

**01 - 02.4**

08.12.GB

**LDM Control valves  
COMAR 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  $r > Kvs / K_{v_{min}}$

Because of possible minus tolerance 10% of  $K_{v_{100}}$  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

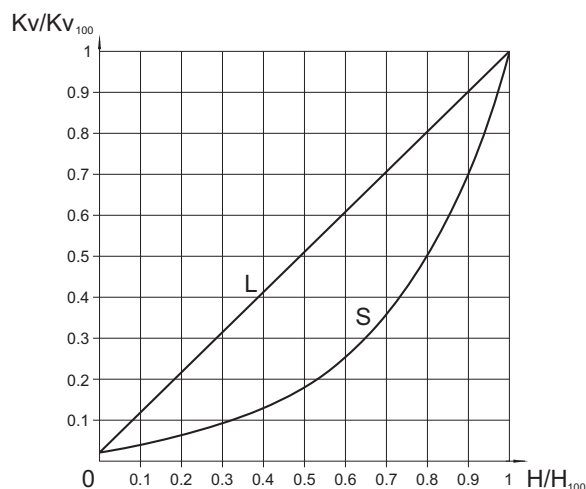
		Pressure drop $p_2 > p_1/2$ $\Delta p < p_1/2$	Pressure drop $\Delta p \geq p_1/2$ $p_2 \leq p_1/2$
Kv =	Liquid	$\frac{Q}{100} \sqrt{\frac{\rho_1}{\Delta p}}$	$\frac{Q}{100} \sqrt{\frac{\rho_1}{\Delta p}}$
	Gas	$\frac{Q_n}{5141} \sqrt{\frac{\rho_n \cdot T_1}{\Delta p \cdot p_2}}$	$\frac{2 \cdot Q_n}{5141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

## 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



L - linear characteristic

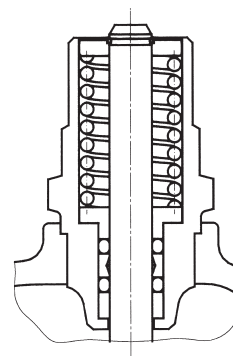
$$Kv/Kv_{100} = 0.0183 + 0.9817 \cdot (H/H_{100})$$

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 +130 °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 500 000 cycles.



## Dimensions and units

Marking	Unit	Name of dimension
Kv	$m^3 \cdot h^{-1}$	Flow coefficient under conditions of units of flow
$Kv_{100}$	$m^3 \cdot h^{-1}$	Flow coefficient at nominal stroke
$Kv_{min}$	$m^3 \cdot h^{-1}$	Flow coefficient at minimal flow rate
Kvs	$m^3 \cdot h^{-1}$	Valve nominal flow coefficient
Q	$m^3 \cdot h^{-1}$	Flow rate in operating conditions ( $T_1, p_1$ )
$Q_n$	$Nm^3 \cdot h^{-1}$	Flow rate in normal conditions (0°C, 0.101 Mpa)
$p_1$	MPa	Upstream absolute pressure
$p_2$	MPa	Downstream absolute pressure
$p_s$	MPa	Absolute pressure of saturated steam at given temperature ( $T_1$ )
$\Delta p$	MPa	Valve differential pressure ( $\Delta p = p_1 - p_2$ )
$\rho_1$	$kg \cdot m^{-3}$	Process medium density in operating conditions ( $T_1, p_1$ )
$\rho_n$	$kg \cdot Nm^{-3}$	Gas density in normal conditions (0°C, 0.101 Mpa)
$T_1$	K	Absolute temperature at valve inlet ( $T_1 = 273 + t_1$ )
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 grey cast iron, we will get the following specification No.:

**RV 111 R 2331 16/150-25/T**

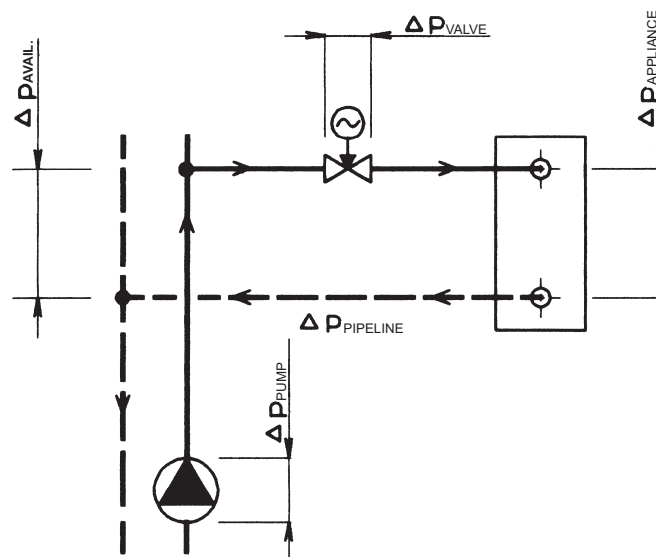
Then we select an appropriate actuator according to the regulation demands.

## 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>. The following differential pressure values correspond to the min. flow rate:  $\Delta p_{PIPELINE QMIN} = 0,40$  kPa,  $\Delta p_{APPLIANCE QMIN} = 0,66$  kPa.  $\Delta p_{AVAIL QMIN} = 40 - 0,4 - 0,66 = 38,94 = 39$ .

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

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.

## Procedure for designing of three-way mixing valve

Given: medium water, 90°C, static pressure at piping spot 600 kPa (6 bar),  $\Delta p_{\text{PUMP2}} = 35 \text{ kPa}$  (0,35 bar),  $\Delta p_{\text{PIPELINE}} = 10 \text{ kPa}$  (0,1 bar),  $\Delta p_{\text{APPLIANCE}} = 20 \text{ kPa}$  (0,2 bar), nominal flow rate  $Q_{\text{NOM}} = 5 \text{ m}^3 \cdot \text{h}^{-1}$

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

$$\Delta p_{\text{VALVE}} = \Delta p_{\text{PUMP2}} - \Delta p_{\text{APPLIANCE}} - \Delta p_{\text{PIPELINE}} = 35 - 20 - 10 = 5 \text{ kPa} (0,05 \text{ bar})$$

$$Kv = \frac{Q_{\text{NOM}}}{\sqrt{\Delta p_{\text{VALVE}}}} = \frac{5}{\sqrt{0,05}} = 22,4 \text{ m}^3 \cdot \text{h}^{-1}$$

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

$$Kvs = (1,1 \text{ to } 1,3) \cdot Kv = (1,1 \text{ to } 1,3) \cdot 22,4 = 24,6 \text{ to } 29,1 \text{ m}^3 \cdot \text{h}^{-1}$$

Now we choose the nearest Kvs value from those available in our catalogue, i.e.  $Kvs = 25 \text{ m}^3 \cdot \text{h}^{-1}$ . This value corresponds to nominal size of DN 40. Then if we choose threaded valve PN 16 made of grey cast iron, we will get the following specification No.:

**RV 111 R 3311 16/150-25/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

$$\Delta p_{\text{VALVE H100}} = \left( \frac{Q_{\text{NOM}}}{Kvs} \right)^2 = \left( \frac{5}{25} \right)^2 = 0,04 \text{ bar} (4 \text{ kPa})$$

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

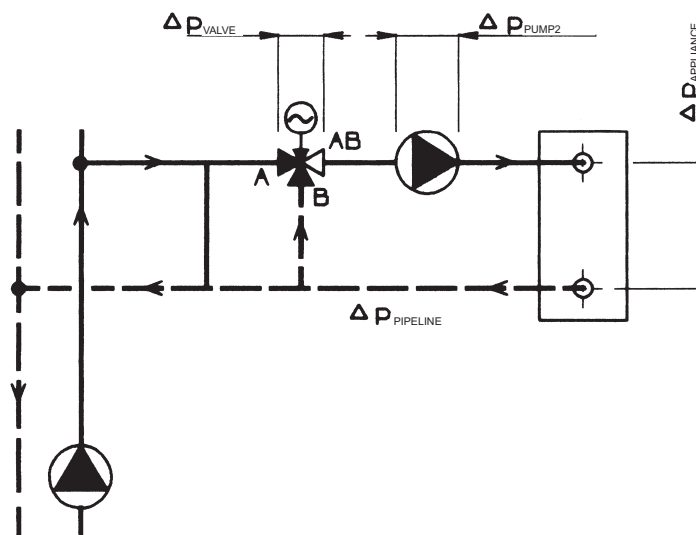
**Caution:** To ensure reliable function of three-way valves, the most important condition is to keep minimum available pressure difference between A and B ports. Three-way valves are capable to manage even high pressure difference between A and B ports but valve's flow characteristic deforms then and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

$$a = \frac{\Delta p_{\text{VALVE H100}}}{\Delta p_{\text{VALVE H0}}} = \frac{4}{4} = 1,$$

which means that the behaviour of flow in A-AB way corresponds to ideal flow curve of the valve. In that case there are Kvs values in both ports the same with linear characteristic i.e. the total flow is nearly constant.

A combination of equal-percentage characteristic in A port and linear characteristic in B port shall be selected in those cases when loading of A port with differential pressure against B port cannot be avoided or when the primary side parameters are too high.

Scheme of typical regulation loop with the application of three-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.

## COMAR line

### RV 111 R

**Control valves  
DN 15 - 40, PN 16**



### Description

The valves series RV 111 COMAR are control valves of a compact construction with external threaded coupling connection. The valves excel with minimum dimensions and weight, quality control function 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 packing, the valves fulfill every demand for a long-time service without necessary maintenance.

The valves are optionally manufactured either two-way or three-way. The part of the delivery is a screw joint enabling a quick and easy installation to an appliance.

Assembled with electromechanic actuators, the valve can be controlled with 3-point or continuous signal. The part of the delivery is also a hand wheel which can be used for the valve control until assembling with an actuator.

### 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 22 of this catalogue.

### Process media

The valves series RV 111 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 from +2°C to +150°C. The valves are not applicable to conditions with cavitation. 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 on the valve body - inlet ports are indicated by letters A and B, outlet port AB.

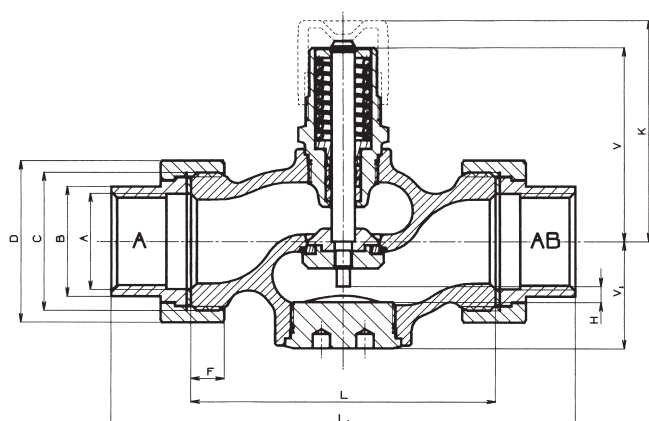
### Technical data

Series	RV 111 R	
Type of valve	Two-way, reverse, control valve	Three-way control valve
Nominal size range	DN 15 to 40	
Nominal pressure	PN 16	
Body material	Grey cast iron EN-JL 1030	
Plug material	Stainless steel 1.4021	
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 DN 40 ... 1.0308	
Type of plug	Contoured or V-ported, with soft seat sealing	
Flow characteristic	LDMspline®, linear	Linear / linear
Kvs value	0.16 to 25 m <sup>3</sup> /hour	0.25 to 25 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	
Packing	O - ring EPDM	

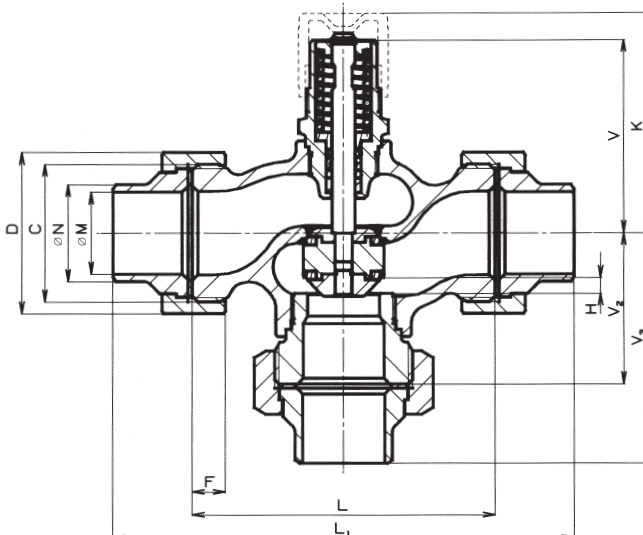
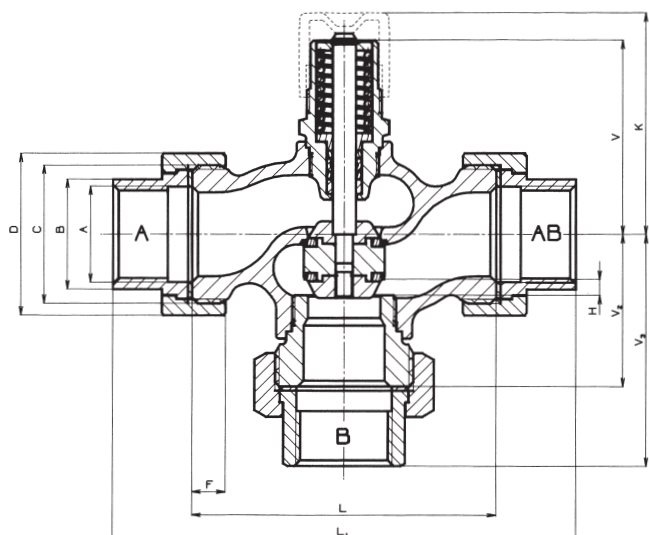
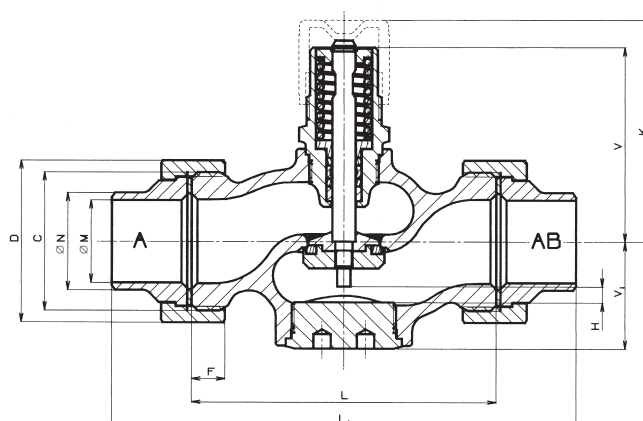
## Dimensions and weights of RV 111 R/T with threaded connection and RV 111 R/W with weld unions

DN	L	L <sub>1</sub>	V	V <sub>1</sub>	V <sub>2</sub>	V <sub>3</sub>	K	A	B	C	D	ØM	ØN	F	H	m 2-way	m 3-way
	mm	mm	mm	mm	mm	mm	mm		mm		mm	mm	mm	mm	mm	kg	kg
15	100	146	67	36.5	50	73	77	Rp 1/2	25	G 1	41	16.1	21.3	9	5,5	1.15	1.35
20	100	149	67	36.5	50	74.5	77	Rp 3/4	32	G 1 1/4	51	21.7	26.9	10		1.45	1.75
25	105	160	67	37	52.5	80	77	Rp 1	38	G 1 1/2	56	29.5	33.7	11		1.7	2.15
32	130	193	78	49	65	96.5	88	Rp 1 1/4	47	G 2	71	37.2	42.4	12		3.0	3.8
40	140	207	78	49	70	103.5	88	Rp 1 1/2	53	G 2 1/4	76	43.1	48.3	14		3.5	4.4

Valves RV 111 R/T with threaded connection



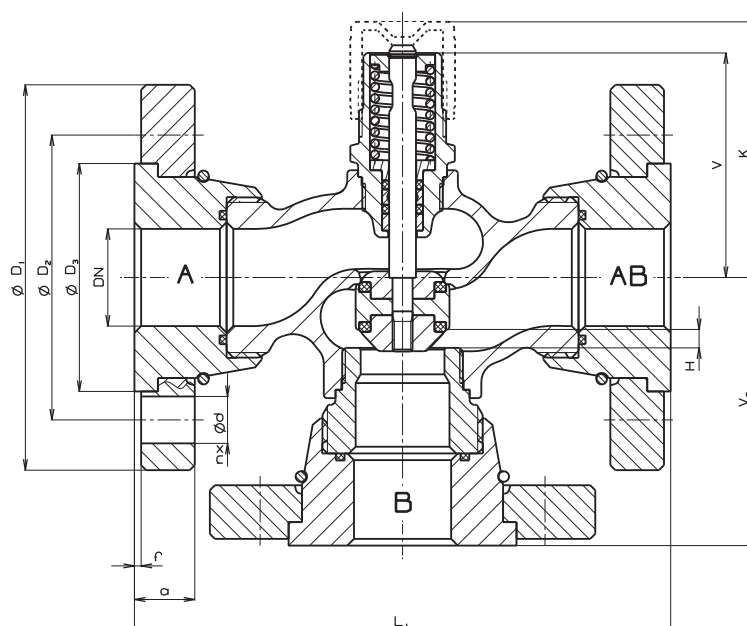
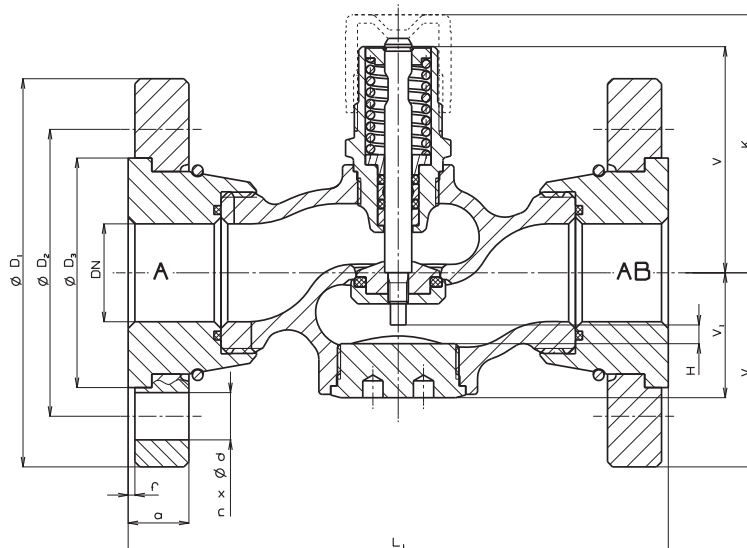
Valves RV 111 R/W with weld unions



## Dimensions and weights of RV 111 R/F with flanges

DN	$L_1$	V	$V_1$	$V_2$	$V_3$	$\varnothing D_1$	$\varnothing D_2$	$\varnothing D_3$	a	f	n	$\varnothing d$	K	H	m 2-way	m 3-way
	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm		mm	mm	mm	kg	kg
15	130	67	36.5	42.5	65	95	65	45	16	2	4	14	77	5,5	2.3	3.1
20	150	67	36.5	52.5	75	105	75	58	16	2	4	14	77		3.2	4.4
25	160	67	37	57.5	80	115	85	68	18	2	4	14	77		3.8	5.3
32	180	78	49	70	90	140	100	78	18	2	4	18	88		5.9	8.1
40	200	78	49	75	100	150	110	88	19	3	4	18	88		6.9	9.5

Valves RV 111 R/F with raised-faced flanges





## Kvs and differential pressure values

DN	Kvs [m <sup>3</sup> /hour]								$\Delta p_{max}$ kPa
	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 <sup>1)</sup>	400
20	6.3	---	---	---	---	---	---	---	350
25	10.0	---	---	---	---	---	---	---	200
32	16.0	---	---	---	---	---	---	---	110
40	25.0	---	---	---	---	---	---	---	60

Two-way execution DN 15 to 25 - flow characteristic LDMspline<sup>®</sup>, DN 32 and 40 - flow characteristic linear. Three-way execution - linear characteristic in both ports.  
<sup>1)</sup> applies to two-way execution only.

## Valve complete specification No. for ordering RV 111 R (COMAR)

		XX	XXX	X	XX	X X	XX	/	XXX	-	XX	/	X
1. Valve	Control valve	RV											
2. Series	Valve with external thread		111										
3. Type of actuating	Hand wheel with possibility of using electric actuator			R									
4. Execution	Two-way				2								
	Three-way				3								
5. Body material	Grey cast iron				3								
6. Flow characteristic	Linear (two-way execution DN 32, 40 and three-way execution)					1							
	LDMspline <sup>®</sup> (two-way execution DN 15 to 25)					3							
7. Kvs	Column No. acc. to Kvs values table					X							
8. Nominal pressure	PN 16						16						
9. Max. temperature °C	150 °C							150					
10. Nominal size	DN 15 to 40									XX			
11. Connection	Threaded connection												T
	Raised-faced flanges												F
	Weld unions												W

**Ordering example:** RV 111 R 2331 16/150-25/T

Actuator must be specified separately.

## Available actuators

LDM	Electric actuator ANT3-5.10	AC 24 V, 3-position control
	Electric actuator ANT3-5.11	AC/DC 24 V, control 0(2) - 10V, (0)4 - 20 mA
	Electric actuator ANT3-5.10SC	AC/DC 24 V, 3-position control, fail-safe function
	Electric actuator ANT3-5.11SC	AC/DC 24 V, control 0(2) - 10V, (0)4 - 20 mA fail-safe function
	Electric actuator ANT3-5.20, ANT3-5.22	AC 230 V, 3-position control
	Electric actuator ANT3-5.21	AC 230 V, control 0(2) - 10V, (0)4 - 20 mA
	Electric actuator ANT3-5.20SC	AC 230 V, 3-position control, fail-safe function
	Electric actuator ANT3-5.21SC	AC 230 V, control 0(2) - 10V, (0)4 - 20 mA fail-safe function
Siemens (Landis & Staefa)	Electric actuator SSC31	AC 230 V, 3-position control
	Electric actuator SSC61	AC 24 V, control DC 0...10V
	Electric actuator SSC61.5	AC 24 V, control DC 0...10V, fail-safe function
	Electric actuator SSC81	AC 24 V, 3-position control
	Electric actuator SQS 35.00 a SQS 35.03	AC 230 V, 3-position control
	Electric actuator SQS 35.50 a SQS 35.53	AC 230 V, 3-position control, fail-safe function
	Electric actuator SQS 65.5	AC 24 V, control DC 0...10V, fail-safe function





## COMAR line

### RV 111 S

**Control valves  
DN 15 - 40, PN 16**

### Description

The valves series RV 111 COMAR are control valves of a compact construction with external threaded coupling connection. The valves excel with minimum dimensions and weight, quality control function and a high tightness in closed position. Thanks to an 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 packing, the valves fulfill every demand for a long-time service without necessary maintenance.

The valves are optionally manufactured either two-way or three-way. The part of the delivery is a screw joint enabling a quick and easy installation to an appliance.

Assembled with electromechanic actuators, the valve can be controlled with 3-point or continuous signal. Valves 111 S are especially designed for electric actuators of producer Sauter.

### 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 22 of this catalogue.

### Process media

The valves series RV 111 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 from +2°C to +150°C. The valves are not applicable to conditions with cavitation. 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 on the valve body - in mixing function are inlet ports indicated by letters A and B, outlet port AB, for splitting function is inlet indicated by letters AB and outlet port A and B.

### Technical data

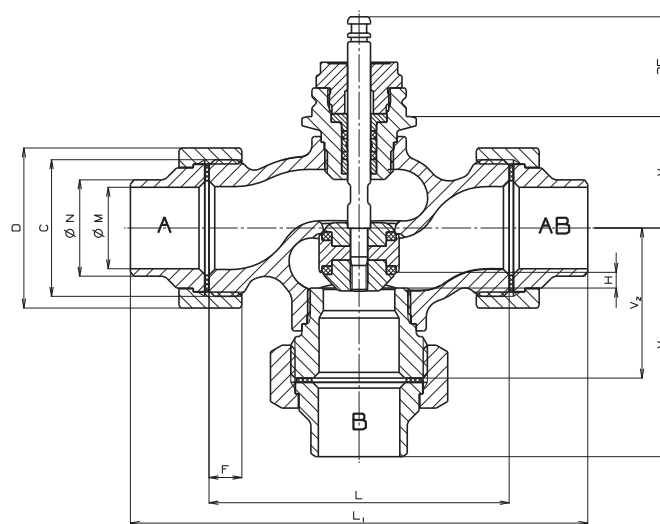
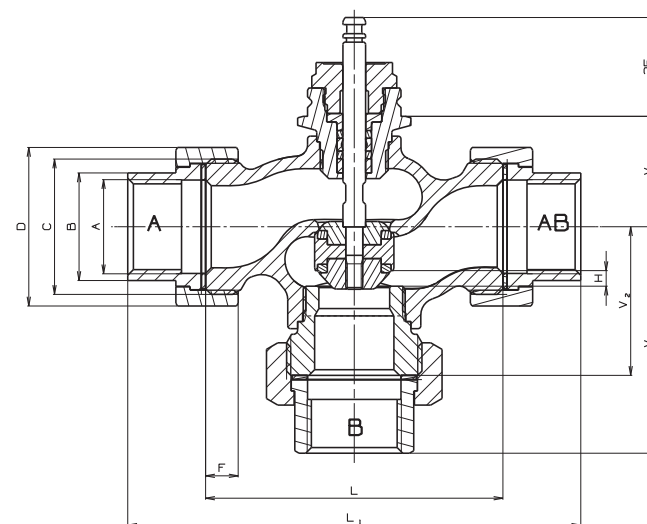
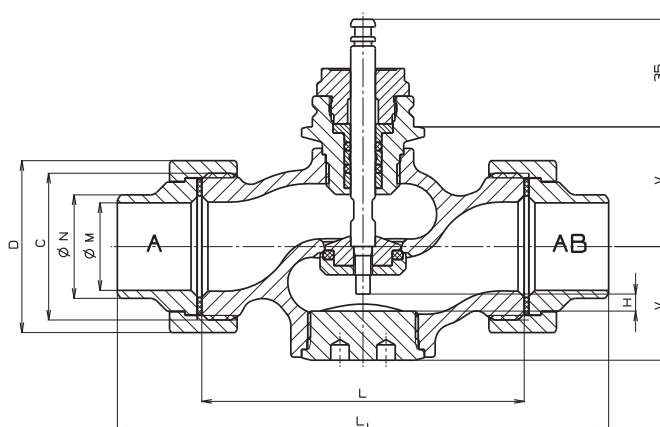
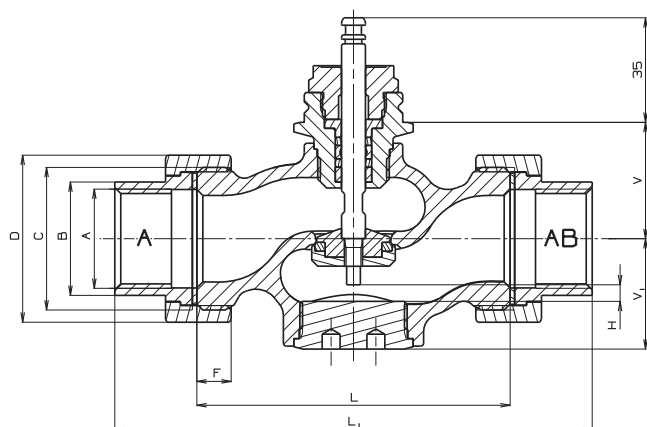
Series	RV 111 S	
Type of valve	Two-way, reverse, control valve	Three-way control valve
Nominal size range	DN 15 to 40	
Nominal pressure	PN 16	
Body material	Grey cast iron EN-JL 1030	
Plug material	Stainless steel 1.4021	
Operating temperature range	+2 to +150°C	
Connection	Externally threaded coupling + screw joints Flanges with raised faces Externally threaded coupling + weld unions	
Material of weld unions	DN 15 to 32 ... 1.0036 DN 40 ... 1.0308	
Type of plug	Contoured or V-ported, with soft seat sealing	
Flow characteristic	LDMspline®, linear	Linear / linear
Kvs value	0.16 to 25 m³/hour	0.25 to 25 m³/hour
Leakage rate	Class IV. - S1 acc. to ČSN-EN 1349 (5/2001) (<0.0005 % Kvs)	
Rangeability r	min 50 : 1	
Packing	O - ring EPDM	

## Dimensions and weights of RV 111 S/T with threaded connection and RV 111 S/W with weld unions

DN	L	L <sub>1</sub>	V	V <sub>1</sub>	V <sub>2</sub>	V <sub>3</sub>	A	B	C	D	ØM	ØN	F	H	m 2-way.	m 3-way
	mm	mm	mm	mm	mm	mm		mm		mm	mm	mm	mm	mm	kg	kg
15	100	146	67	36.5	50	73	Rp 1/2	25	G 1	41	16.1	21.3	9	5,5	1.15	1.35
20	100	149	67	36.5	50	74.5	Rp 3/4	32	G 1 1/4	51	21.7	26.9	10		1.45	1.75
25	105	160	67	37	52.5	80	Rp 1	38	G 1 1/2	56	29.5	33.7	11		1.7	2.15
32	130	193	78	49	65	96.5	Rp 1 1/4	47	G 2	71	37.2	42.4	12		3.0	3.8
40	140	207	78	49	70	103.5	Rp 1 1/2	53	G 2 1/4	76	43.1	48.3	14		3.5	4.4

Valves RV 111 S/T with threaded connection

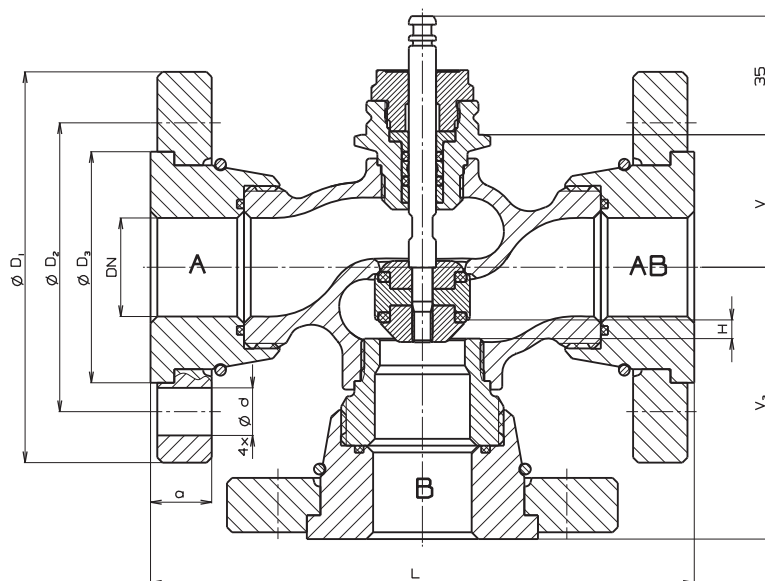
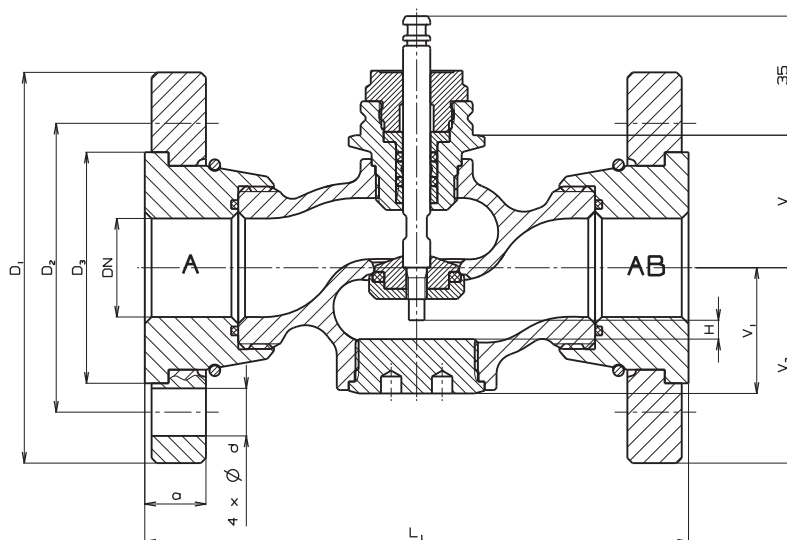
Valves RV 111 S/W with weld unions



## Dimensions and weights of RV 111 S/F with flanges

DN	$L_1$	V	$V_1$	$V_2$	$V_3$	$\varnothing D_1$	$\varnothing D_2$	$\varnothing D_3$	a	f	n	$\varnothing d$	H	m 2-way	m 3-way
	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm		mm	mm	kg	kg
15	130	67	36.5	42.5	65	95	65	45	16	2	4	14	5,5	2.3	3.1
20	150	67	36.5	52.5	75	105	75	58	16	2	4	14		3.2	4.4
25	160	67	37	57.5	80	115	85	68	18	2	4	14		3.8	5.3
32	180	78	49	70	90	140	100	78	18	2	4	18		5.9	8.1
40	200	78	49	75	100	150	110	88	19	3	4	18		6.9	9.5

Valves RV 111 S/F with raised-faced flanges



## Kvs and differential pressure values

DN	Kvs [m <sup>3</sup> /h]								Δ p <sub>max</sub> [kPa]	
	1	2	3	4	5	6	7	8	250 N	500 N
15	4.0	2.5	1.6	1.0	0.63	0.4	0.25	0.16 <sup>1)</sup>	400	400
20	6.3	---	---	---	---	---	---	---	400	400
25	10.0	---	---	---	---	---	---	---	350	400
32	16.0	---	---	---	---	---	---	---	220	400
40	25.0	---	---	---	---	---	---	---	130	300

Dvoucestné provedení DN 15 až 25 charakteristika LDMspline®, DN 32 a 40 charakteristika lineární.

Trojcestné provedení - charakteristika v obou větvích lineární.  
<sup>1)</sup> platí pouze pro dvoucestné provedení

## Valve complete specification No. for ordering RV 111 S (COMAR)

		XX	XXX	X	XX	X X	XX	/	XXX	-	XX	/	X
1. Valve	Control valve	RV											
2. Series	Valve with external thread		111										
3. Type of actuating	Hand wheel with possibility of using electric actuator			S									
4. Execution	Two-way				2								
	Three-way				3								
5. Body material	Grey cast iron				3								
6. Flow characteristic	Linear (two-way execution DN 32, 40 and three-way execution)					1							
	LDMspline® (two-way execution DN 15 to 25)					3							
7. Kvs	Column No. acc. to Kvs values table					X							
8. Nominal pressure	PN 16						16						
9. Max. temperature °C	150 °C								150				
10. Nominal size	DN 15 to 40										XX		
11. Connection	Threaded connection												T
	Raised-faced flanges												F
	Weld unions												W

Ordering example: RV111 S 2331 16/150-25/T

Actuator must be specified separately.

## Available actuators

Sauter	Electric actuator AVM 105	AC 24 V or 230 V, 3-position control, 250 N
	Electric actuator AVM 115	AC 24 V or 230 V, 3-position control, 500N
	Electric actuator AVM 105S	AC 24 V, SUT control technology 0-10V, 250N
	Electric actuator AVM 115S	AC 24 V, SUT control technology 0-10V, 500N

# ANT3-5.1x(SC)



## LDM electric actuators

### Description

Electromechanical actuators ANT3-11 are designed to control the regulating valves LDM series RV 122 BEE line and actuators ANT3-5 to control regulating valves RV 111 COMAR line. Its connection to the valve ensures a zero clearance between stem of the actuator and the valve so the precise regulating ability is ensured even for minimal position changes. The actuators are self-adaptive. The end positions are limited by the valve stroke. To communicate with a control system, the actuators are equipped with either standard 3-position control or proportional control (options: 0..10 V, 2..10 V, 0..20 mA or 4..20 mA). The version marked "SC" contains electronically controlled fail-safe function activated by power supply failure, by valves with proportional control by failure of voltage at NF terminal as well. In setting mode for the actuators with proportional control it is possible to define a final position in percentage of the stroke value. The actuator automatically runs into that position when the fail-safe function is induced. Standard setting is position "closed". As a source of energy for the fail-safe function, there are block of capacitors which are continuously charged when the actuator is in operation. Service life of capacitors is 10 years what corresponds with service life of the actuator under standard conditions. All the types of ANT actuator are equipped with hand wheel for manual operating.

### Application

The actuators in combination with LDM valves are designed especially for applications in heating, air-conditioning and refrigerating. There they can take advantage of combination of control flow characteristic LDMspline<sup>®</sup> optimized for heat transfer processes and precision and reliability provided by simple mechanic design. In some applications, it is possible to make use of its fail-safe function which is induced by voltage failure at given terminal and puts the valve to previously defined position.

### Properties

- Easy assembly to the valve without the necessity of any adjusting. No tools required.
- Self-adaptive function precisely sets the stroke range according to the limit positions of the valve stroke.
- Hand wheel for operating in case of emergency
- Stroke indicator for information on actual open position of the valve.
- Option of equipping with resistance feedback or adjustable position switch (for actuators with 3-position control without safety function)
- Intelligent microprocessor control (for actuators with a fail-safe function and proportional control)
- Automatic recognition of presence of impurities between the seat and plug of the valve including an algorithm for self-cleaning function (for actuators with proportional control)
- Option of control signal 0..10 V, 2..10 V, 0..20 mA, 4..20 mA (for actuators with proportional control)
- Option of adjusting a final position for actuators with fail-safe function in range of 0..100% of the stroke.
- Possibility to read history and detection of failures (for actuators with microprocessor)
- Long service life and reliability with a sophisticated and patented design due to a selection of high quality materials
- Feedback 0(2)-10V or 0(4)-20mA for actuators with microprocessor control
- Possibility of digital control (protocol MODBUS)
- Adjustable sensitivity (dead band)

### Technical data of actuators ANT3-5

Type ANT3-...	5.10	5.11	5.10SC	5.11SC
Voltage (± 10%)	24 V AC	24 V AC/DC		
Frequency	50 Hz			
Control	3-position	0..10 V, 4..20 mA	3-position	0..10 V, 4..20 mA
Power consumption	1,5 VA	14 VA	14 VA	14 VA
Nominal force	300 N + 30%			
Nominal stroke	ANT3-5.xx ... 5,5 mm			
Open-close run time 50 Hz	66 s	5 s	33 s	5 s
Fail-safe function	---	---	8 s	8 s
Feedback	100 Ω, 1 kΩ <sup>1)</sup>	0(2)-10V; 0(4)-20mA <sup>2)</sup>		
Adjustable position switch	PS1 <sup>1)</sup>	---	---	---
Impedance of input control signal	---	≥ 10 kΩ (V) 250 Ω (mA)	---	≥ 10 kΩ (V) 250 Ω (mA)
Enclosure	IP 54 (IEC 60529)			
Medium max. temp.	150°C			
Ambient temp. range	-5 to +55°C			
Ambient humidity range	5 .. 95 % relative humidity			
Storage conditions	-15 to +55 C°, 5 .. 95 % relative humidity			
Weight	0,7 kg		0,8 kg	

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

<sup>2)</sup> Standard equipment. It shall be clearly specified in the order (type and range of feedback signal, basic execution 0-10V)

## Optional accessories

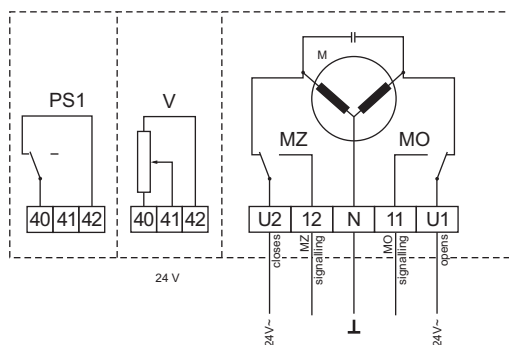
Resistance position transmitter	0..100 Ω or 0..1000 Ω	(for 3-position control actuators only without safety function)
Adjustable position switch PS1		(for 3-position control actuators only without safety function)

## Wiring diagrams of actuators

Note: ANT3-5 ... closes the valve by retracting its stem: 

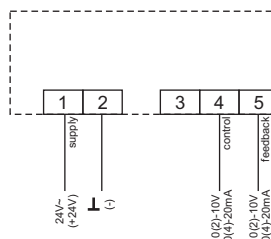
### ANT3-5.20 ANT3-5.22

3-position control, 24 V AC



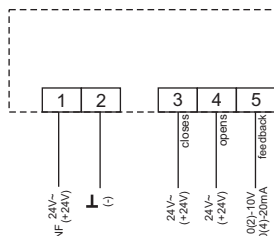
### ANT3-5.21

Proportional control, 24 V AC/DC



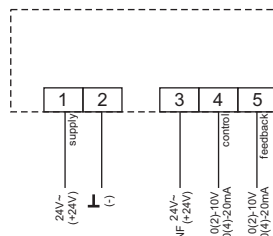
### ANT3-5.20SC

3-position control, 230 V AC, fail-safe function



### ANT3-5.21SC

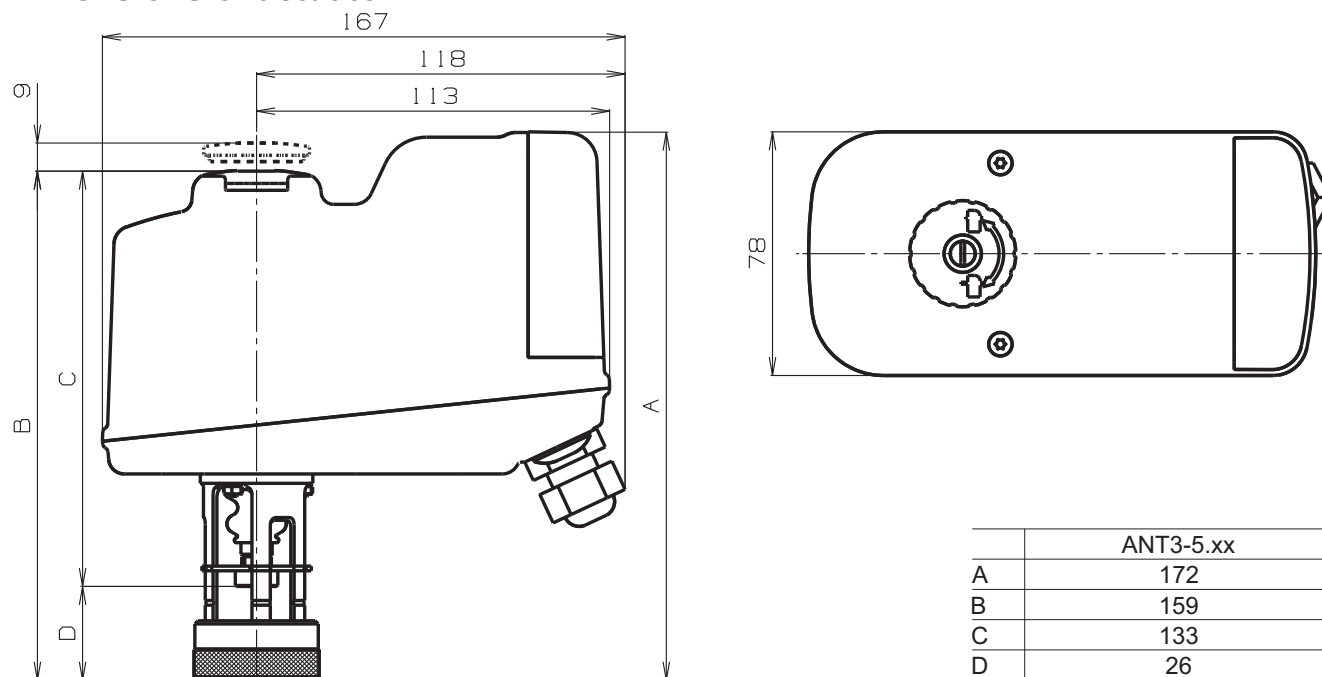
Proportional control, 230 V AC, fail-safe function



- MO power switch for "Open" position
- MZ power switch for "Closed" position
- M motor
- V feedback 100Ω or 1000Ω
- Ps1 adjustable position switch (max. 0,5 A)
- NF terminal fail-safe function
- 11, 12 terminals signalling of end positions (max. 0,5 A)

Type of control and feedback signal (voltage or current) are adjusted from production and it is not possible to change it. Range is adjustable using PC and software ANT3.

## Dimensions of actuator



# ANT3-5.2x(SC)



## LDM electric actuators

### Description

Electromechanical actuators ANT3-11 are designed to control the regulating valves LDM series RV 122 BEE line and actuators ANT3-5 to control regulating valves RV 111 COMAR line. Its connection to the valve ensures a zero clearance between stem of the actuator and the valve so the precise regulating ability is ensured even for minimal position changes. The actuators are self-adaptive. The end positions are limited by the valve stroke. To communicate with a control system, the actuators are equipped with either standard 3-position control or proportional control (options: 0..10 V, 2..10 V, 0..20 mA or 4..20 mA). The version marked "SC" contains electronically controlled fail-safe function activated by power supply failure, by valves with proportional control by failure of voltage at NF terminal as well. In setting mode for the actuators with proportional control it is possible to define a final position in percentage of the stroke value. The actuator automatically runs into that position when the fail-safe function is induced. Standard setting is position "closed". As a source of energy for the fail-safe function, there are block of capacitors which are continuously charged when the actuator is in operation. Service life of capacitors is 10 years what corresponds with service life of the actuator under standard conditions. All the types of ANT actuator are equipped with hand wheel for manual operating.

### Application

The actuators in combination with LDM valves are designed especially for applications in heating, air-conditioning and refrigerating. There they can take advantage of combination of control flow characteristic LDMspline<sup>®</sup> optimized for heat transfer processes and precision and reliability provided by simple mechanic design. In some applications, it is possible to make use of its fail-safe function which is induced by voltage failure at given terminal and puts the valve to previously defined position.

### Properties

- Easy assembly to the valve without the necessity of any adjusting. No tools required.
- Self-adaptive function precisely sets the stroke range according to the limit positions of the valve stroke.
- Hand wheel for operating in case of emergency
- Stroke indicator for information on actual open position of the valve.
- Option of equipping with resistance feedback or adjustable position switch (for actuators with 3-position control without safety function)
- Intelligent microprocessor control (for actuators with a fail-safe function and proportional control)
- Automatic recognition of presence of impurities between the seat and plug of the valve including an algorithm for self-cleaning function (for actuators with proportional control)
- Option of control signal 0..10 V, 2..10 V, 0..20 mA, 4..20 mA (for actuators with proportional control)
- Option of adjusting a final position for actuators with fail-safe function in range of 0..100% of the stroke.
- Possibility to read history and detection of failures (for actuators with microprocessor)
- Long service life and reliability with a sophisticated and patented design due to a selection of high quality materials
- Feedback 0(2)-10V or 0(4)-20mA for actuators with microprocessor control
- Possibility of digital control (protocol MODBUS)
- Adjustable sensitivity (dead band)

### Technical data of actuators ANT3-5

Type ANT3-...	5.20	5.22	5.21	5.20SC	5.21SC
Voltage (± 10%)	230 V AC				
Frequency	50 Hz				
Control	3-position		0..10 V, 4..20 mA	3-position	0..10 V, 4..20 mA
Power consumption	3 VA		10 VA	10 VA	10 VA
Nominal force	300 N + 30%				
Nominal stroke	ANT3-5.xx ... 5,5 mm				
Open-close run time 50 Hz	66 s	33 s	5 s	33 s	5 s
Fail-safe function	---		---	8 s	8 s
Feedback	100 Ω, 1 kΩ <sup>1)</sup>			0(2)-10V; 0(4)-20mA <sup>2)</sup>	
Adjustable position switch	PS1 <sup>1)</sup>		---	---	---
Impedance of input control signal	---		≥ 10 kΩ (V) 250 Ω (mA)	---	≥ 10 kΩ (V) 250 Ω (mA)
Enclosure	IP 54 (IEC 60529)				
Medium max. temp.	150°C				
Ambient temp. range	-5 to +55°C				
Ambient humidity range	5 .. 95 % relative humidity				
Storage conditions	-15 to +55 C°, 5 .. 95 % relative humidity				
Weight	0,7 kg			0,8 kg	

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


<sup>2)</sup> Standard equipment. It shall be clearly specified in the order (type and range of feedback signal, basic execution 0-10V)



## Optional accessories

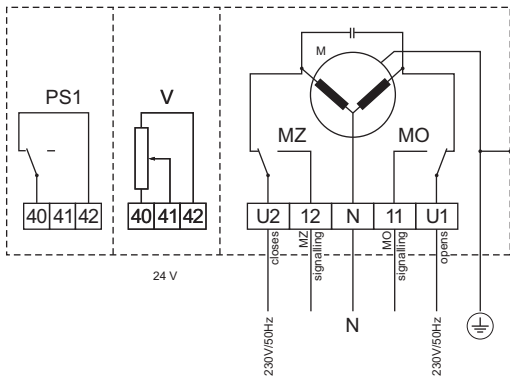
Resistance position transmitter	0..100 Ω or 0..1000 Ω	(for 3-position control actuators only without safety function)
Adjustable position switch PS1		(for 3-position control actuators only without safety function)

## Wiring diagrams of actuators

Note: ANT3-5 ... closes the valve by retracting its stem: 

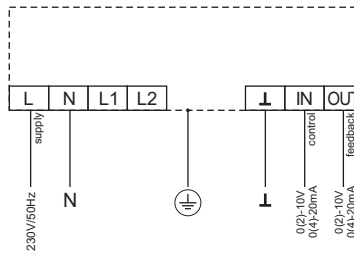
### ANT3-5.20 ANT3-5.22

3-position control, 230 V AC



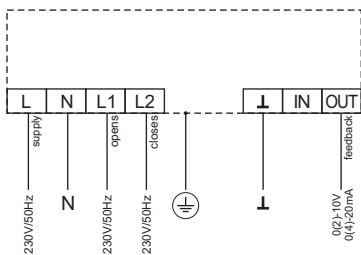
### ANT3-5.21

Proportional control, 230 V AC



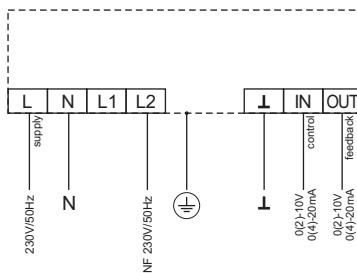
### ANT3-5.20SC

3-position control, 230 V AC,  
fail-save function



### ANT3-5.21SC

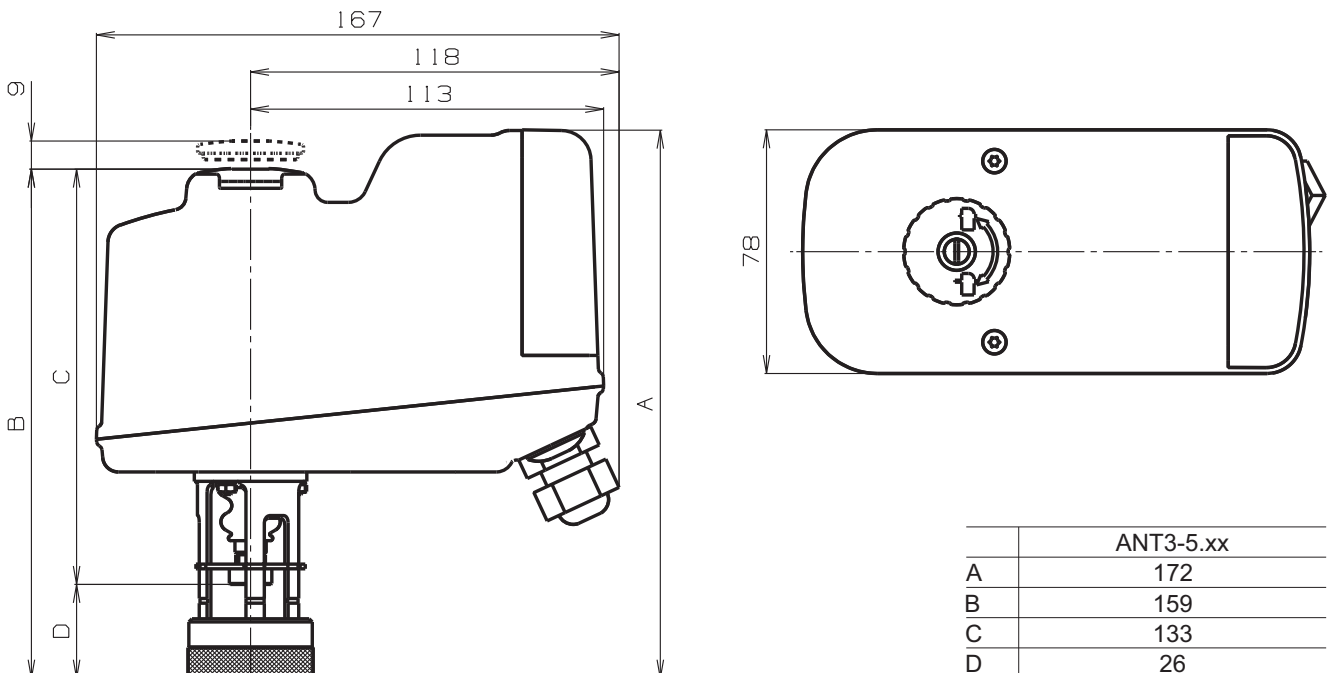
Proportional control, 230 V AC,  
fail-save function



- MO power switch for "Open" position
- MZ power switch for "Closed" position
- M motor
- V feedback 100Ω or 1000Ω
- Ps1 adjustable position switch (max. 0,5 A)
- NF terminal fail-safe function
- 11, 12 terminals signalling of end positions (max. 0,5 A)

Type of control and feedback signal (voltage or current) are adjusted from production and it is not possible to change it. Range is adjustable using PC and software ANT3.

## Dimensions of actuator



# SSC31 SSC61... SSC81



**Electric actuators  
Siemens (Landis & Staefa)**

## Technical data

Type	SSC31	SSC61	SSC61.5	SSC81
Voltage	AC 230 V	DC 24 V nebo AC 24 V		AC 24 V
Frequency	50 / 60 Hz			
Motor power	6 VA	2 VA	2 VA (3 VA when condenser fully charged)	0,8 VA
Control	3 - position	DC 0 - 10 V		3 - bodové
Open-close running time	150 s	30 s		150 s
Fail-safe function	---	---	30 s	---
Nominal force	300 N			
Stroke	5,5 mm			
Enclosure	IP 40			
Proces medium max. t.	2 to 110°C			
Ambient temp. range	5 to 50°C			
Ambient humidity range	0 ... 95 % without condensation			
Weight	0,26 kg	0,25 kg	0,27 kg	0,25 kg

## Wiring diagram

### Terminal board

**SSC31**

Y2	4895Z706	Control signal CLOSE (AC 230 V)
Y1		Control signal OPEN (AC 230 V)
N		Zero

**SSC81**

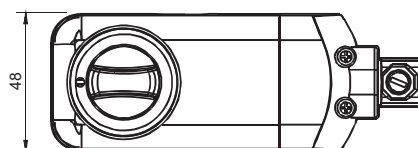
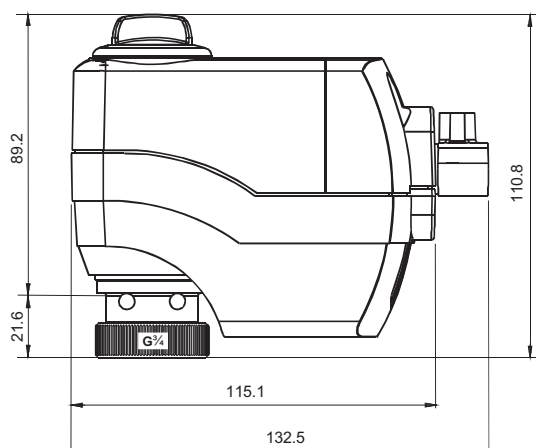
Y2	4895Z715	Control signal CLOSE (AC 24 V)
Y1		Control signal OPEN (AC 24 V)
G		Phase AC 24 V

**SSC61**

Y	4895Z21	Control signal DC 0...10 V
G		Phase AC 24 V (+ with DC 24 V)
G0		System neutral (- with DC 24 V)

## Dimensions of actuator

All dimensions in mm





## Electric actuators Siemens (Landis & Staefa)

### Technical data

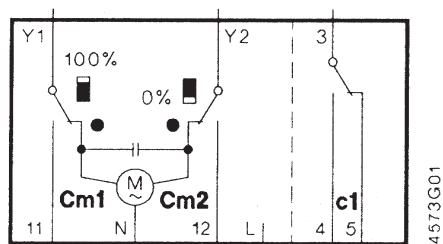
Type	SQS 35.00	SQS 35.03	SQS 35.50	SQS 35.53
Voltage	AC 230 V			
Frequency	50 / 60 Hz			
Motor power	2,5 VA	3,5 VA	5 VA	6 VA
Control	3 - position control			
Open-close running time	150 s	35 s	150 s	35 s
Fail-safe action time	---		8 s	
Nominal force	300 N			
Stroke	5,5 mm			
Enclosure	IP 54			
Process medium max. temp.	130°C			
Ambient temperature range	-5 to 50°C			
Ambient humidity limit	Class D, DIN 40040			
Weight	0,5 kg		0,6 kg	

### Accessories

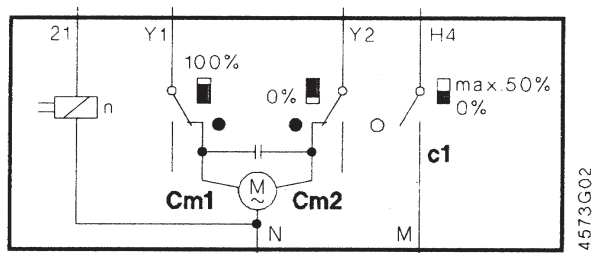
For SQS 35.00 and SQS 35.03    Auxiliary switch ASC 9.6

### Wiring diagram

SQS 35.00 and SQS 35.03

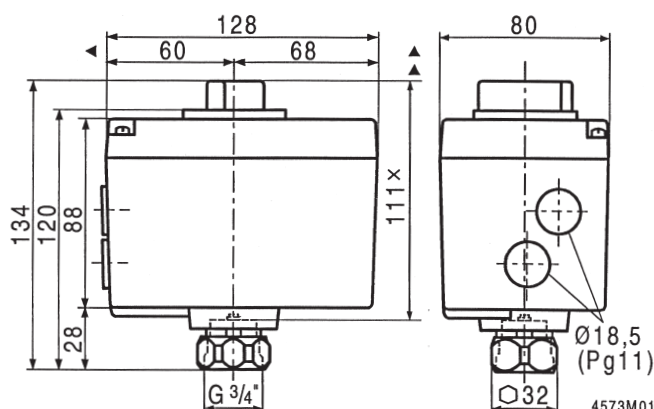


SQS 35.50 and SQS 35.53



- Cm1 end position switch for stroke 100%
- Cm2 end position switch for stroke 0%
- c1 auxiliary switch ASC9.6
- Y1 opening of control valve
- Y2 closing of control valve
- 21 fail-safe function
- N measuring neutral

### Actuator dimensions



x - dimensions for valve connection

# SQS65.5



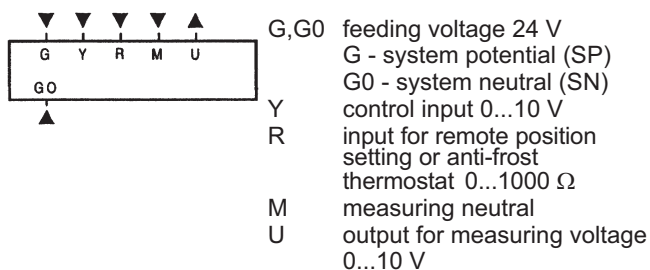
## Electric actuator Siemens (Landis & Staefa)

### Technical data

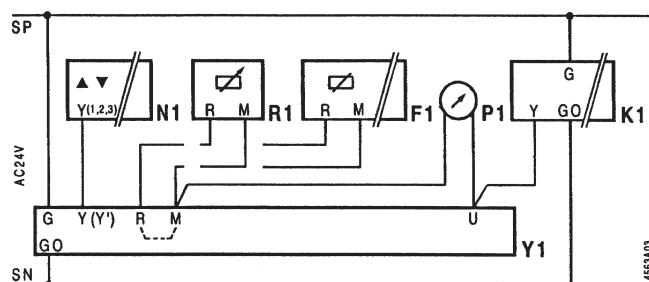
Type	SQS 65.5
Voltage	24 V
Frequency	50 / 60 Hz
Motor power	7 VA
Control	0...10 V
Open-close running time	35 s
Fail-safe action time	8 s
Nominal force	300 N
Stroke	5,5 mm
Enclosure	IP 54
Process medium max. temp.	130°C
Ambient temp. range	-5 to 50°C
Ambient humidity limit	Class D, DIN 40040
Weight	0,6 kg

### Wiring diagram

Terminal board

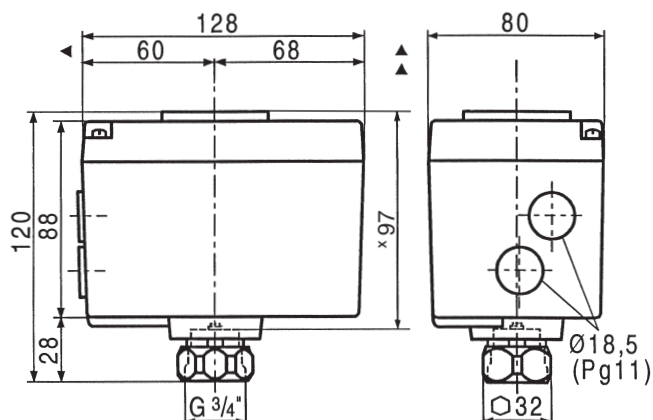


SQS 35.50 and SQS 35.53



- F1 anti-frost thermostat
- K1 two-position switch
- N1 regulator
- P1 position indicator
- R1 device for remote position control
- Y1 actuator

### Dimensions of actuator



x - dimension for valve connection

# AVM 105 AVM 115



## Electric actuators Sauter

### Technical data

Type	AVM 105 F100	AVM 105 F120	AVM 105 F122	AVM 115 F120	AVM 115 F122
Voltage	230 V AC	230 V AC	24 V AC	230 V AC	24 V AC
Frequency	50 / 60 Hz				
Motor power	4,5 VA	4,0 VA	1,7 VA	4,0 VA	1,7 VA
Control	3-position; 2-position				
Open-close running time	30 s				120 s
Nominal force	250 N			500 N	
Stroke	max. 8 mm				
Enclosure	IP 54				
Process medium max. temp.	100°C, with cooling intermediate piece 130°C or 150°C				
Ambient temperature range	-10 až 55°C				
Ambient humidity limit	< 95% r. v. without condensation				
Hand control	Little handle - additional accessories				
Weight	0,7 kg				

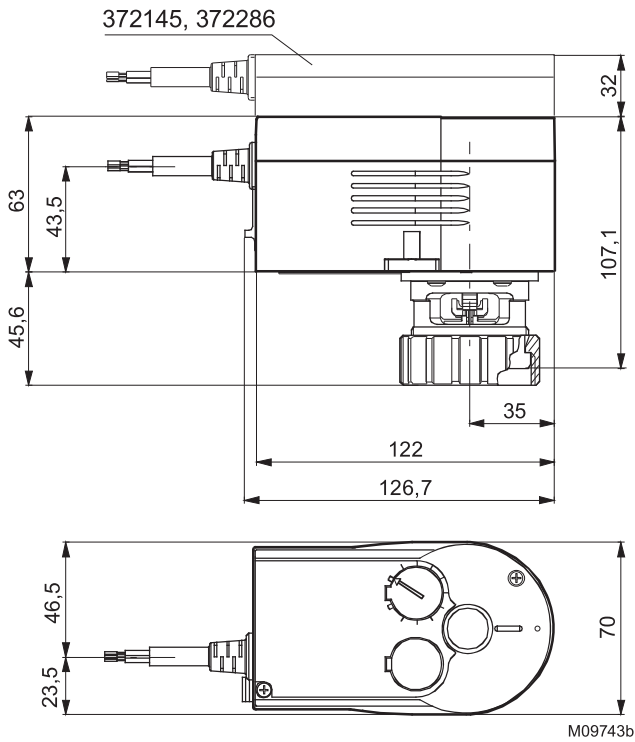
See original producer's catalogue sheets for further detailed information about actuators.

### Accessories

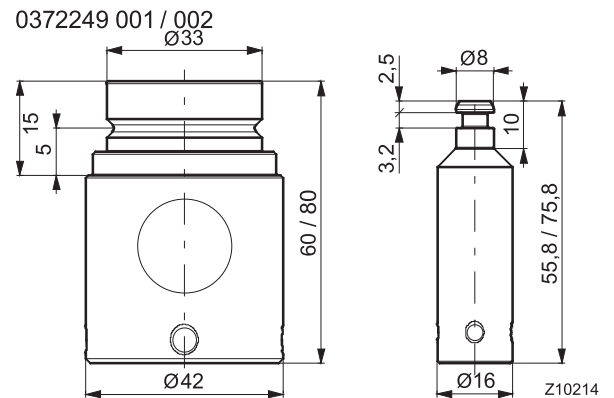
0372145 001*)	Single auxiliary change-over contacts. MV 505795
0372145 002*)	Double auxiliary change-over contacts. MV 505795
0372249 001	Intermediate piece required for media temperature >100 °C (recommended for temperature < 10 °C); MV 505932
0372249 002	Intermediate piece required for media temperature up to 150°C; MV 505932
0372286 001*)	Potentiometer 130 Ω; MV 505795
0372286 002*)	Potentiometer 1000 Ω; MV 505795
0372286 003*)	Potentiometer 5000 Ω; MV 505795
0372320 001	Allen key for manual adjustment

\*) Only one potentiometer or one set of auxiliary contacts can be fitted to each drive!

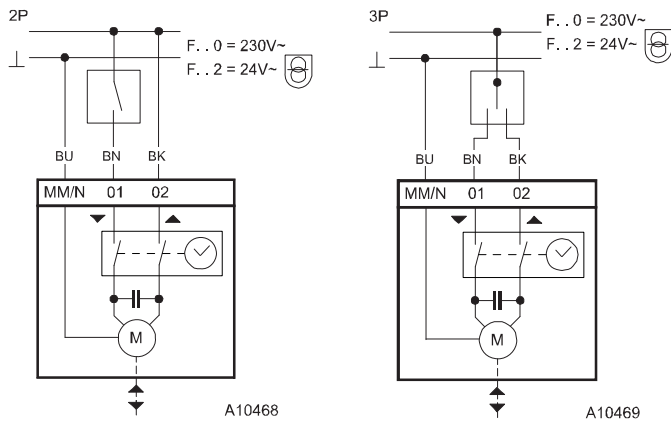
## Actuator dimensions



## Cooling intermediate piece

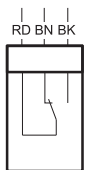


## Wiring diagram



## Accessories

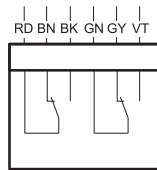
372145 001



A09782

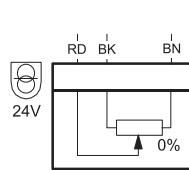
BU = blue  
BN = brown  
BK = black  
RD = red  
GY = grey  
GN = green  
VT = violet

372145 002



A10183

0372286



A10379

# AVM 105S AVM 115S

**Electric actuators  
Sauter**



## Technical Data

Type	AVM 105S F132	AVM 115S F132
Execution	Electric actuator with SUT technology	
Frequency	24 V AC 230 V AC $\pm$ 20%, 50..60 Hz / 24 V DC +20% / -10%	
Motor power	8,5 VA	8,7 VA
Control	0 - 10 V; 3-position; 2-position	
Fail-safe action time	Adjustable 35, 60, 120 s	Adjustable 60, 120 s
Nominal force	250 N	500 N
Stroke	max. 8 mm	
Enclosure	IP 54	
Process medium max. temp.	100°C, with cooling intermediate piece 130°C or 150°C	
Ambient temperature range	-10 to 55°C	
Ambient humidity limit	< 95% r. v. without condensation	
Hand control	Little handle - additional accessories	
Weight	0,7 kg	

See original producer's catalogue sheets for further detailed information about actuators.

## Accessories

0313529 001	Split-range unit for setting sequences; to be fitted in separate distribution box as per MV 505671
0372145 001*)	Single auxiliary change-over contacts. MV 505795
0372145 002*)	Double auxiliary change-over contacts. MV 505795
0372249 001	Intermediate piece required for media temperature >100 °C (recommended for temperature < 10 °C); MV 505932
0372249 002	Intermediate piece required for media temperature up to 150°C; MV 505932
0372286 001*)	Potentiometer 130 $\Omega$ ; MV 505795
0372286 002*)	Potentiometer 1000 $\Omega$ ; MV 505795
0372286 003*)	Potentiometer 5000 $\Omega$ ; MV 505795
0372320 001	Allen key for manual adjustment
0372462 001	CASE Drives PC Tool for configuration of actuators per computer; MV 506101

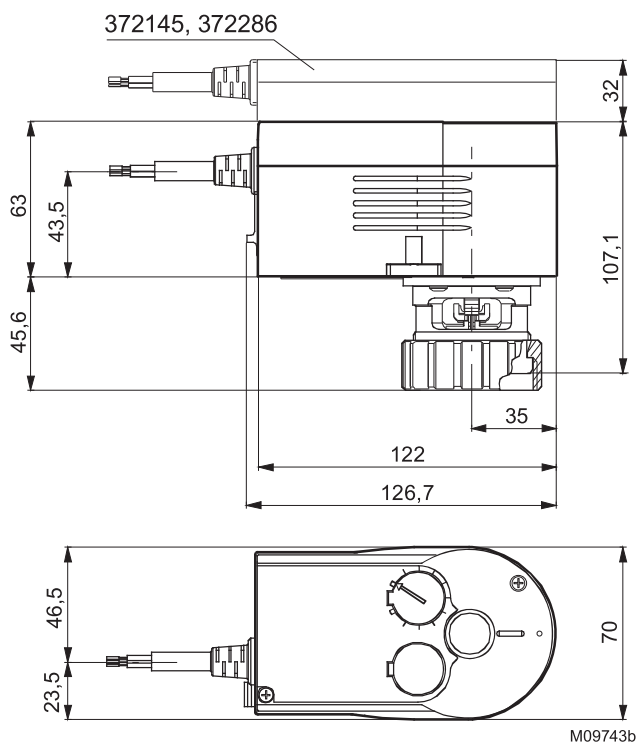
\*) Only one potentiometer or one set of auxiliary contacts can be fitted to each drive!

## SUT - Sauter Universal Technology

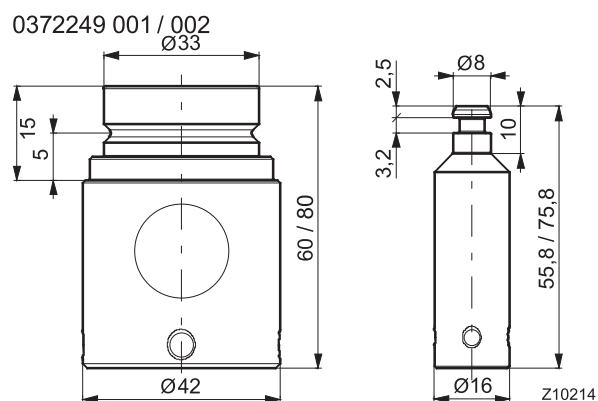
- Stepping motor with SUT (SAUTER Universal Technology) electronic control unit and electronic load-dependent cut-off
- Automatic detection of control signal applied (continuous or switching)
- The type of characteristic curve (linear, quadratic or equal percentage) can be set in the actuator
- Independent adaptation to valve stroke
- Direction of travel can be set on cable
- Coding switch for selection of characteristic and running time (35, 60 or 120 s)



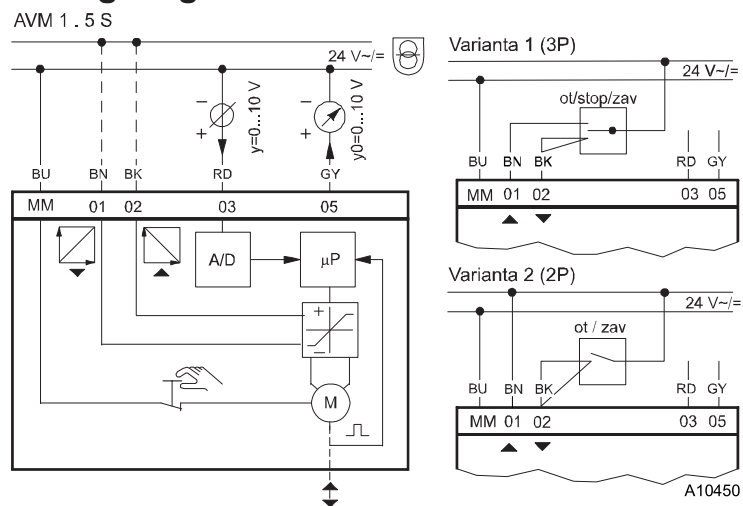
## Actuator dimensions



## Cooling intermediate piece

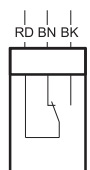


## Wiring diagram



## Accessories

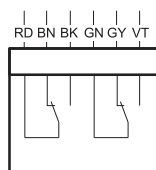
372145 001



A09782

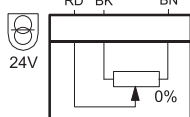
BU = blue  
BN = brown  
BK = black  
RD = red  
GY = grey  
GN = green  
VT = violet

372145 002



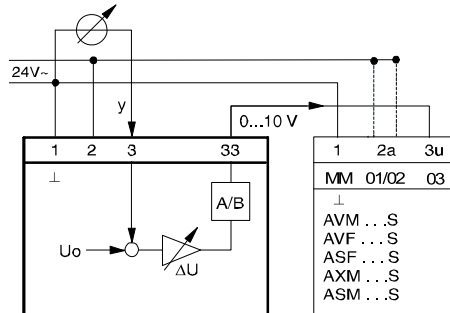
A10183

0372286



A10379

0313529



A09421c

## Maximal permissible operating pressures [MPa]

Material	PN	Temperature [ °C ]										
		120	150	200	250	300	350	400	450	500	525	550
Grey cast iron EN-JL 1030 (EN-GLJ-200)	16	1,60	1,44	---	---	---	---	---	---	---	---	---
		---	---	---	---	---	---	---	---	---	---	---



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