

02 - 02.2

10.07.GB

**Control valves
RV 702**



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 quantity can be even regulated or not.

Because of eventual 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:

$$Kvs = 1.2 \div 1.3 Kv$$

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	$\frac{Q}{100} \sqrt{\frac{\rho_1}{\Delta p}}$	
	Gas	$\frac{Q_n}{5141} \sqrt{\frac{\rho_n \cdot T_1}{\Delta p \cdot p_2}}$	$\frac{2 \cdot Q_n}{5141 \cdot p_1} \sqrt{\rho_n \cdot T_1}$
	Superh. steam	$\frac{Q_m}{100} \sqrt{\frac{v_2}{\Delta p}}$	$\frac{Q_m}{100} \sqrt{\frac{2v}{p_1}}$
	Sat. steam	$\frac{Q_m}{100} \sqrt{\frac{v_2 \cdot x}{\Delta p}}$	$\frac{Q_m}{100} \sqrt{\frac{2v \cdot x}{p_1}}$

Above critical flow of vapours and gases

When pressure ratio is above critical ($p_2/p_1 < 0.54$), speed of flow reaches acoustic velocity at the narrowest section. This event can cause higher level of noisiness and then it is convenient to use a throttling system ensuring low noisiness (multi-step pressure reduction, damping orifice plate at outlet).

Cavitation

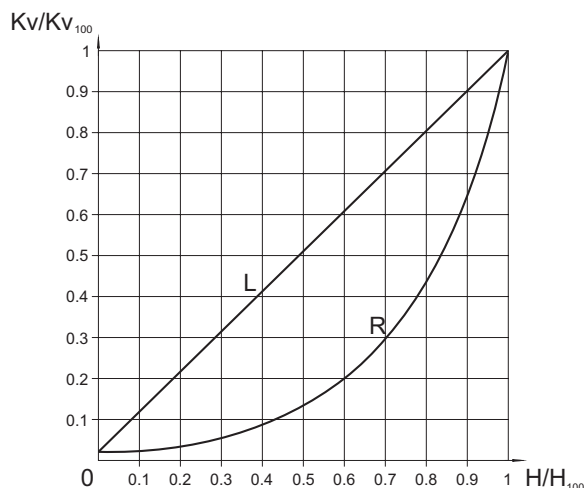
Cavitation is a phenomenon when there are steam bubbles creating and vanishing in shocks - generally at the narrowest section of flowing due to local pressure drop. This event

expressively cuts down service life of inner parts and can result in creation of unpleasant vibrations and noisiness. In control valves it can happen on condition that

$$(p_1 - p_2) \geq 0.6 (p_1 - p_s)$$

Valve differential pressure should be set the way so that neither any undesired pressure drop causing cavitation can occur, nor liquid-steam(wet steam) mixture can create. Otherwise it must be taken into account when calculating Kv value. If the creation of cavitation still threatens, it is necessary to use a multi-step pressure reduction.

Valve flow characteristics



L - linear characteristic

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

R - equal-percentage characteristic (4-percentage)

$$Kv/Kv_{100} = 0.0183 \cdot E^{(4 \cdot H/H_{100})}$$

Rangeability

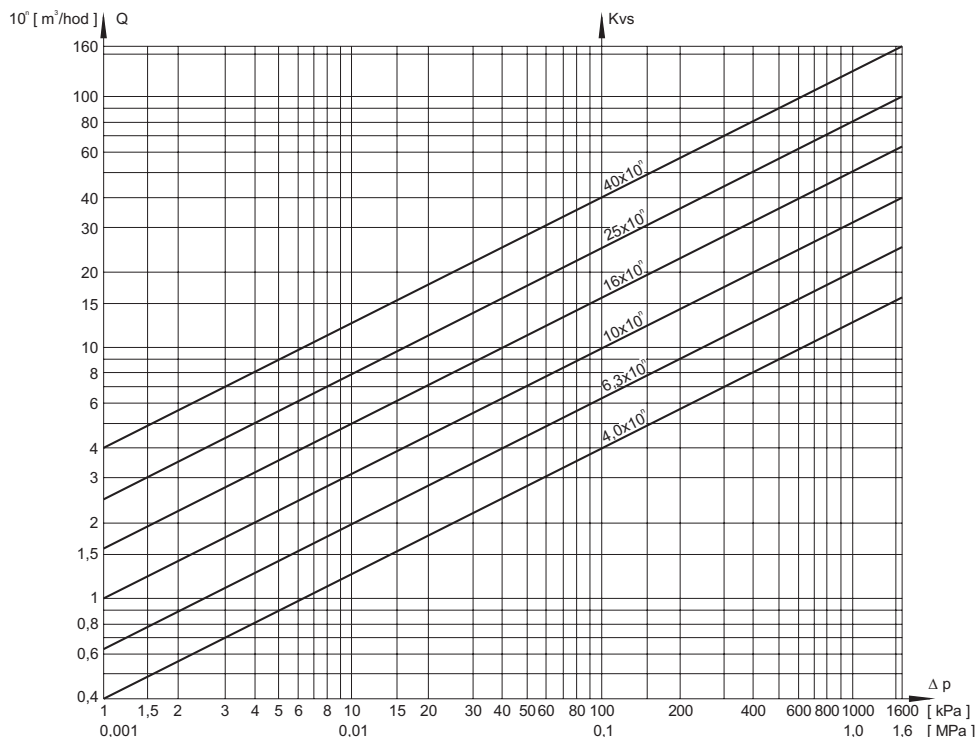
Rangeability is the ratio of the biggest value of flow coefficient to the smallest value. In fact it is the ratio (under the same conditions) of highest regulated flow rate value to its lowest value.

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

Dimensions and units

Marking	Unit	Name of dimension
Kv	m ³ /hour	Flow coefficient under conditions of units of flow
Kv ₁₀₀	m ³ /hour	Flow coefficient at nominal stroke
Kvs	m ³ /hour	Valve nominal flow coefficient
Q	m ³ /hour	Flow rate in operating conditions (T ₁ , p ₁)
Q _n	Nm ³ /hour	Flow rate in normal conditions (0 °C, 0.101 MPa)
Q _m	kg/hour	Flow rate in operating conditions (T ₁ , p ₁)
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)
Δp	MPa	Valve differential pressure (Δp = p ₁ - p ₂)
ρ ₁	kg/m ³	Process medium density in operating conditions (T ₁ , p ₁)
ρ _n	kg/Nm ³	Gas density in normal conditions (0 °C, 0.101 MPa)
v ₂	m ³ /kg	Specific volume of steam when temperature T ₁ and pressure p ₂
v	m ³ /kg	Specific volume of steam when temperature T ₁ and pressure p ₁ /2
T ₁	K	Absolute temperature at valve inlet (T ₁ = 273 + t ₁)
x	1	Proportionate weight volume of saturated steam in wet steam

Diagram for the valve Kvs value specification according to the required flow rate of water Q and the valve differential pressure Δp



The diagram serves to specify the valve Kvs value regarding to the required flow rate of water at a given differential pressure. It can be also used for finding out the differential pressure value of the existing valve in behaviour with the flow rate. The diagram applies to water with the density of 1000 kg/m³.

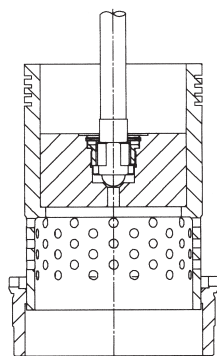
For the value $Q = q \cdot 10^n$, it is necessary to calculate with $Kvs = k \cdot 10^n$. Example: water flow rate of $16 \cdot 10^{-1} = 1,6 \text{ m}^3/\text{hour}$ corresponds to $Kv = 2,5 = 25 \cdot 10$ when differential pressure 40kPa.

Application of multi-step pressure reduction

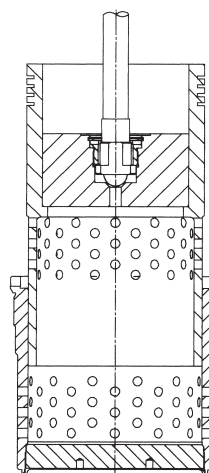
When the valves are designed for operation in above-critical differential pressure ($p_1/p_2 < 0,54$ when throttling steam and gases), or when diff. pressure value is higher than the recom-

mended service diff. pressure, it is effectual to use a throttling system in two or three steps to prevent the cavitation from creating and to ensure both a long service life of the valve inner parts and low noisiness when operating.

One-step pressure reduction



Two-step pressure reduction



Application of orifice plate

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



Control valves
Inlet DN 25, 50, 100, 125, 150, 250
Outlet DN 25 to 600
PN 16 to 400

Description

The valves with extended outlet series RV 702 are single-seated control valves of a unit construction designed to fit in all demands of an appliance the valve is designed for. The pressure-balanced, multi-step throttling system is always designed to eliminate the valve's high differential pressures with a high resistance to wearing caused by flow and effects of expanding steam. It also ensures a low noisiness level. The valve is equipped with packing "Live Loading".

The valves are delivered with weld ends.

The valves are actuated with linear actuators. The connection is designed for using both domestic and foreign actuators of the following producers: ZPA Nová Paka, ZPA Pečky, Regada Prešov, Auma, Schiebel, EMG-Drehmo, Foxboro.

Process media

The valves are especially designed to control the flow and pressure of vapours and gases without impurities. The producer recommends to pipe a strainer into pipeline in front of the valve when impurities are present. Impurities can affect the quality and reliability of regulation and can cause a reduction of the valve service life. The common process media are for example saturated or superheated steam and other media with no special demands on the used type of material of the valve. The valve application for any other media must be consulted with the producer because of the type of material that is in contact with the process medium.

Application

The sphere of application of these valves continues in the sphere for the valves series RV 502. They are especially designed for industry applications such as heating plants, power plants or regulation of technological processes. The max. permissible operating pressure values correspond to EN 12516-1, see page 23 of this catalogue.

Installation

The valves must be piped the way so that the process medium flow will coincide with the arrows indicated on the valve body. They can be installed in horizontal, vertical or inclined pipeline in any position except the position when the actuator is under the valve body. The valves DN 250 can be piped in horizontal pipeline only. The actuator cannot be tilted.

Recommended differential pressures

In regard to the pressure balancing of the plug and to linear forces of usable actuators, the valves' application in high differential pressures is not limited by the forces caused by process medium pressure but by the type of used throttling system. A recommended max. differential pressure for one step of multi-step pressure reduction is 5.0 MPa when perforated plug and perforated cage are used. It is recommended to consult the concrete cases with the producer with regard to pressure ratio and parameters of other equipment.

Technical data

Series	RV 702		
Execution	Control valve, single-seated, straight-through, with pressure-balanced plug, with extended outlet and orifice plate in extended outlet		
Range of nominal size	Inlet DN 25 to 250; outlet DN 25 to 600		
Nominal pressure	Inlet PN 160 to 320, outlet PN 16 to 250	Inlet PN 160 to 400, outlet PN 16 to 320	
Body material (including weld ends)	Cast steel 1.0619 (GP 240 GH)	Alloy steel 1.7357 (G17CrMo5-5)	Stainless steel 1.4931 (GX23CrMoV12-1)
Material of weld ends	1.0425 (P 265 GH)	1.7335 (13CrMo4-5)	1.4922 (X20CrMoV 11-1) 1.4923 (X22CrMoV 12-1) 1.4903 (X10CrMoVNb 9-1)
Seat material: DN 25, 50, 100, 125, 150, 250	17 021.6 (1.4006); 42 2906.5 (1.4027) + stellited seat STELIT 6		
Plug material: DN 25, 50, 100, 125, 150, 250	17 348.4 (1.4571) + stellited seat STELIT 6		
Operating temp. range	-20 to 400°C	-20 to 550°C	-20 to 600°C
Weld ends	Acc. to ČSN 13 1075 (3/1991)		
Trim	One or two-step pressure reduction Perforated plug - seat (cage), orifice plate		
Flow characteristic	Linear, equal-percentage		
Leakage rate	Acc. to ČSN EN 1349 (5/2001) Class III, execution with higher tightness Class V		
Packing	Graphite - Live Loading		

Range of Kvs values

DN	25/XXX	50/XXX	100/XXX	125/XXX	150/XXX	250/XXX
Multi-step pressure reduction	Kvs values [m ³ /h] - linear flow characteristic					
1	1.6 - 8.0	3.2 - 32	10 - 125	16 - 360 *)	16 - 360 *)	40 - 630
2	1.25 - 8.0	2.5 - 32	8.0 - 100	12.5 - 250	12.5 - 250	40 - 500
Multi-step pressure reduction	Kvs values [m ³ /h] - equal-percentage flow characteristic					
1	2.5 - 6.3	6.3 - 25	16 - 63	32 - 125	32 - 125	50 - 320
2	1.6 - 4.0	5.0 - 20	12.5 - 50	25 - 80	25 - 80	50 - 160

*) For PN 160 and 250 only, for PN 320 and 400
Kvs_{max} = 250 m³/h

Nominal values of Kvs are understood as multiplies of 10 of the progression of selected number R10 (1.0; 1.25; 1.6; 2.0; 2.5; 3.2; 4.0; 5.0; 6.3; 8.0; 10.0). They are specified individually for

every valve acc. to the customer's requirements and value within the appropriate range shown in the table above. Parameters of outlet (DN, PN) can be modified on request.

Dimensions and weights of RV 702 with weld ends *)

DN	V ₁	V ₂	V ₃	L	H	m	m _{max}
	[mm]	[mm]	[mm]	[mm]	[mm]	[kg]	[kg]
25/40	100	260	160	---	16	---	---
50/100	110	320	160	---	25	---	---
100/200	170	405	160	880	40	---	---
125/250	225	466	160	---	63	---	---
150/200	225	466	160	---	63	---	---
150/300	225	466	160	1015	63	---	---
250/500	345	675	210	---	100	---	---

*) There are only recommended combination of DN for inlet and outlet of RV 702 valve.

m - weight of the valve without orifice plates

m_{max} - weight of the valve with 3 orifice plates

Note: Mentioned weights are approximate. The missing data are to be specified by the producer.

Connecting dimensions of weld ends

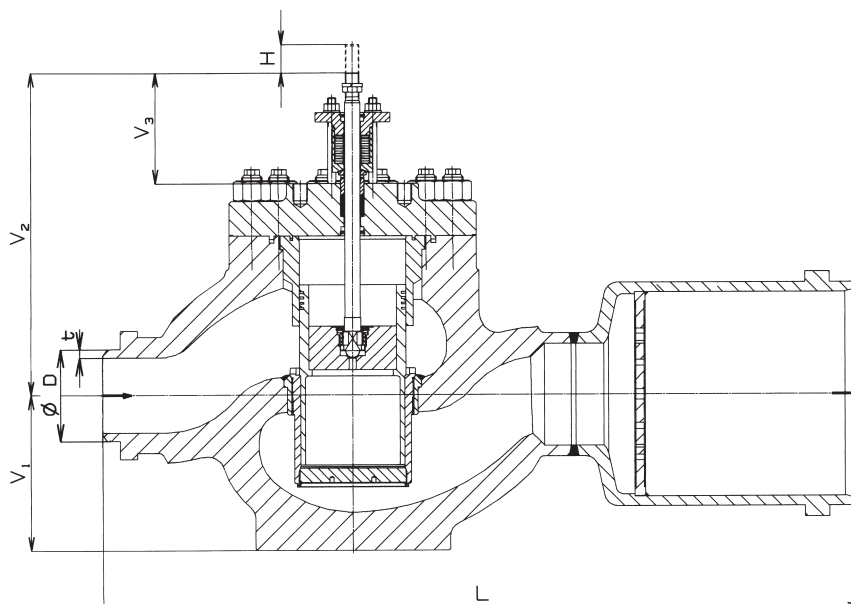
DN	PN							
	16 - 40	63	100	160	250	320**	400**	16-400
	t	t	t	t	t	t	t	D
	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
25	2.6	2.6	2.9	4	5	6	7.1	33.7
40	2.6	2.9	3.6	5	7	6.8	11	48.3
50	2.9	3.2	4.5	6.3	8	10	14.2	60.3
65	3.2	3.6	5	7	10	13	17.5	76.1
80	3.6	4	5.6	8	12.5	14.2	19	88.9
100	4	5	7	10	14	16	20	114.3
125	4.5	5.6	8	12.5	18	20	23	139.7
150	5	7	10	14	20	23	26	168.3
200	6.3	8	12.5	18	25	28	32	219.1
250	7	10	16	22	32	35	38	273
300	8	12.5	18	25				323.9
350	9	12.5	20	28				355.6
400	11	14	20	32				406.4
500	14	18	25					503
600*	18	23						610

* For DN 600 - weld ends connection acc. to LDM execution.

** For PN 320, 400 - weld ends connection acc. to LDM execution.

These combinations of DN and PN are not available

Control valve RV 702 with weld ends



Valve complete specification No. for ordering RV 701

		XX	X X X	X X X	X X X X	X X	-(XX/XX)	/	XXX	-(XX/XX)
1. Valve	Control valve	RV								
2. Series	Straight-through valve with extended outlet		7 0 2							
3. Type of actuating ¹⁾ Pneumatic actuators only for DN 150 ²⁾ Applicable to max. DN 150	Electric actuator			E						
	Pneumatic actuator			P						
	Electric actuator Modact MTR ²⁾			E P D						
	Electric actuator Modact MTN Control ²⁾			E Y A						
	Electric actuator Modact MTN ²⁾			E Y B						
	Electric pohn Modact MOP 52 030			E Y E						
	El. actuator Modact MOP Control 52 030			E Y F						
	Electric actuator Modact MOP 52 031			E Y G						
	El. actuator Modact MOP Control 52 031			E Y H						
	Electric actuator Auma SAR 7.5			E A G						
	Electric actuator Auma SAR Ex 7.5			E H H						
	Electric actuator Auma SAR 10.1			E A K						
	Electric actuator Auma SAR Ex 10.1			E A J						
	Electric actuator Schiebel rAB5			E Z G						
	Electric actuator Schiebel exrAB5			E Z H						
Electric actuator Schiebel rAB8			E Z K							
Electric actuator Schiebel exrAB8			E Z L							
Pneumatic actuator Foxboro PO 700 ¹⁾			P F G							
Pneumatic actuator Foxboro PO 1502 ¹⁾			P F D							
4. Connection	Weld ends				4					
5. Body material <i>(operating temp. ranges are specified in parentheses)</i>	Cast steel 1.0619 (-20 to 400°C)				1					
	Stainless steel 1.4931 (-20 to 600°C)				5					
	Alloy steel 1.7357 (-20 to 550°C)				7					
	Other material on request				9					
6. Packing	Graphite - Live Loading				5					
7. Multi-step pressure reduction	One-step pressure reduction				1					
	Two-step pressure reduction				2					
8. Flow characteristic	Linear - Leakage rate class III.					L				
	Linear - Leakage rate class V.					D				
	Equal-percentage - Leakage rate class III.					R				
	Equal-percentage - Leakage rate class V.					Q				
9. No. of orifice plate	Max. 3					X				
10. Nominal pressure	PN inlet / outlet						(XX/XX)			
11. Max. operating temp. °C	Acc. to process medium							XXX		
12. Nominal size	DN - acc. to the valve's execution									(XX/XX)

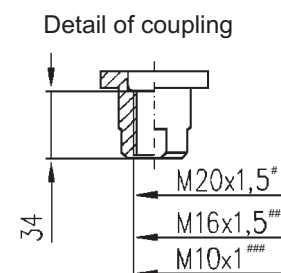
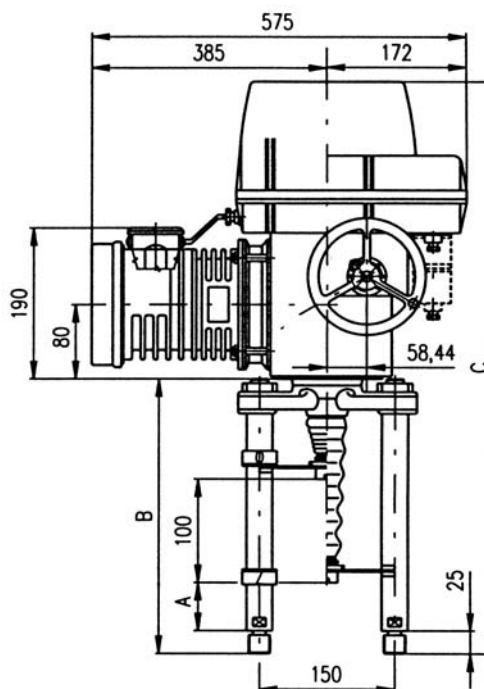
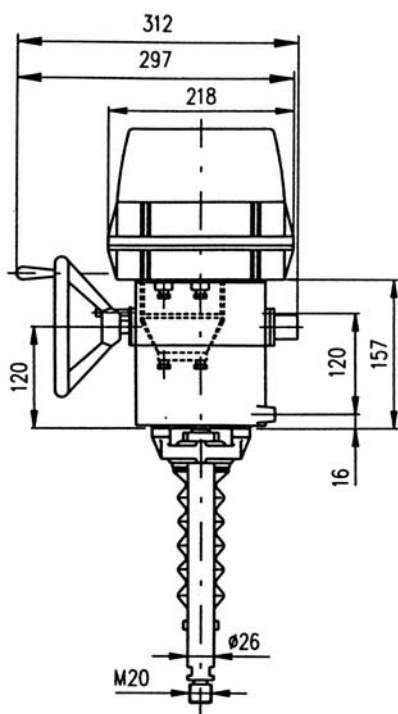
Order example: Two-way, control valve DN 80, PN 160, with electric actuator Modact MTN Control, body material: cast steel, weld ends, packing Graphite, two-step pressure reduction, linear flow characteristic is specified as follows: **RV 702 EYA 4152 L0 160/400-80.**

Note

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


**Electric actuator Modact MTR
Regada**
Technical data

Type	Modact MTR
Marking in valve specification No.	EPD
Voltage	230 V
Frequency	50 / 60 Hz
Motor power	16 or 25 W
Control	3 - pos. c. (in connection with NOTREP positioner - continuous)
Nominal force	10, 16, 25 kN
Travel	12,5 to 100 mm
Enclosure	IP 54 (IP 65 on request)
Process medium max. temperature	Acc. to used valve
Ambient temperature range	-25 to 50°C
Ambient humidity limit	90 % (tropical execution 100 % condensation)
Weight	27 to 31 kg

Dimensions of Modact MTR


Columns	with acme thread			Columns	with ball bolt		
	A	B	C		Version	A	B
P-1045a/C	130	378	707	P-1045a/H	130	400	729

^{#)} RV 702, DN 100÷150

^{##)} RV 702, DN 50

^{###)} RV 702, DN 25

Specification of Modact MTR

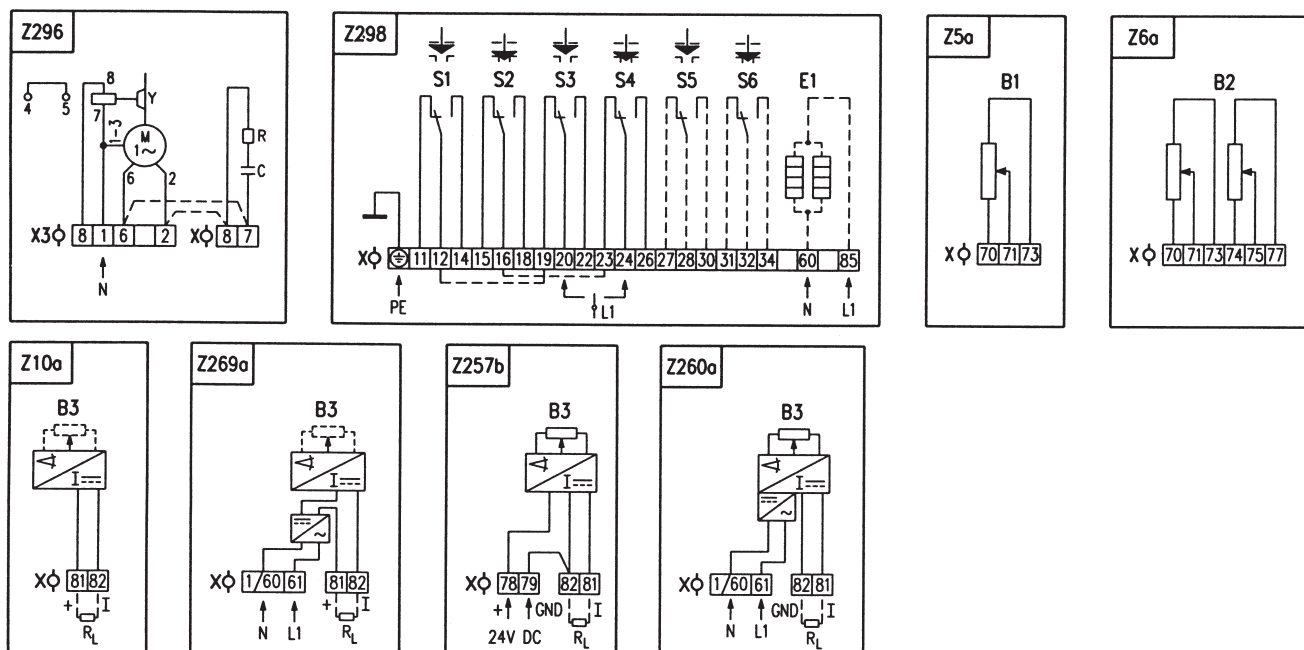
Electric actuator MTR, linear					52 420.	X	-	X	X	X	X	X	/	X	X				
Mild up to hot dry with temperature range (-25 °C to +50 °C)					0														
Electric connection		Voltage			Wiring diagram														
To terminal board		230 V AC			Z296														
To connector									9										
Screw version		Switching-off thrust ¹⁾²⁾	Rated operating speed	Operating speed	Electric motor														
ball screw					Power	Speed	Current												
	16 000/32-G	10.0 - 16.0 kN	32 mm/min.	38 - 32 mm/min.	16 W	1 150	0.31 A							E					
	25 000/32-G	10.0 - 25.0 kN	32 mm/min.	38 - 32 mm/min.	25 W	1 250	0.41 A							G					
	16 000/50-G	10.0 - 16.0 kN	50 mm/min.	60 - 50 mm/min.										H					
Control board version		Operating stroke			Wiring diagram														
Electromechanical control board - without local control		16 mm			Z298									B					
		25 mm															C		
		40 mm																E	
		63 mm																F	
Transmitter		Connection		Output		Wiring diagram													
Without transmitter		—		—		—									A				
Resistive	Single		—		1x100 Ω		Z5a								B				
	Double				2x100 Ω		Z6a									C			
	Single				1x2000 Ω		Z5a									F			
	Double				2x2000 Ω		Z6a									P			
Resistive with current converter	Without power supply		2-wire		4 - 20 mA		Z10a								S				
	With power supply				Z269a											Q			
	Without power supply		3-wire		0 - 20 mA		Z257a								T				
	With power supply				Z260a											U			
	Without power supply				4 - 20 mA		Z257a									V			
	With power supply				Z260a												W		
	Without power supply		3-wire		0 - 5 mA		Z257a								Y				
	With power supply				Z260a											Z			
Capacitive CPT	Without power supply		2-wire		4 - 20 mA		Z10a								I				
	With power supply				Z269a											J			
Mechanical connection	Connecting height / stroke		Pillar spacing / Bore of flange		Thread of stem ³⁾		Dimensional drawing												
Columns	130/100		150/ —		M20x1.5 M16x1.5, M10x1		P-1045a/C; P-1045a/H								C				
Additional equipment					Wiring diagram														
	Without additional equipment; adjusted max. switching-off thrust from range														0 1				
A	2 additional position switches S5,S6					Z298									0 2				
B	Adjustment of switching-off thrust for required value														0 3				

Combinations available and specification codes: A+B = 07

Notes:

- State the switching-off thrust in your order by words. If not stated it is adjusted to the maximum rate of the corresponding range. The load torque equals minimally the maximum switching-off thrust of the choosing range multiplied by 1.3.
- The maximum load thrust equals the max. Switching-off thrust multiplied by:
 - 0.8 for duty cycle S2-10 min., Or S4-25%, 6 - 90 cycles per hour
 - 0.6 for duty cycle S4-25%, 90 - 1200 cycles per hour
- The thread in the coupling is to be specified in the order by words.

Wiring diagram of actuator Modact MTR



Notes:

1. For the EA version with connection to the terminal board, the terminal 1/60 (the wiring diagrams Z269a and Z260a) is leaded out to the terminal No. 1.
2. For EA version with connection to the terminal board the actuator is not equipped by the jumper X3:6-X:7 and X3:2-X:8 (Z296) from manufacturing plant (it is necessary to connect it by customer).

Legend:

Z5a	connection of single resistive transmitter
Z6a	connection of double resistive transmitter
Z10a	connection of resistive with current converter of capacitive transmitter - 2-wire without supply
Z257b	connection of resistive transmitter with current converter - 3-wire
Z260a	connection of resistive transmitter with current converter - 3-wire with power supply
Z269a	connection of resistive transmitter with current converter or capacitive transmitter - 3-wire with power supply
Z296	connection of 1-phase electric motor
Z298	connection of thrust and position switches and space heater

B1	resistive transmitter (potentiometer) single
B2	resistive transmitter (potentiometer) double
B3	capacitive transmitter
S1	thrust switch "open"
S2	thrust switch "closing"
S3	position switch "open"
S4	position switch "closed"
S5	additional position switch "open"
S6	additional position "closed"
M	motor
C	capacitor
Y	motor's brake
E1	space heater
X	terminal board
X3	electric motor's terminal board
I/U	input (output) current (voltage) signals
R	reducing resistor
R _L	loading resistor



Electric actuators Modact MTN and Modact MTN Control ZPA Pečky

Technical data

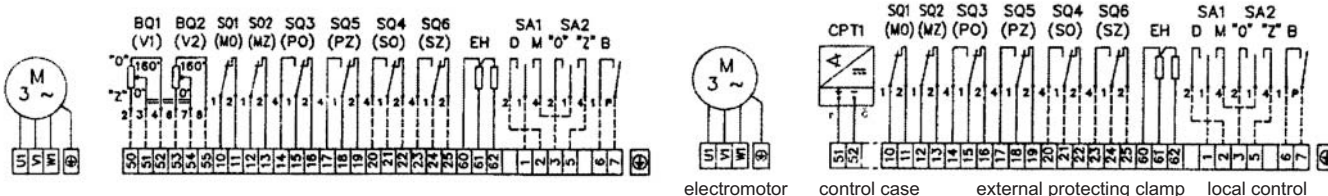
Type	Modact MTN Control	Modact MTN
Marking in valve specification No.	EYA	EYB
Voltage	3 x 220 V / 400 V (3 x 220 V/380V)	
Frequency	50 Hz	
Motor power	See specification table	
Control	3 - position control or continuous	
Nominal force	15000 and 25000 N	
Travel	10 to 100 mm	
Enclosure	IP 55	
Process medium max. temperature	Acc. to used valve	
Ambient temperature range	-25 to 55 °C	
Ambient humidity range	5 - 100 % with condensation	
Weight	45 kg	

Wiring diagram of actuator Modact MTN

Execution - terminal board

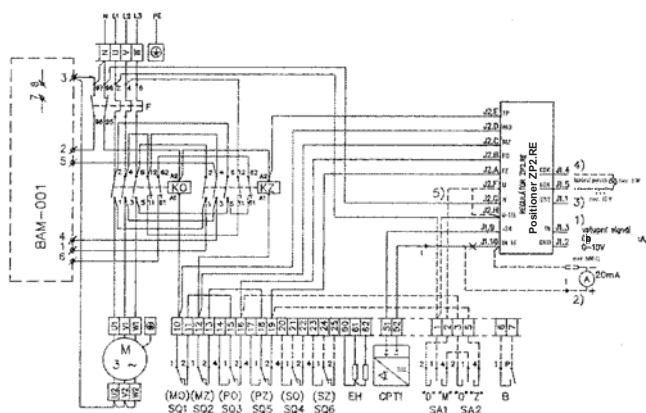
Position transmitter : resistance 2x100 W or without

Position transmitter : capacity CPT 1 1/A 4 - 20 mA



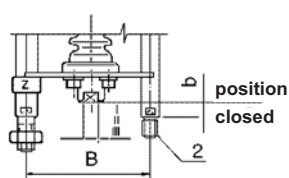
Wiring diagram of actuator Modact MTN Control

With current transmitter, built-in contactor combination, brake BAM and positioner.



- SQ1 (MO) power switch in "opening" direction
- SQ2 (MZ) power switch in "closing" direction
- SQ3 (PO) limit switch in "opening" direction
- SQ5 (PZ) limit switch in "closing" direction
- SQ4 (SO) signalisation switch in "opening" direction
- SQ6 (SZ) signalisation switch in "closing" direction
- EH heaters 2 x TR 551 10k/A
- CPT1 capacity position transmitter CPT1/A 4 - 20 mA
- BAM-001 dynamic brake
- KO contactor in "opening" direction
- KZ contactor in "closing" direction
- F thermal relay
- SA1 control switch "local - remote"
- SA2 switch "open - close"
- BQ1, BQ2 position transmitter 2 x 100 W
- ZP2.RE electronic positioner

Connection dimensions - details of additional specification 52 442

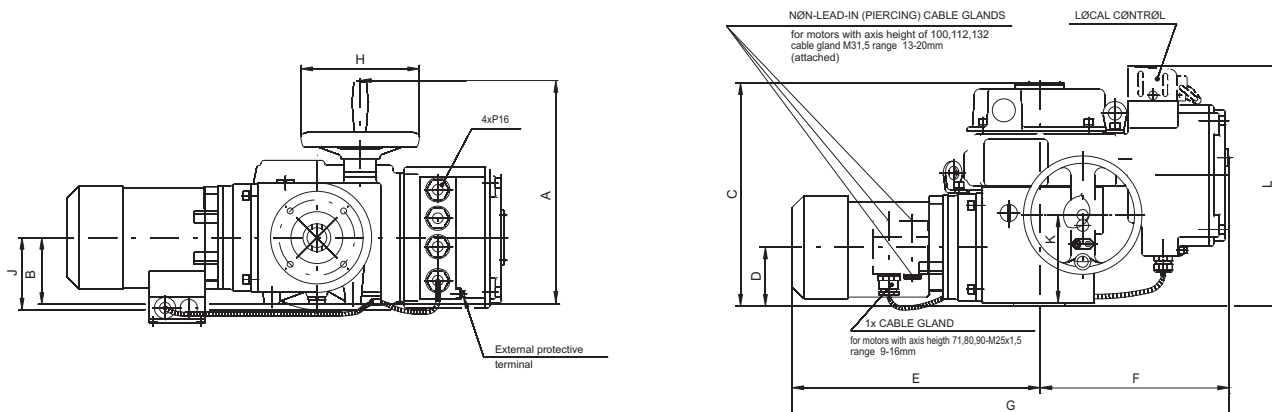


Columns pitch	B	150
Position "closed"	b	74
	g	130
	l	M 20x1,5
Clutch thread	II	M 16x1,5
	III	M 10x1

Execution	Specification No.		RV 702
	basic	additional	
Bg2II	52 442	XMXX	DN 40+80
Bg2III	52 442	XPXX	DN 25
Bg2I	52 442	XRXX	DN 100+250

DIMENSIONAL DRAWING OF ACTUATORS MODACT MOP CONTROL

52 030 a 52 031



Type marking	A	B	C	D	E	F	G	H	J	K	L
52 030	305	90	300	78	334	258	592	160	99	120	325
52 031	376	120	328	92	436	258	694	200	-	144	328

Specifikace pohonu Modact MOP

Connection dimensions		Output shaft type A	Via terminal board	XX XXX	X	X	X	X	X			
			With connector		5							
					F							
Local control, position indicator												
Resistance transmitter or execution without transmitter		Without local control, without position indicator						1				
		Local control						4				
Capacity transmitter CPT 1/A		Local control for actuators Modact MOP Control						7				
		Local control for actuators Modact MOP Control						B				
								E				
		Local control for actuators Modact MOP Control						H				
Type marking	Moment		Running speed	Stroke	Electromotor				52 030			
	Tripping	Driving			Power	rpm	I _n (400V)	I _z / I _n				
	(Nm)	(Nm)										
MØP 40/70 - 7	20-40	70	7	2-250	0,05	650	0,42	1,6	52 030			J
MØP 40/65 - 9		65	9		0,06	830	0,34	2,0				0
MØP 40/55 - 15		55	15		0,09	870	0,47	2,0				1
MØP 40/75 - 25		75	25		0,18	1350	0,56	3,0				2
MØP 40/65 - 40		65	40		0,25	1350	0,76	3,0				3
MØP 40/50 - 50		50	50		0,25	2830	0,68	4,0				4
MØP 40/60 - 80		60	80		0,37	2740	1,00	3,5				5
MØP 80/135 - 7	40-80	135	7	2-250	0,09	630	0,36	2,2	52 030			K
MØP 80/140 - 9		140	9		0,12	890	0,60	2,5				6
MØP 80/135 - 15		135	15		0,18	835	0,62	2,3				7
MØP 80/105 - 25		105	25		0,25	1350	0,76	3,0				8
MØP 100/130 - 9	63-100	130	9	2-250	0,12	890	0,60	2,5	52 031			0
MØP 100/130 - 15		130	15		0,25	850	0,78	2,7				1
MØP 100/150 - 25		150	25		0,37	920	1,20	3,1				2
MØP 100/170 - 40		170	40		0,55	1395	1,45	3,9				3
MØP 100/150 - 63		150	63		0,75	1395	1,86	4,0				4
MØP 100/200 - 80		200	80		1,1	2845	2,40	6,1				E
MØP 100/150 - 100		150	100		1,1	1410	2,65	4,3				5
MØP 100/150 - 145	150	145	1,5	2860	3,30	5,5	F					

the table continues on next page

continuation of the table of the specification of Modact MOP from the previous page

		XX XXX	X	X	X	X	X	
Signalization, position transmitter, blinker								
Only for actuators Modact MOP	Without signalisation, position transmitter and blinker						0	
	Position transmitter						1	
	Signalization switches						2	
	Signalization switches and position transmitter						3	
	Blinker						4	
	Position transmitter, blinker						5	
	Signalization switches and blinker						6	
	Signalization switches, position transmitter, blinker						7	
Signalization, position transmitter, blinker								
Only for actuators Modact MOP Control	Complete equipment Sch P-0781	Position transmitter					A	
		Signalization switches and position transmitter					B	
		Position transmitter, blinker					C	
		Signalization switches, position transmitter and blinker					D	
	Without positioner	Without signalization, without posit. transmitter and blinker						E
		Position transmitter						F
		Signalization switches						G
		Signalization switches and position transmitter						H
		Blinker						I
		Position transmitter, blinker						J
		Signalization switches, blinker						K
		Signalization switches, position transmitter and blinker						L
	Without positioner and brake BAM	Without signalization, without position transm. and blinker						M
		Position transmitter						N
		Signalization switches						Ø
		Signalization switches and position transmitter						P
		Blinker						R
		Position transmitter, blinker						S
		Signalization switches, blinker						T
		Signalization switches, position transmitter and blinker						U
This mark is valid for the the types of the actuators							P	

continuation of the table of the specification of Modact MOP from the previous page

		XX XXX	X	X	X	X	X	
Signalization, position transmitter, blinker								
Only for actuators Modact MOP	Without signalisation, position transmitter and blinker						0	
	Position transmitter						1	
	Signalization switches						2	
	Signalization switches and position transmitter						3	
	Blinker						4	
	Position transmitter, blinker						5	
	Signalization switches and blinker						6	
	Signalization switches, position transmitter, blinker						7	
Signalization, position transmitter, blinker								
Only for actuators Modact MOP Control	Complete equipment Sch P-0781	Position transmitter					A	
		Signalization switches and position transmitter					B	
		Position transmitter, blinker					C	
		Signalization switches, position transmitter and blinker					D	
	Without positioner	Without signalization, without posit. transmitter and blinker						E
		Position transmitter						F
		Signalization switches						G
		Signalization switches and position transmitter						H
		Blinker						I
		Position transmitter, blinker						J
		Signalization switches, blinker						K
		Signalization switches, position transmitter and blinker						L
	Without positioner and brake BAM	Without signalization, without position transm. and blinker						M
		Position transmitter						N
		Signalization switches						Ø
		Signalization switches and position transmitter						P
		Blinker						R
		Position transmitter, blinker						S
		Signalization switches, blinker						T
		Signalization switches, position transmitter and blinker						U
This mark is valid for the the types of the actuators							P	



EAG, EAH EAJ, EAK

**Electric actuators
SAR 07.5, SAR Ex 07.5
SAR 10.1, SAR Ex 10.1
Auma**

Technical data

Type	SAR 07.5	SAR Ex 07.5	SAR 10.1	SAR Ex 10.1
Marking in valve's specification No.	EAG	EAH	EAJ	EAK
Voltage	380 or 400 V			
Frequency	50 Hz			
Motor power	See specification table			
Control	3 - position control or with signal 4 - 20 mA			
Nominal force	20 Nm ~ 10 kN; 25 Nm ~ 12,5 kN; 30 Nm ~ 15 kN			
Travel	Acc. to the valve stroke 16, 25, 40, 63, 100 mm			
Enclosure	IP 67			
Process medium max. temperature	Acc. to used valve			
Ambient temperature range	-25 až 40°C			
Ambient humidity limit	100 %			
Weight	20 kg			

Specification of Auma actuators

Type		SA	X	XX	XX.X
Duty	Control	SA	R		
Execution	Normal			Ex	
	Non-explosive				
Actuator's size	07.5				07.5
	10.1				10.1

Output drive type A (thread TR 36x6 LH, flange size F10)

Output speed (rpm)		Tripping torque	SAR 10.1 SAR Ex 10.1	Motor power [kW]	SAR 10.1, SAR Ex 10.1			
	4		60-120 Nm		0,09			
	5,6				0,09			
	8				0,18			
	11				0,18			
	16				0,37			
	22				0,37			
	32				0,75			
	45				0,75			

Output drive type A (thread TR 20x4 LH, flange size F10)

Output speed (rpm)		Tripping torque	SAR 07.5 SAR Ex 07.5	Motor power [kW]	SAR 07.5, SAR Ex 7.5			
	4		30-60 Nm		0,045			
	5,6				0,045			
	8				0,09			
	11				0,09			
	16				0,18			
	22				0,18			
	32				0,37			
	45				0,37			

Accessories

2 TANDEM switches

Gearing for signalisation of position

Mechanical position indicator

Potentiometer 1x200 Ω

Electronic position transmitter RWG (potentiometer included), 4 - 20 mA, 2-wire

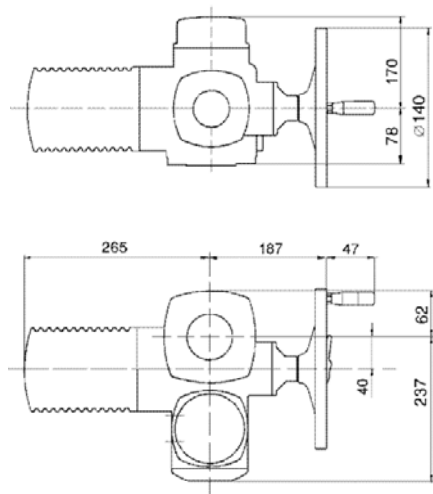
Electronic position transmitter RWG (potentiometer included), 4 - 20 mA, 3/4-wire

Inductive position transmitter IWG, 4 - 20 mA

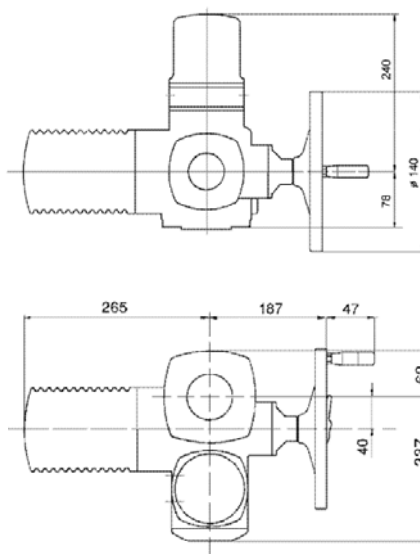
AUMATIC - for continuous control (specification of accessories acc. to catalogue of producer)

Dimensions of actuators Auma

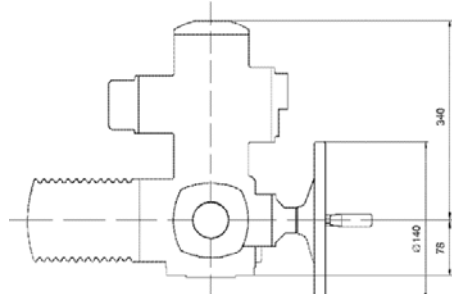
Normal execution



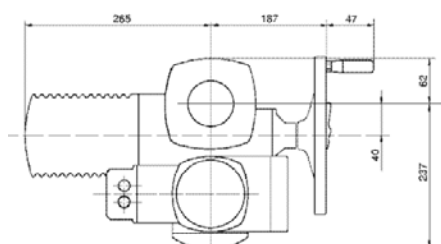
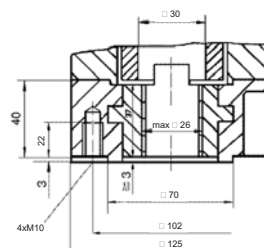
Ex version



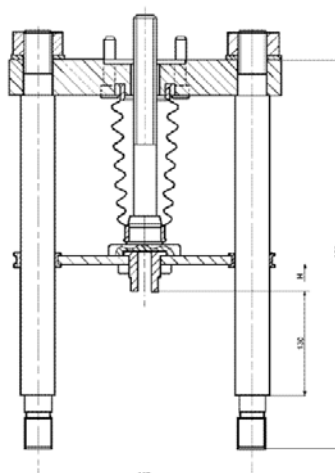
Version with AUMATIC



Output shaft A, flange F10



Attachement yoke (4 columns)





EZG
EZH

**Electric actuators ...AB5
Schiebel**

Technical data

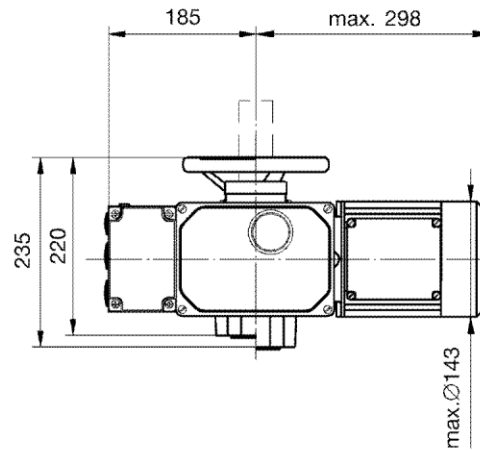
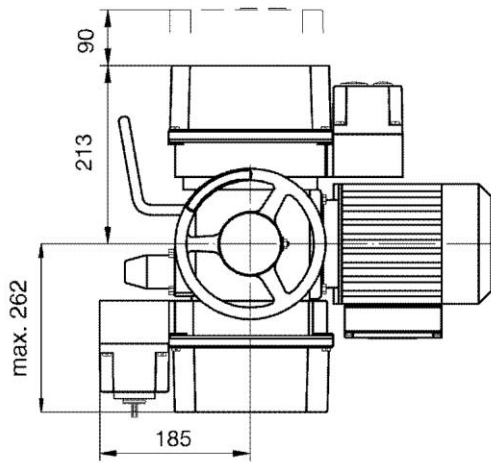
Type	rAB5	exrAB5
Marking in the valve's specification No.	EZG	EZH
Voltage	400 / 230 V; 230 V	400 / 230 V
Frequency	50 Hz	
Motor power	See specification table	
Control	3 - position control or with signal 4 - 20 mA	
Nominal force	25 Nm ~ 12,5 kN; 30 Nm ~ 15 kN	
Stroke	Acc. to valve's stroke 16, 25, 40, 63, 100 mm	
Enclosure	IP 66	IP 65
Process medium max. temperature	Acc. to used valve	
Ambient temperature range	-25 to 80°C	-20 to 40°C
Ambient humidity limit	90 % (tropical version 100 % with condensation)	
Weight	16 - 18 kg	16 kg

Specification of actuators

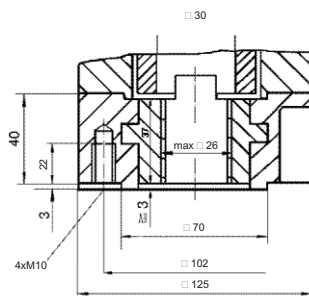
				XX	X	AB5	A	X	+	XXX		
Execution		Non-explosive		ex								
		Normal										
Duty		Control			r							
Actuator's size						AB5						
Output drive type (thread TR 20x4 LH, flange F10)							A					
Output speed (rpm)	Tripping torque	rAB5		rAB5		exrAB5		10-30 Nm	Motor power [kW]			
		exrAB5		400/230V	230V	400/230V						
		2,5		0,09	0,09	0,09						2,5
		5		0,12	0,12	0,12						5
		7,5		0,09	0,09	0,09						7,5
		10		0,12	0,12	0,18						10
		15		0,18	0,18	0,18						15
		20		0,18	0,18	0,37						20
		30		0,37	0,37	0,37						30
40		0,37	0,37	0,37		40						
Accessories		Potentiometer 1x1000 Ω								F		
		Double potentiometer								FF		
		Electronic transmitter 4 - 20 mA								ESM21		
		Positioner ACTUMATIC R								CMR		

Dimensions of actuator ...AB5

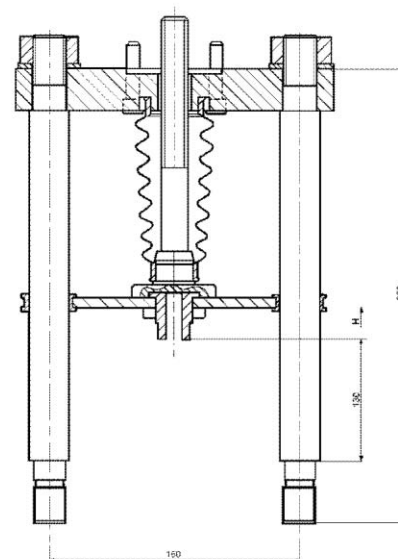
Actuator...AB5



Øoutput shaft type A, flange F10



Attachement yoke (4 columns)





**EZK
EZL**

**Electric actuators ...AB8
Schiebel**

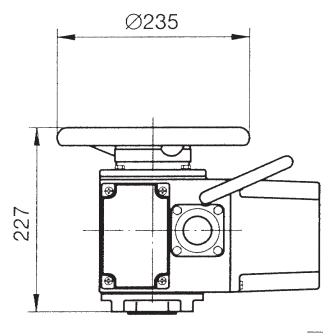
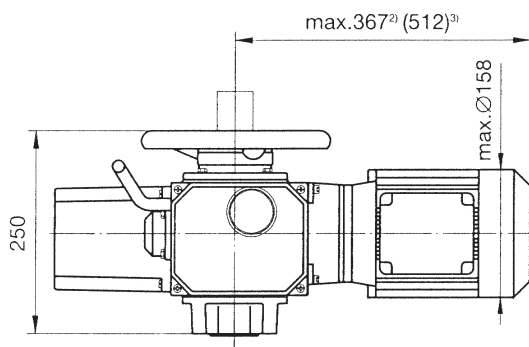
Technical data

Type	rAB8	exrAB8
Marking in valve's specification No.	EZK	EZL
Voltage	400 / 230 V; 230 V	400 / 230 V; 230 V
Frequency	50 Hz	
Motor power	See specification table	
Control	3 - position or with signal of 4 - 20 mA	
Nominal force	60 Nm	
Stroke	25 mm	
Enclosure	IP 66	IP 65
Process medium max. temp.	Acc. to used valve	
Ambient temperature range	-25 to 80°C	-20 to 40°C
Ambient temperature limit	90 % (tropical version 100 % with condensation)	
Weight	24 kg	20 kg

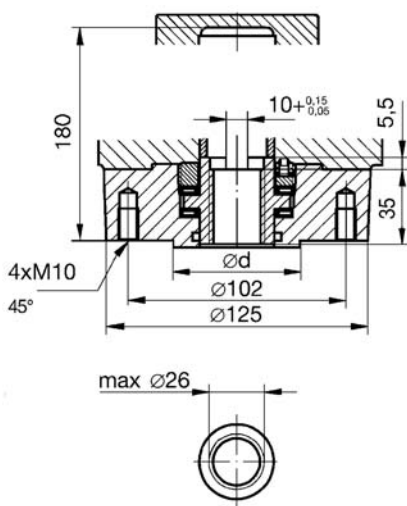
Specification of actuator

Execution		Non-explosive	XX	X	AB8	A	X	+	XXX			
		Normal	ex									
Duty		Control		r								
Actuator size					AB8							
Output shaft type (connection flange size F10, thread 36x6)						A						
Output speed [rpm]	Tripping torque	rAB8 30-80 Nm	Motor power [kW]	rAB8		exrAB8						
				400/230V	230V	400/230V						
				2,5	0,12	0,12					0,12	2,5
				5	0,12	0,12					0,12	5
				7,5	0,18	0,18					0,18	7,5
				10	0,37	0,37					0,18	10
				15	0,37	0,37					0,37	15
				20	0,55	0,75					0,37	20
				30	0,75	1,10					0,75	30
40	1,10	1,10	1,10	40								
Accessories		Potentiometer 1x1000 Ω							F			
		Double potentiometer							FF			
		Electronic transmitter 4 - 20 mA							ESM21			
		Positioner ACTUMATIC R							CMR			

Dimensions of actuators ...AB8

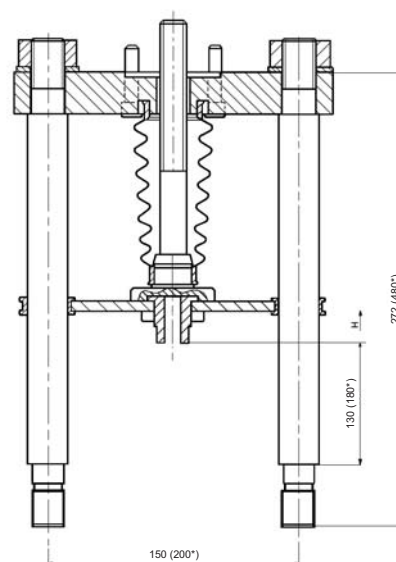


Output shaft type A, flange F10



Attachement yoke (4 columns)

* Data in parentheses apply to DN 250 only





Pneumatic actuators Foxboro

Technical data

Type	PO 700		PO 1502	
Marking in valve specification No.	PFG		PFD	
Feeding pressure	p _{max} = 0,6 Mpa, p _{min} -see in tab.			
Function	direct	indirect	direct	indirect
Control	Pneumatic signal of 20 - 100 kPa Current signal of 0(4) - 20 mA			
Nominal force	According to table of nominal force values			
Stroke	20, 40, 60 mm		60, 80 mm	
Enclosure	IP 54			
Process medium max. temperature	According to used valve			
Ambient temperature range	-40 to 80°C			
Ambient humidity limit	95 %			
Weight	See table of dimensions			

Accessories

Electropneumatic positioner (analogous) type SRI 990	Device with electric input of 4 to 20 mA and outlet of controlling air into actuator. It is adjusted by switches and potentiometers.
Electropneumatic positioner (intelligent) type SRD 991	Device with electric input of 4 to 20 mA and outlet of controlling air into actuator. It is adjusted by PC and special software. Communication HART, Fieldbus Foundation, PRØFIBUS.
Electropneumatic positioner (digital) type SRD 991 - D	Device with electric input of 4 to 20 mA and outlet of contr. air into actuator. It is adjusted by a local keyboard and diods, possibly on display.
Pneumatic positioner type SRP 981	Device with pneumatic input of 20 to 100 kPa to control the pneumatic actuators with pneumatic control signal
Signalisation switches type SGE 985	Adjustable end position switches
Air set type A 3420	Reduces control air pressure to a value required
Electropneumatic positioner type SRI 986	Analog positioner with input signal of 4 (0) - 20 mA

Operating conditions

Pneumatic actuators FOXBORO can operate with extremely high ambient temperatures with unique resistance to shock loads. They excel with resistance to vibrations and reached 10⁶ of cycles in operation. It is possible to deliver the actuator with both fail to open and fail to close function, possibly with a position blocking (air lock) upon feeding pressure air supply failure. Various accessories can be delivered together with the actuator.

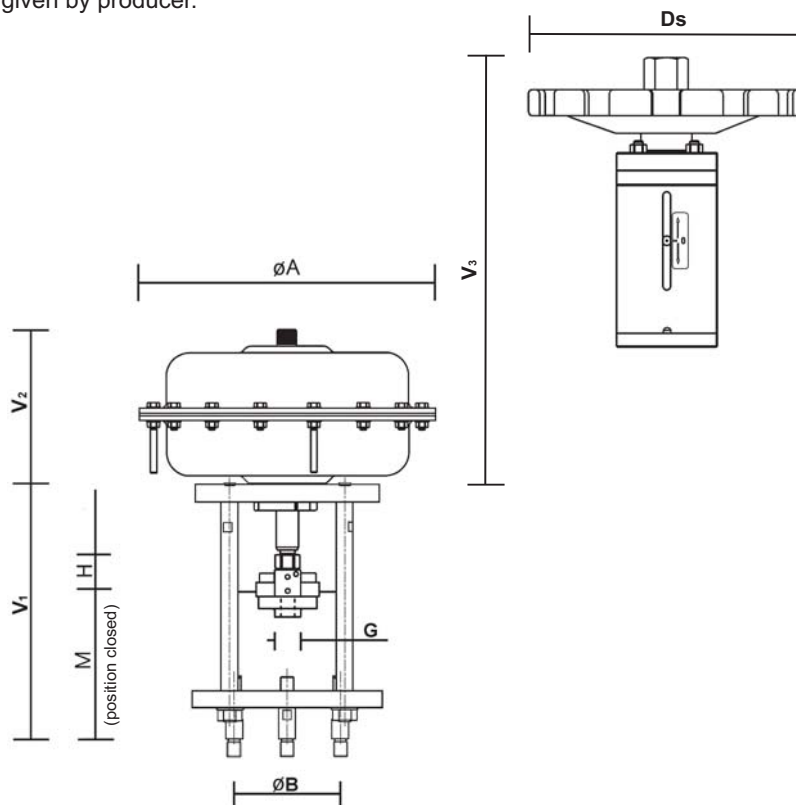
Direct and indirect functions

Direct function ensures that actuator's stem retracts upon control air supply failure (valve opens).
Indirect function ensures that actuator's stem extends upon control air supply failure (valve closes).

Dimensions and weights of Foxboro actuators

DN	Actuator	H	A	B	G	M	V1	V2	V3	Ds	m [kg]	m (+ HW)
25	PØ 700	16	405	150	M10x1	160	278	227	600	350	65	82
50	PØ 700	25	405	150	M16x1,5	160	278	227	600	350	65	82
100	PØ 1502	40	550	150	M20x1,5	160	324	409	---	---	148	---
125, 150	PØ 1502	63	550	150	M20x1,5	160	337	409	---	---	148	---

Note: Face to face dimensions [mm]
Missing data to be given by producer.



Valve specification No. of Foxboro actuators

Actuator type	PX XXXX	X	XX	X	X	X
	PA 700					
	PA 1502					
Colour	white		B			
Spring range [bar]	2,0 - 3,5			FS		
	1,8 - 2,7			JC		
	1,5 - 3,8			VI		
Hand wheel	without wheel				O	
	heavy wheel				H	
Function	direct					A
	indirect					Z
Stroke [mm]	20					A
	40					B
	60					C
	80					D

DN	Actuator type	Function	Stroke [mm]	Spring range [bar]	Setting of spring [bar]	Feeding pressure min. [bar]
25	PO 700 BJCxZA	Fail to close	20	1,8 - 2,7	1,98 - 2,7	4,8
	PO 700 BJCxAA	Fail to open	20	1,8 - 2,7	1,8 - 2,55	4,5
50	PO 700 BVlxZB	Fail to close	40	1,5 - 3,8	2,36 - 3,8	5,3
	PO 700 BVlxAB	Fail to open	40	1,5 - 3,8	1,5 - 2,93	5,3
100	PO 1502 BFSOZC	Fail to close	60	2 - 3,5	2,5 - 3,5	5
	PO 1502 BFSOAC	Fail to open	60	2 - 3,5	2 - 3	4,5
125, 150	PO 1502 BFSOZD	Fail to close	80	2 - 3,5	2,3 - 3,5	5
	PO 1502 BFSOAD	Fail to open	80	2 - 3,5	2 - 3,18	5

Maximal permissible overpressures [MPa]

Material	PN	Temperature [°C]										
		100	150	200	250	300	350	400	450	500	550	600
Cast steel 1.0619	16	1.36	1.27	1.14	1.04	0.94	0.88	0.84	---	---	---	---
	25	2.13	1.98	1.78	1.62	1.47	1.37	1.32	---	---	---	---
	40	3.41	3.17	2.84	2.60	2.35	2.19	2.11	---	---	---	---
	63	5.37	4.99	4.48	4.09	3.71	3.45	3.33	---	---	---	---
	100	8.53	7.92	7.11	6.50	5.89	5.48	5.28	---	---	---	---
	160	13.6	12.7	11.4	10.4	9.40	8.80	8.40	---	---	---	---
	250	21.3	19.8	17.8	16.2	14.7	13.7	13.2	---	---	---	---
	320	27.2	25.4	22.8	20.8	18.8	17.6	16.8	---	---	---	---
	400	34.1	31.7	28.4	26.0	23.5	21.9	21.1	---	---	---	---
Alloy steel 1.7357	16	1.63	1.58	1.49	1.43	1.33	1.23	1.15	1.07	0.89	0.35	---
	25	2.54	2.48	2.33	2.23	2.08	1.93	1.80	1.67	1.39	0.55	---
	40	4.07	3.96	3.74	3.57	3.33	3.09	2.89	2.67	2.23	0.88	---
	63	6.41	6.24	5.88	5.63	5.24	4.86	4.55	4.20	3.51	1.39	---
	100	10.17	9.90	9.34	8.93	8.32	7.71	7.22	6.67	5.57	2.21	---
	160	16.3	15.8	14.9	14.3	13.3	12.3	11.5	10.7	8.90	3.50	---
	250	25.4	24.8	23.3	22.3	20.8	19.3	18.0	16.7	13.9	5.50	---
	320	32.6	31.6	29.8	28.6	26.6	24.6	23.0	21.4	17.8	7.00	---
	400	40.7	39.6	37.4	35.7	33.3	30.9	28.9	26.7	22.3	8.80	---
Stainless steel 1.4931	16	1.63	1.58	1.54	1.46	1.35	1.27	1.15	1.07	0.89	0.79	0.43
	25	2.54	2.48	2.41	2.29	2.11	1.98	1.80	1.67	1.39	1.23	0.67
	40	4.07	3.96	3.85	3.66	3.38	3.18	2.89	2.67	2.23	1.97	1.06
	63	6.41	6.24	6.06	5.76	5.33	5.00	4.55	4.20	3.51	3.10	1.68
	100	10.17	9.90	9.63	9.14	8.46	7.94	7.22	6.67	5.57	4.92	2.26
	160	16.3	15.8	15.4	14.6	13.5	12.7	11.5	10.7	8.90	7.90	4.30
	250	25.4	24.8	24.1	22.9	21.1	19.8	18.0	16.7	13.9	12.3	6.70
	320	32.6	31.6	30.8	29.2	27.0	25.4	23.0	21.4	17.8	15.8	8.60
	400	40.7	39.6	38.5	36.6	33.8	31.8	28.9	26.7	22.3	19.7	10.6

Notes: