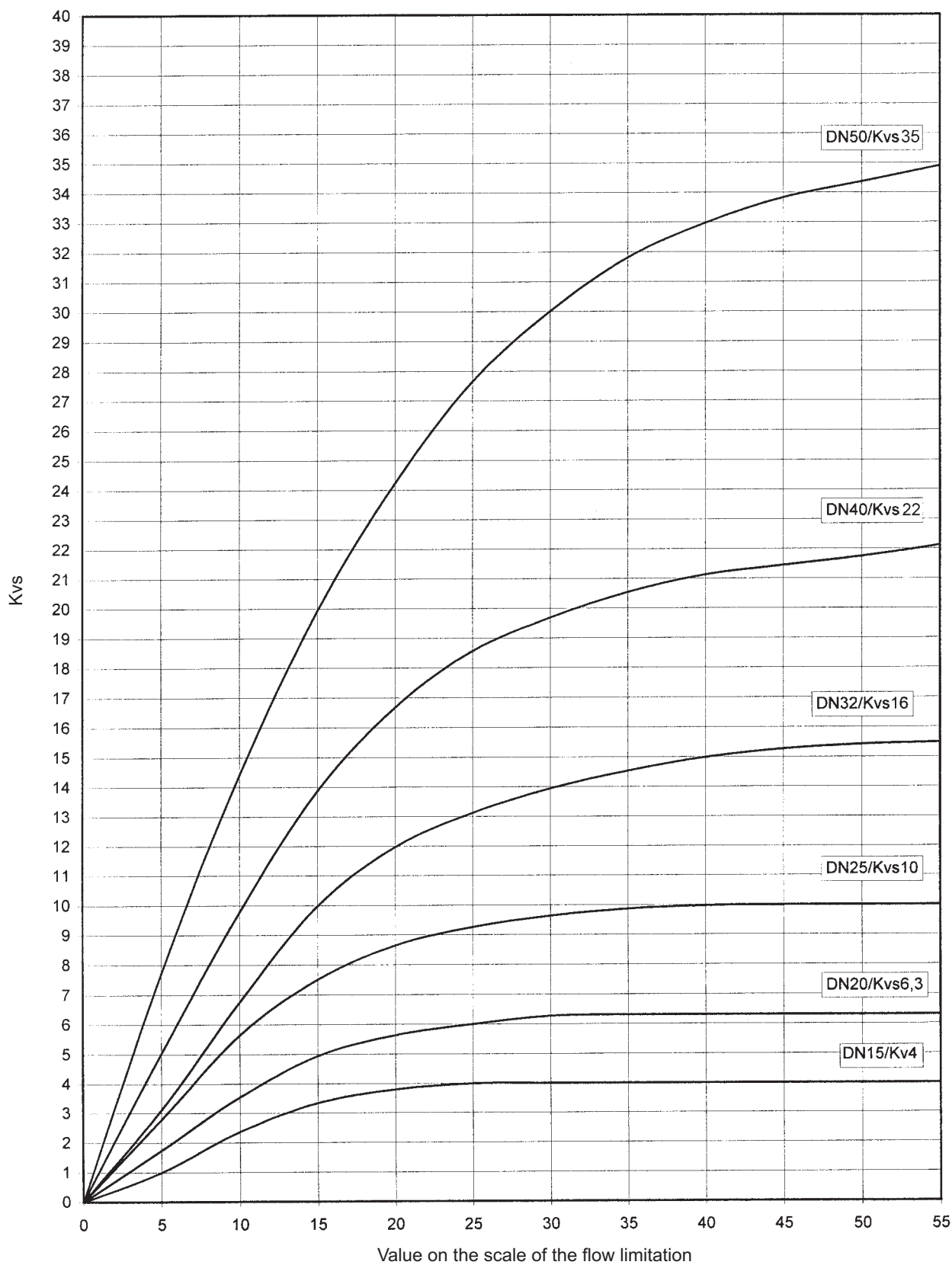
## Maximal permissible operating pressures [MPa]

Material	PN	Temperature [°C]										
		120	150	200	250	300	350	400	450	500	525	550
Spheroidal cast iron EN-JS1030	25	2.5	2.43	---	---	---	---	---	---	---	---	---
		---	---	---	---	---	---	---	---	---	---	---

### RV 122 P - behaviour of Kvs with setting of flow limitation



## RV 122 P - behaviour of Kvs with setting of flow limitation





## Electric actuators LDM

### Description

Electric actuators ANT11 are electromechanic actuators designed to actuate the control valves of LDM series RV 122 BEE line. Their design ensures free-backlash connection between the stem of the actuator and the valve and thus the proper regulation features are achieved even with slight position changes. The actuators are self-adaptive, the limit positions are set with the valve's own stroke. To communicate with superior control system, the actuators are equipped with standard 3-position control or with continuous signal (options 0..10 V, 2..10 V, 0..20 mA or 4..20 mA). The version marked "S" contains a fail-safe function electronically controlled which is activated by a supply power failure at specific terminal. In setting the actuators equipped with continuous control, it is possible to specify, in terms of stroke percentage, the starting position to which the actuator runs when the fail-safe function is activated. As a source of energy for the fail-safe function, there are two NiMH batteries which are continuously charged. All the types of the actuators are equipped with hand wheel for emergency operating.

### Application

The actuators assembled with LDM valves are especially designed for application in heating, air-conditioning and refrigerating systems. There it is possible to effectively use a combination of control characteristic LDMspline® optimized for heat-transfer applications ensured with easy mechanical design of the actuator. In some applications, it is possible to use a fail-safe action which in case of power supply failure sets the actuator to a position specified beforehand.

### Features

- Easy assembly with the valve without necessity for setting with any tools
- Self-adaptive function precisely defining the stroke range
- Hand wheel for emergency operating
- Stroke indicator for info on actual state of the valve opening
- Option of providing the actuator with resistance feedback or adjustable position switch (for actuators with 3-position control)
- Intelligent microprocessor control (for actuators with fail-safe function and continuous control)
- Automatic detection of impurity entry between seat and plug in the valve including algorithm for self-tight function (for actuators with continuous control)
- Options of control signal 0..10 V, 2..10 V, 0..20 mA, 4..20 mA (for actuators with continuous control)
- Option for setting the starting position in the stroke range of 0.. 100% for actuators with continuous control and fail-safe function
- Possibility of data record reading and record on failures for the version with microprocessor
- High operating reliability and service durability thanks to sophisticated design and use of high quality materials and mechanically stressed parts.

### Technical data for ANT11

Type	ANT11.10	ANT11.11	ANT11.20	ANT11.10S	ANT11.11S	ANT11.12S
Feeding voltage	24 V AC $\pm$ 10%		230 V AC $\pm$ 10%	24 V AC $\pm$ 10%		
Frequency	50 Hz					
Control	3 - position	continuous	3 - position	3 - position	continuous	3 - position
Power	1,5 VA	7,0 VA	3,0 VA	7,0 VA	7,0 VA	7,0 VA
Nominal force	300 N $\pm$ 15%					
Nominal stroke	11 mm					
Running time (50 Hz)	66 s	25 s	66 s	66 s	25 s	25 s
Fail-safe function	---	---	---	15 s	15 s	15 s
Feedback <sup>1)</sup>	100 $\Omega$ , 1 k $\Omega$	---	100 $\Omega$ , 1 k $\Omega$	100 $\Omega$ , 1 k $\Omega$	---	100 $\Omega$ , 1 k $\Omega$
Adjustable position switch	PS1	---	PS1	---	---	---
Impedance of input of control signal	---	$\geq$ 10 k $\Omega$ (V) 250 $\Omega$ (mA)	---	---	$\geq$ 10 k $\Omega$ (V) 250 $\Omega$ (mA)	---
Enclosure	IP 54 (IEC 60529)					
Max. operating temperature	150°C					
Ambient temperature range	-5 to +55°C					
Ambient humidity range	5 .. 95 % of relative humidity					
Storage conditions	-15 to +55°C, 5 .. 95 % of relative humidity					
Weight	0,55 kg			0,7 kg		

<sup>1)</sup>Optional accessories. One piece of accessory can be used only. Must be specified in order.

## Optional accessories

Resistance position transmitter 0..100 Ω or 0..1000 Ω (for 3-position control actuators only)

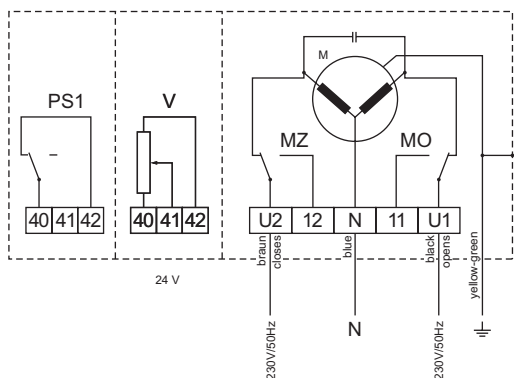
Adjustable position switch PS1 (only for actuators with 3-position control without a fail-safe function)

## Wiring diagrams of actuators

Note: ANT11 ... closes the valve by extending its stem

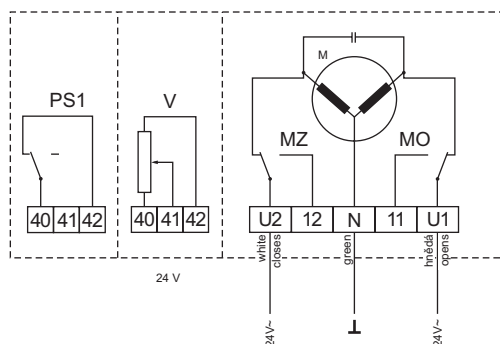
### ANT11.20

3-position control, 230 V / 50 Hz



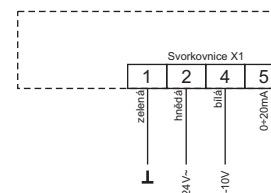
### ANT11.10

3-position control 24 V / 50 Hz



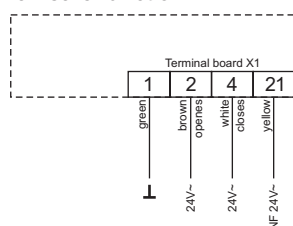
### ANT11.11

Control 0..10 V, 24 V / 50 Hz



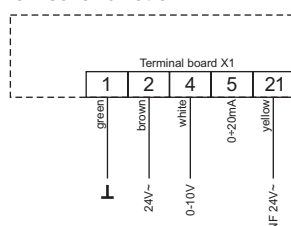
### ANT11.10S, ANT11.12S

3-position control, 24 V / 50 Hz, fail-safe function



### ANT11.11S

Control 0..10 V, 24 V / 50 Hz, fail-safe function



- MO power switch for position "Open"
- MZ power switch for position "Closed"
- M motor
- V transmitter 100Ω or 1000Ω
- PS1 adjustable position switch
- 21 terminal for fail-safe function
- 11, 12 end position terminals (max. current 0,5 A)

## Dimension of actuator

