02 - 03.1

10.05.GB

Steam-condition station
RS 502

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 $\Delta p \geqq p_1/2$ $p_2 \leqq p_1/2$
Kv =	Liquid	$\frac{Q}{100}\sqrt{\frac{\rho_1}{\Delta p}}$	
	Gas	$\frac{Q_n}{5141}\sqrt{\frac{\rho_n . T_1}{\Delta p . p_2}}$	$\frac{2.Q_n}{5141.p_1}\sqrt{\rho_n . T_1}$
	Superh. steam	$\frac{Q_m}{100}\sqrt{\frac{v_2}{\Delta p}}$	$\frac{Q_m}{100}\sqrt{\frac{2v}{p_1}}$
	Sat. steam	$\frac{Q_m}{100}\sqrt{\frac{v_2 . x}{\Delta p}}$	$\frac{Q_m}{100}\sqrt{\frac{2v.x}{p_1}}$

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).

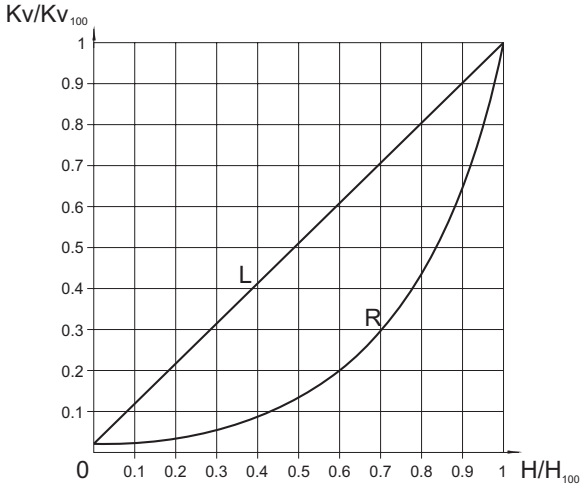
Cavitation

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

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

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

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

R - equal-percentage characteristic (4-percentage)

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

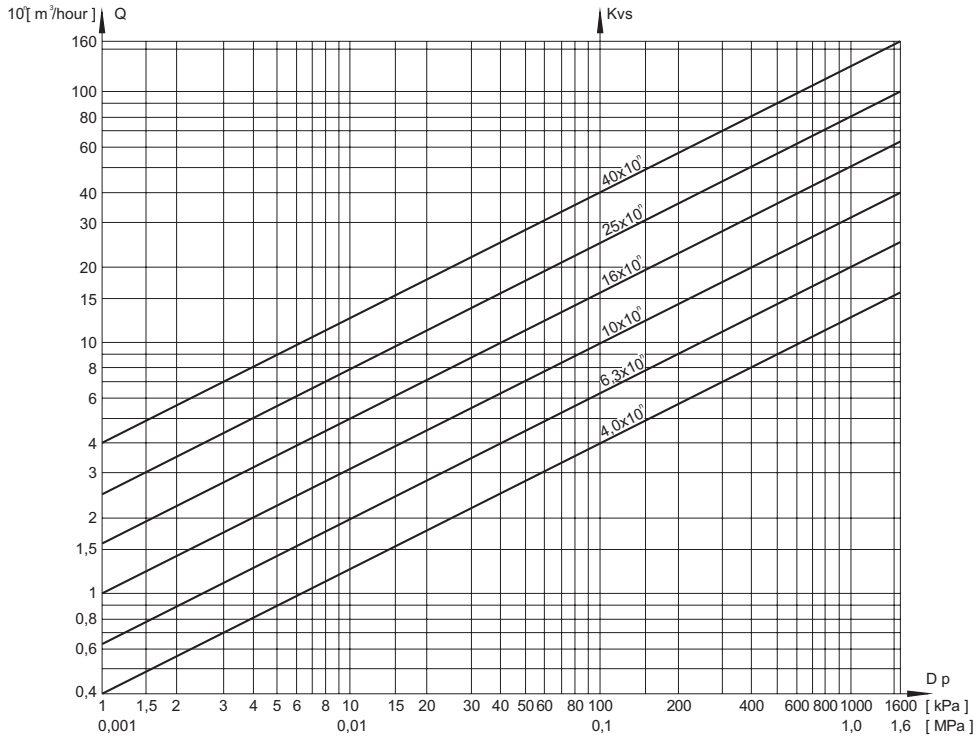
Rangeability

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 ($\Delta p = p_1 - p_2$)
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



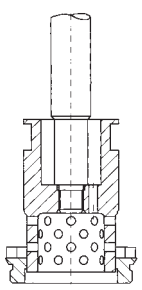
The diagram serves to specify the valve Kvs value regarding to the required flow rate of water at a given differential pressure. It can be also used for finding out the differential pressure value of the existing valve in behaviour with the flow rate. The diagram apllies to water with the density of 1000 kg/m^3.

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

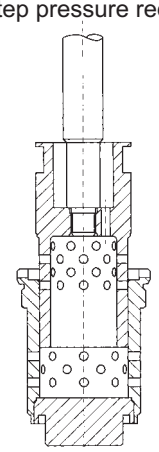
Application of multi-step pressure reduction

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

Water injection into outlet pipe

The valve outlet is designed for connection of water injection head VH see catalogue 02-03.2 or drive-steam water injection head VHP. The heads are designed to create tiny water drops independently on injected quantity with regard to their most well-proportioned and quickest spraying and vaporescence. The advantage of this design is a possibility of application of a low-pressure source, distribution and injection water regulation and separation of the valve trim from their effects. The injection water quantity is controlled by a separate control valve.

RS 502

Steam-conditioning station
Inlet DN 50 to 150
Outlet DN 100 to 500
PN 16 to 160

Description

Steam conditioning station RS 502 is single-seated control valve of a unit construction designed for water injection into the extended outlet. The pressure-balanced, multi-step throttling trim is designed to eliminate high differential pressures within the valve and ensure the low noisiness. It ensures a high resistance to wearing caused by medium flow and to effects of the expanding steam. Cooling water is injected into the extended outlet with a specially designed nozzle (VH and VHP) with changeable flow. The valves can be supplied with weld ends possibly with flanges having the faces according to the customers´ requests.
The valves are actuated with linear electric actuators. The connection is designed for both domestic and foreign actuators of the following producers: ZPA Nová Paka, ZPA Pečky, Regada Prešov, AUMA, Schiebel and Foxboro.

Application

The valves are designed for simultaneous pressure and temperature reduction of steam. They are especially designed for industrial applications such as low-pressure steam production in heating, steam circuit in power plants or technological processes. The max. permissible operating pressures correspond to EN 12 516-1 see page 23 of this catalogue.

Installation

The valves must be piped the way so that 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.

Process media

The valves are designed to regulate the pressure and temperature of water vapour without mechanical 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 application for other process media must be considered with respect to used material that is in contact with the process medium and therefore its usage should be consulted with the producer.

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 parametres of other equipment.

Technical data

Series	RS 502	
Type of valve	Control valve, single-seated, straight-through, with pressure-balanced plug, with extended outlet and orifice plate at outlet,with water injection into outlet pipe	
Nominal size range	Inlet DN 50 to 150, outlet DN 100 to 500	
Nominal pressure	Inlet PN 16 to 160, outlet PN 16 to 100	
Body material	Carbon steel 1.0619 (GP 240 GH)	Alloy steel 1.7357 (G17CrMo5-5)
Material of weld ends	1.0425 (P 265 GH)	1.7335 (13CrMo4-5)
Seat material: DN 50 - 150	17 021.6 (1.4006)	
Plug material: DN 50 - 150	17 123.6 (1.4078)	
Operating temp. range	-20 to 400°C	-20 to 550°C
Connection flanges	For PN 16 to 100 acc. to ČSN EN 1092-1 (2/2003), for PN 160 acc. to DIN 2548 (G17CrMo5-5)	
Type of flanges	Type B1 acc. to ČSN EN 1092-1 (2/2003) - raised flange	
	Type F acc. to ČSN EN 1092-1 (2/2003) - female flange	
	Type B2 acc. to ČSN EN 1092-1 (2/2003) - plain flange	
Weld ends	Acc. to ČSN 13 1075 (3/1991)	
Type of trim	One or two-step pressure reduction	
	Perforated plug - seat (cage), orifice plate	
Flow characteristic	Linear, equal-percentage	
Lekage rate	Acc. to ČSN EN 1349 (5/2001) Class III, execution with high level of tightness Class V	
Packing	Graphite	

Range of Kvs values

DN	50/XXX	65/XXX	80/XXX	100/XXX	125/XXX	150/XXX
Multi-step pressure reduct.	Kvs values [m³/hour] - linear flow characteristic					
1	3.2 - 32	6.3 - 50	8.0 - 80	10 - 125	10 - 125	16 - 250
2	2.5 - 32	5.0 - 40	8.0 - 80	8.0 - 125	8.0 - 125	12.5 - 200
Multi-step pressure reduct.	Kvs values [m³/hour] - equal-percentage characteristic					
1	6.3 - 25	6.3 - 32	16 - 50	16 - 63	16 - 63	32 - 125
2	5.0 - 20	5.0 - 25	12.5 -40	12.5 - 50	12.5 - 50	25 - 80

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 showen in the table above. Paramteres of outlet (DN, PN) can be modified on request.

Dimensions and weights for the valve type RS 502 with weld ends

DN	V_1	V_2	V_3	V_4	V_5	L	H	m
	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[kg]
50/100	150	291	130	170	118	710	25	50
65/125	175	310	130	---	140	---	25	67
80/150	180	320	130	---	160	---	40	94
100/200	204	345	130	215	185	909	40	113
125/250	204	345	130	---	---	---	40	---
150/300	264	453	190	250	241	1091	63	257
150/500	264	453	190	---	320	---	63	---

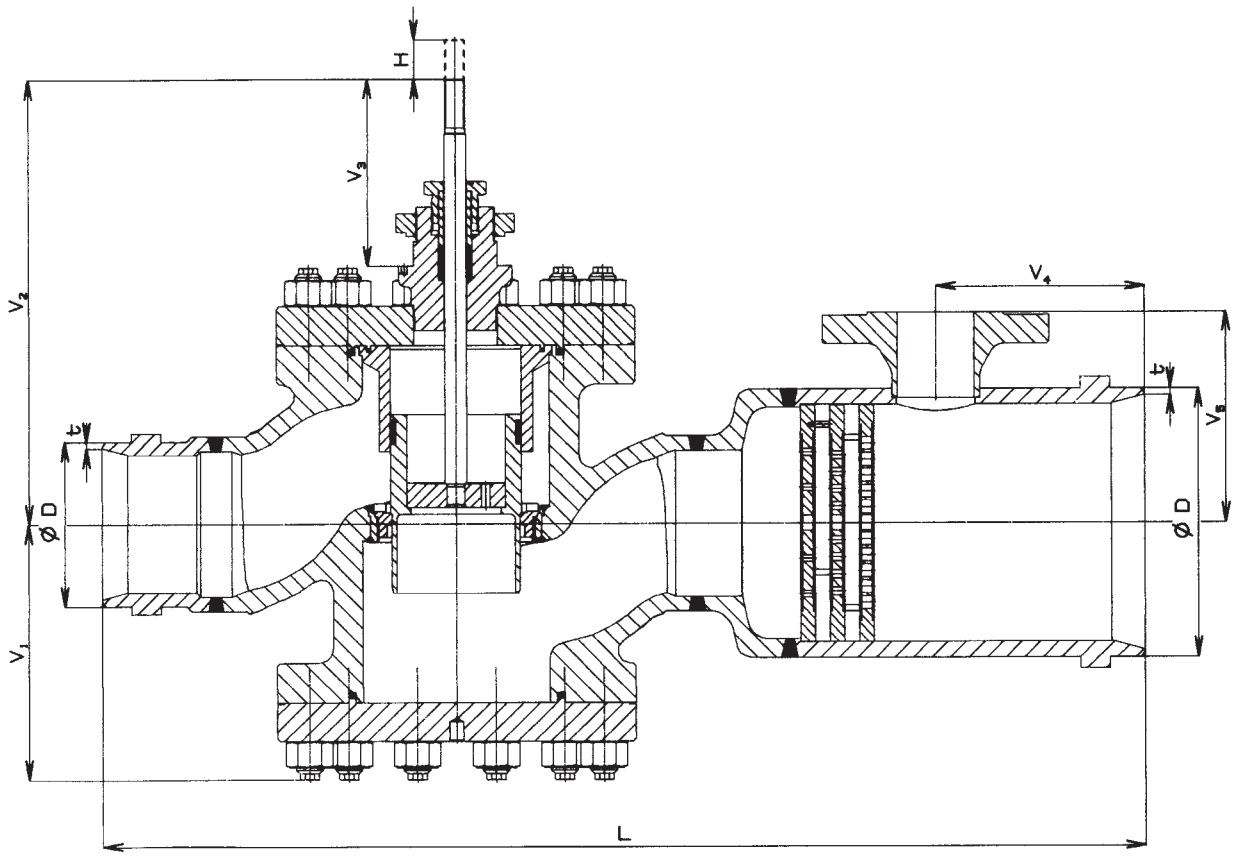
*) There are only recommended combination of DN for inlet and outlet of RS 502 valve.

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

Weld ends connection dimensions

	PN 16	PN 25	PN 40	PN 63	PN 100	PN 160	PN 16-160
DN	t	t	t	t	t	t	D
	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
50	2.9	2.9	2.9	3.2	4.5	6.3	60.3
65	3.2	3.2	3.2	3.6	5	7	76.1
80	3.6	3.6	3.6	4	5.6	8	88.9
100	4	4	4	5	7	10	114.3
125	4.5	4.5	4.5	5.6	8	12.5	139.7
150	5	5	5	7	10	14	168.3
200	6.3	6.3	6.3	8	12.5	---	219.1
250	7	7	7	10	16	---	273.0
300	8	8	8	12.5	18	---	323.9
400	11	11	11	14	20	---	406.4
500	14	14	14	18	25	---	508.0

Steam-conditioning station RS 502 with weld ends



Dimensions and weights for the type RS 502 with flanges *)

DN	V_1	V_2	V_3	V_4	V_5	L	H	m
	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[kg]
50/100	150	291	130	---	---	---	25	73
65/125	175	310	130	---	---	---	25	102
80/150	180	320	130	---	---	---	40	140
100/200	204	345	130	---	---	---	40	188
125/250	204	345	130	---	---	---	40	---
150/300	264	453	190	---	---	---	63	428
150/500	264	453	190	---	---	---	63	---

*) There are only recommended combination of DN for inlet and outlet of the RS 502 valves in the table.
Note: Mentioned weight should be considered as approximate. The missing data are to be specified by the producer.

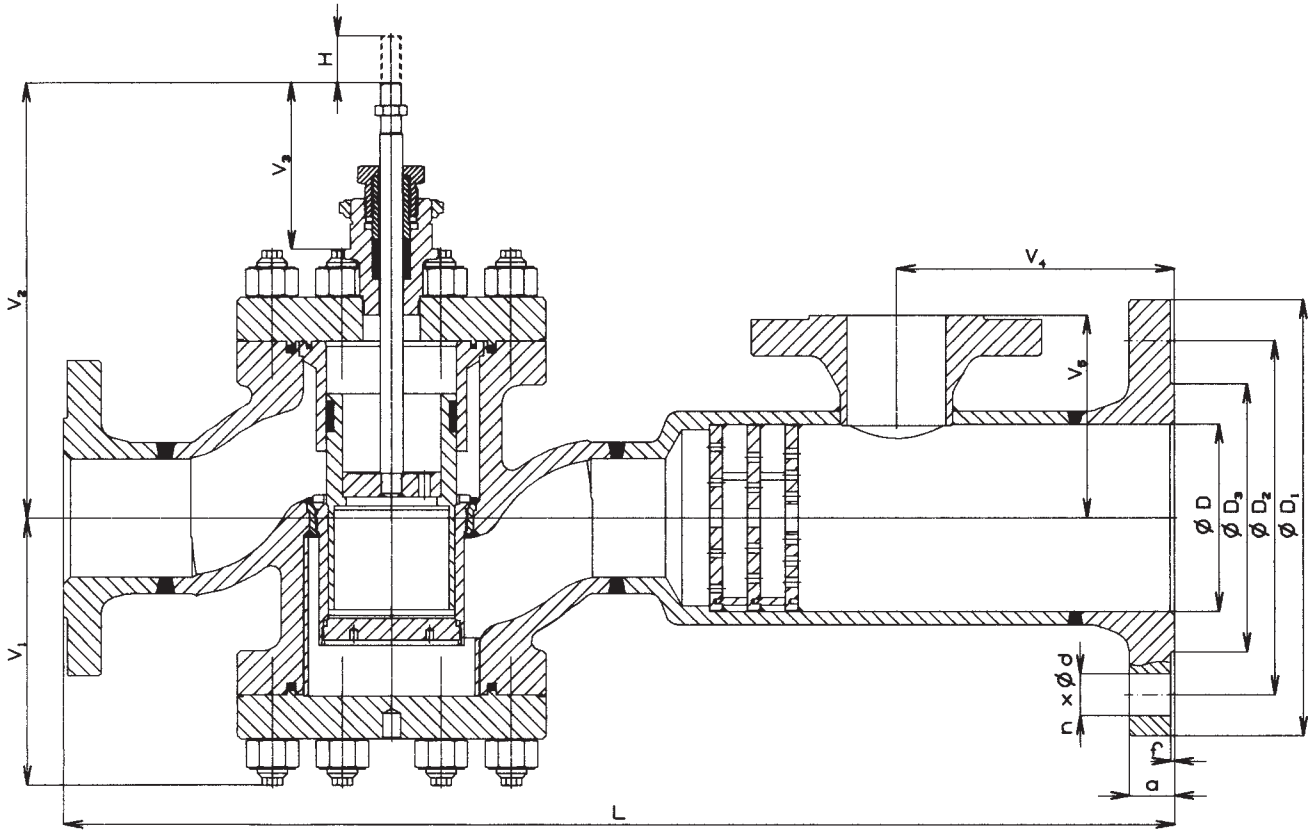
Connection flanges dimensions

	PN 16					PN 25					PN 40					PN 63				
DN	D_1	D_2	a	d	n	D_1	D_2	a	d	n	D_1	D_2	a	d	n	D_1	D_2	a	d	n
	[mm]	[mm]	[mm]	[mm]	[ks]	[mm]	[mm]	[mm]	[mm]	[ks]	[mm]	[mm]	[mm]	[mm]	[ks]	[mm]	[mm]	[mm]	[mm]	[ks]
50	165	125	18	18	4	165	125	20	18	4	165	125	20	18	4	180	135	26	22	4
65	185	145	18	18	8	185	145	22	18	8	185	145	22	18	8	205	160	26	22	8
80	200	160	20	18	8	200	160	24	18	8	200	160	24	18	8	215	170	28	22	8
100	220	180	20	18	8	235	190	24	22	8	235	190	24	22	8	250	200	30	26	8
125	250	210	22	18	8	270	220	26	26	8	270	220	26	26	8	295	240	34	30	8
150	285	240	22	22	8	300	250	28	26	8	300	250	28	26	8	345	280	36	33	8
200	340	295	24	22	12	360	310	30	26	12	375	320	34	30	12	415	345	42	36	12
250	405	355	26	26	12	425	370	32	30	12	450	385	38	33	12	470	400	46	36	12
300	460	410	28	26	12	485	430	34	30	16	515	450	42	33	16	530	460	52	36	16
400	580	525	32	30	16	620	550	40	36	16	660	585	50	39	16	670	585	60	42	16
500	715	650	44	33	20	730	660	48	36	20	755	670	57	42	20	800	705	68	48	20

	PN 100					PN 160					PN 16 - 160	
DN	D_1	D_2	a	d	n	D_1	D_2	a	d	n	D_3	f
	[mm]	[mm]	[mm]	[mm]	[ks]	[mm]	[mm]	[mm]	[mm]	[ks]	[mm]	[mm]
50	195	145	28	26	4	195	145	30	26	4	102	
65	220	170	30	26	8	220	170	34	26	8	122	
80	230	180	32	26	8	230	180	36	26	8	138	
100	265	210	36	30	8	265	210	40	30	8	162 [1)]	
125	315	250	40	33	8	315	250	44	33	8	188	2
150	355	290	44	33	12	355	290	50	33	12	218 [2)]	
200	430	360	52	36	12	---	---	---	---	---	285 [3)]	
250	505	430	60	39	12	---	---	---	---	---	345 [4)]	
300	585	500	68	42	16	---	---	---	---	---	410 [5)]	
400	715	620	78	48	16	---	---	---	---	---	535 [6)]	
500	870	760	94	56	20	---	---	---	---	---	615 [7)]	

[1)] for PN 16 ... 158 mm
[2)] for PN 16 ... 212 mm
[3)] for PN 16 ... 268 mm
for PN 25 ... 278 mm
[4)] for PN 16 ... 320 mm
for PN 25 ... 335 mm
[5)] for PN 16 ... 378 mm
for PN 25 ... 395 mm
[6)] for PN 16 ... 490 mm
for PN 25 ... 505 mm
[7)] for PN 16 ... 610 mm

Steam-conditioning station RS 502 with flanges



Valve complete specification No. for ordering RS 502

		XX	X X X	X X X	X X X X	X X	-	(XX/XX)	/	XXX	-	(XX/XX)
1. Valve	Steam-conditioning station	RS										
2. Series	Straight-through valve with extended outlet and water injection into outlet pipe		5 0 2									
3. Type of actuating	Electric actuator			E								
	Pnumatic actuator			P								
	Electric actuator Zepadyn			E N C								
	Electric actuator Modact MTR			E P D								
	Electric actuator Modact MT Control			E Y A								
	Electric actuator Modact MT			E Y B								
	Electric pohon 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 SA 07.1			E A A								
	Electric actuator Auma SA Ex 07.1			E A B								
	Electric actuator Auma SAR 07.1			E A C								
	Electric actuator Auma SAR Ex 07.1			E A D								
	Electric actuator Schiebel AB5			E Z E								
	Electric actuator Schiebel exAB5			E Z F								
	Electric actuator Schiebel rAB5			E Z G								
	Electric actuator Schiebel exrAB5			E Z H								
	Pneumatic actuator Foxboro PB 502			P F B								
	Pneumatic actuator Foxboro PB 700			P F C								
	Pneumatic actuator Foxboro PO 1502			P F D								
4. Connection	Flange with raised face				1							
	Flange with female face				2							
	Flange with plain face				3							
	Weld ends				4							
5. Body material *(operating temp. ranges are specified in parentheses)*	Cast steel 1.0619 (-20 to 400°C)				1							
	Alloy steel 1.7357 (-20 to 550°C)				7							
	Other material on request				9							
6. Packing	Graphite				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)

Ordering example: Steam-conditioning station with water injection, DN 80/150, PN 160/100, with electric actuator Modact MTN Control, body material: carbon steel, connection: weld ends, packing: graphite, two-step pressure reduction, one orifice plate at outlet, with linear flow characteristic is specified as follows **RS 502 EYA 4152 L1 (160/100)/400-(80/150).**

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.
Further it is necessary to specify in the order the parametres of injection water possibly the type of injection nozzle(VH) acc. to the data sheet No. 02-03.2.

ENC

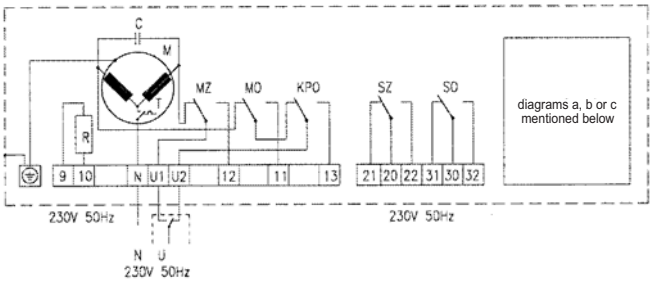
Electric actuator Zepadyn 670 (Zepadyn 524 60) ZPA Nová Paka

Technical data

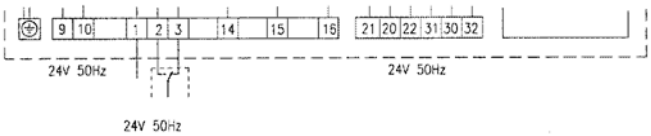
Type	Zepadyn 670 XXX (Zepadyn 524 60.XXXX)
Marking in valve specification No.	ENC
Voltage	230 V or 24 V
Frequency	50 Hz
Power consumption	40 VA
Control	3 - position control, 0 - 10 V, 0(4) - 20 mA
Nominal force	10000 N
Stroke	16, 25 mm
Enclosure	IP 65 (type 524 60 IP 54)
Process medium max. temp.	Acc. to used valve
Ambient temperature range	-25 to 55°C
Ambient humidity limit	10 - 100 % with condensation
Hmotnost	11 kg

Wiring diagrams

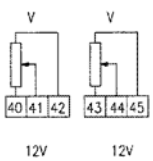
Feeding voltage 230 V/50 Hz



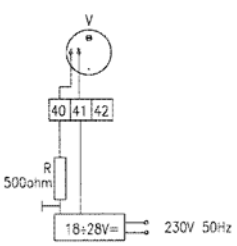
Feeding voltage 24 V/50 Hz



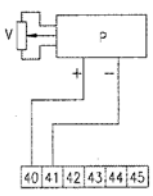
Execution:
with resistance transmitter



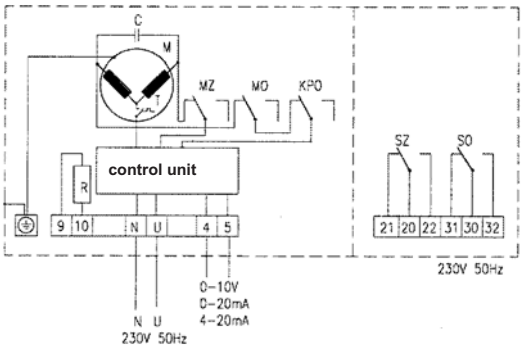
with capacity position transmitter



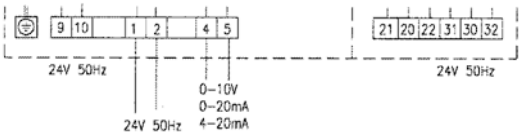
with converter 4-20mA



Execution with positioner, feeding voltage 230 V/50 Hz



Execution with positioner, feeding voltage 24 V/50 Hz



Specification of actuator Zepadyn 670 (marking valid from 1. 1. 2001)

		Zepadyn 670	X	X	X	/	
Feeding voltage AC	230 V (50/60 Hz)		1				
	24 V (50/60 Hz)		2				
Nominal force [kN]	10			4			
Running speed mm.min^{-1}	6,3				1		
	16				2		
	25				3		
	32				4		
Additional accessory	Positioner 0-1 V, 0-10 V, 0(4)-20 mA - without R2						OP1
	Signalization switches SO and SZ						S1
	1 resistance transmitter 100Ω						R1
	2 resistance transmitters 100Ω - without OP1, I1 and C1						R2
	Converter 4 - 20 mA - without R2 and C1						I1
	Capacity transmitter CPT1 - without R2 and I1						C1
	Heater						T1
	Connection - column pitch 132, M20, coupling M10x1, M16x1,5						P3

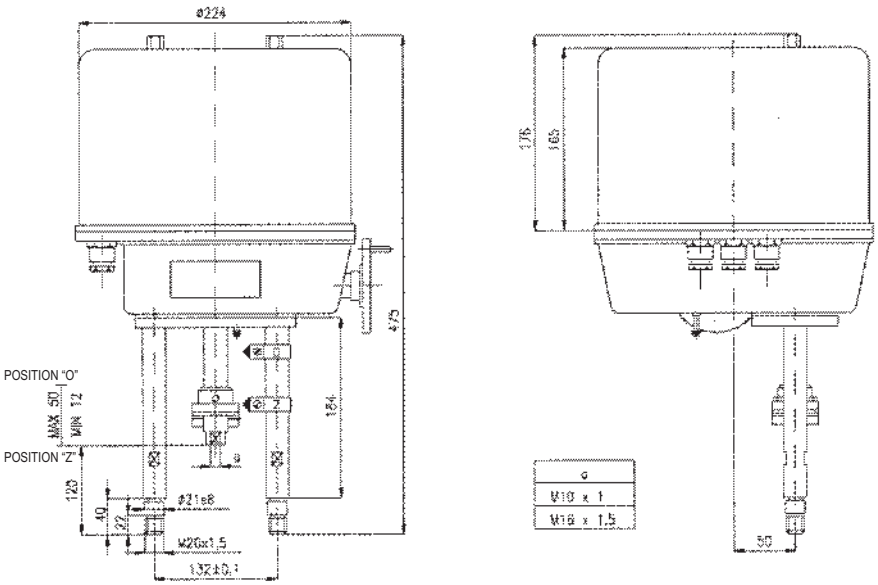
Basic version : 3-position control, hand wheel, limit switches for Open and Closed positions, without transmitter and connection parts.

Specification of actuator Zepadyn 524 60 (marking valid till 31. 12. 2000)

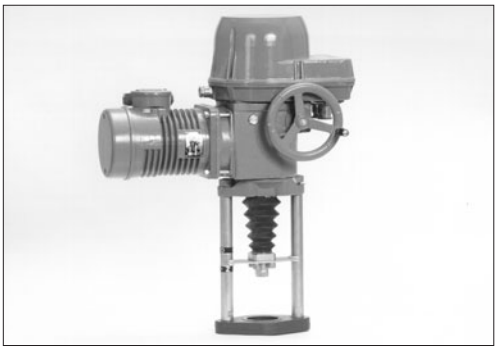
			Zepadyn 524 60.	X	X	X	X	/	
Feeding voltage 230 V/50 Hz	Nominal force kN	10		3	X	X	X		
	Resetting speed mm.min^{-1}	6,3		X	0	X	X		
		16		X	1	X	X		
		25		X	2	X	X		
Feeding voltage 24 V/50 Hz	Nominal force kN	10		7	X	X	X		
	Resetting speed mm.min^{-1}	6,3		X	0	X	X		
		16		X	1	X	X		
		25		X	2	X	X		
Provedení vysílače	Without transmitter					0	X		
	Single transmitter 100Ω					1	X		
	Double transmitter 2x100Ω					2	X		
	Other (e.g. feedback of 4 - 20 mA)*					9	X		
Connection dimensions							1		
Execution	With capacity transmitter CPT1/A								C1
	With positioner								OP1
	With converter 4-20 mA								I1

*) On request

Dimensions of actuator Zepadyn



EPD

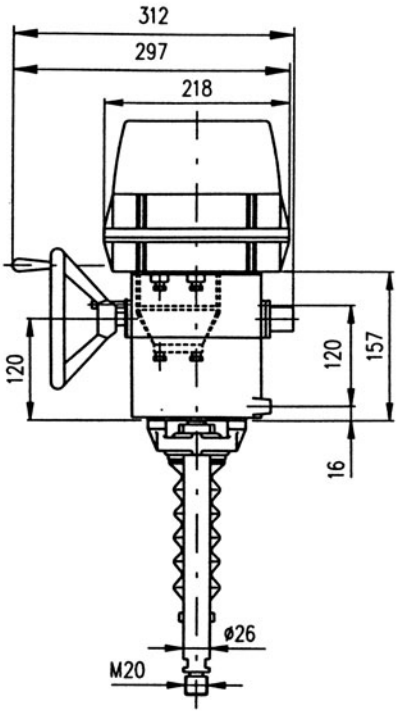


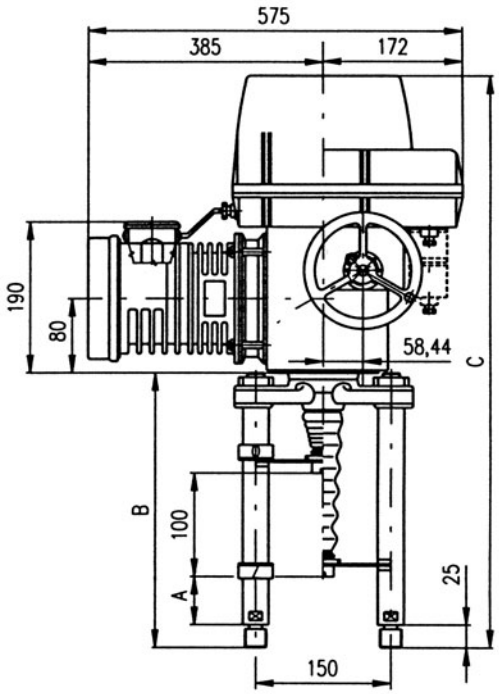
Elektrické pohony Modact MTR Regada

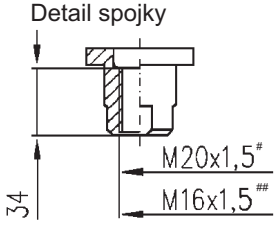
Technické parametry

Typ	Modact MTR
Označení v typovém čísle ventilu	EPD
Napájecí napětí	230 V
Frekvence	50 / 60 Hz
Výkon	16 nebo 25 W
Řízení	3 - bodové (ve spojení s regulátorem NOTREP spojité)
Jmenovitá síla	16, 25 kN
Zdvih	12,5 až 100 mm
Krytí	IP 54 (na objednávku IP 65)
Maximální teplota média	daná použitou armaturou
Přípustná teplota okolí	-25 až 55°C
Přípustná vlhkost okolí	90 % (tropické provedení 100 % s kondenzací)
Hmotnost	27 až 31 kg

Schéma zapojení pohonu







sloupky	s kuličkovým šroubem			přiřazení k ventilům
verze	A	B	C	
P-1045a/H	130	400	729	RS 502 DN 150/XXX
P-1045a/E	74	344	673	RS 502 DN 50/XXX ÷ 125/XXX

#) RS 502, DN 150/XXX
##) RS 502, DN 50/XXX ÷ 125/XXX

Specification of Modact MTR

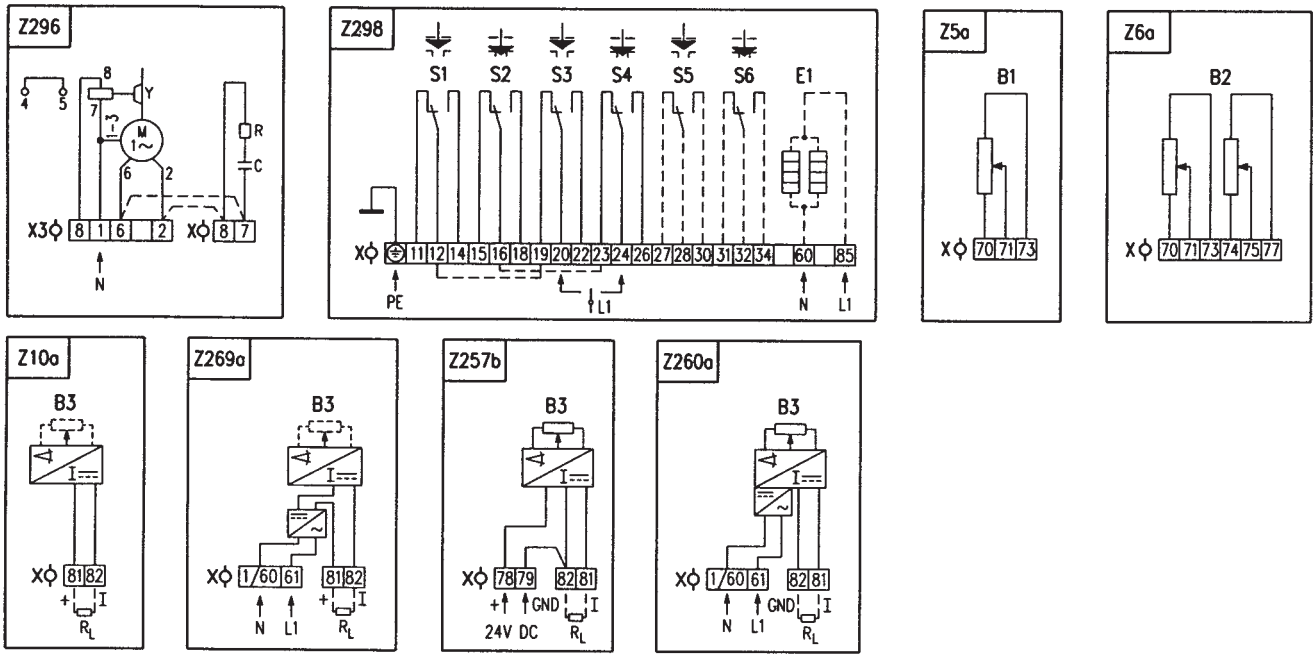
Electric actuator MTR, linear											52 420.	X	-	X	X	X	X	X	/	X	X
Mild up to hot dry with temperature range (-25 °C to +50 °C)												0									
Electric conection			Voltage						Wiring diagram													
To terminal board			230 V AC						Z296					9								
To connector														8								
Screw version		Switching-off thrust [1) 2)]	Rated operating speed	Operating speed	Electric motor																	
					Power	Speed	Current															
ball screw	16 000/32-G	10.0 - 16.0 kN	32 mm/min.	38 - 32 mm/min.	16 W	1 150	0.31 A								E							
	10 000/32-G	6.3 - 10.0 kN	50 mm/min.	60 - 50 mm/min.											F							
	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							
	10 000/63-G	6.3 - 10.0 kN	63 mm/min.	75 - 63 mm/min.											J							
	6 300/100-G	4.0 - 6.3 kN	100 mm/min.	120 - 100 mm/min.											K							
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				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 hight / stroke			Pillar spacing / Bore of flange	Thread of stem [3)]		Dimensional drawing															
Columns	74/100			150/ —	M20x1.5		P-1045a/B; P-1045a/E											B				
	130/100				M16x1.5		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:

1) 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 torgue equals minimally the maximum switching-off thrust of the choosing range multiplied by 1.3.
2) 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
3) The thread in the coupling is to be specified in the order by words.

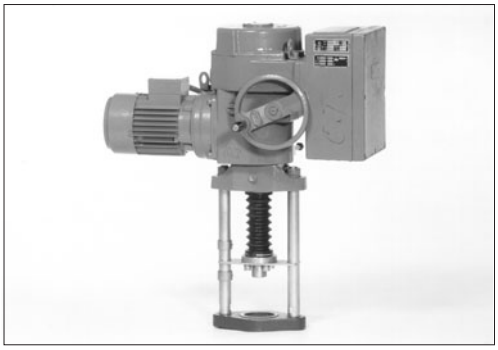
Wiring diagram of actuator Modact MTR



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	conection of 1-phase electric motor
Z298	conection of thrust and position switches and space heater
B1	resistive trasmitter (potentiometer) single
B2	resistive trasmitter (potentiometer) double
B3	capacitive transmitter
S1	thrust switch "open"
S2	thrust switch "closing"
S3	position switch "open"
S4	position switch "closed"
S5	additional position swich "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	reducting resistor
R_L	loading resistor



EYA
EYB

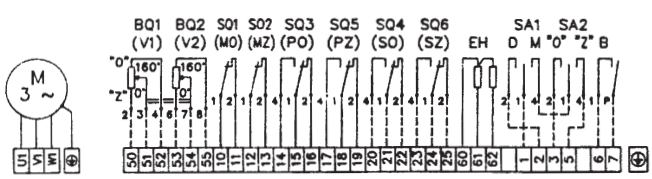
Electric actuators Modact MTN and Modact MTN Control ZPA Pečky

Technical data

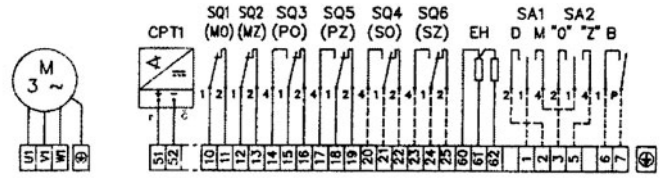
Type	Modact MTN Control	Modact MTN
Marking in valve specification No.	EYA	EYB
Voltage	3 x 220 V / 400 V (3 x 220 V/380V)	
Frequency	50 Hz	
Motor power	See specification table	
Control	3 - position control or continuous	
Nominal force	15000 and 25000 N	
Travel	10 to 100 mm	
Enclosure	IP 55	
Process medium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



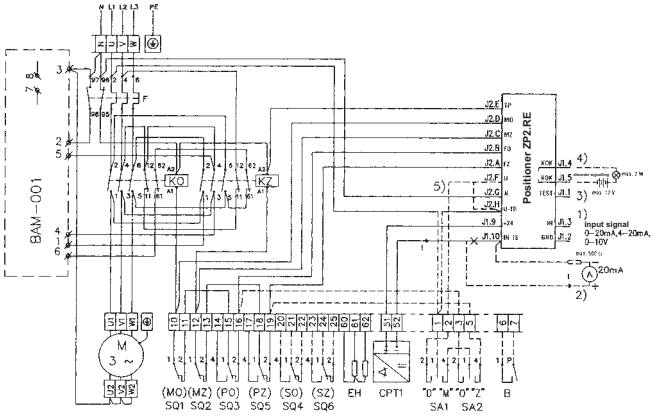
Position transmitter : capacity CPT 1 1/A 4 - 20 mA



electromotor | control case | external protecting clamp | local control

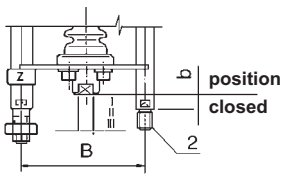
Wiring diagram of actuator Modact MTN Control

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
Clutch thread	I	M 20x1,5
	II	M 16x1,5

Execution	Specification No.		RS 502
	basic	additional	
Bb2II	52 442	XMXX	DN 50/XXX ÷ 100/XXX
Bg2I	52 442	XRXX	DN 150/XXX

Specification of actuators Modact MTN and Modact MTN Control

Basic equipment :	2 power switches MO, MZ	1 position transmitter - resist. 2x100 W or cap. CPT1/A
	2 limit switches PO, PZ	2 limit switches PO, PZ
	2 limit and signalisation switches SO, SZ	2 limit and signalisation switches SO, SZ

Basic technical data :

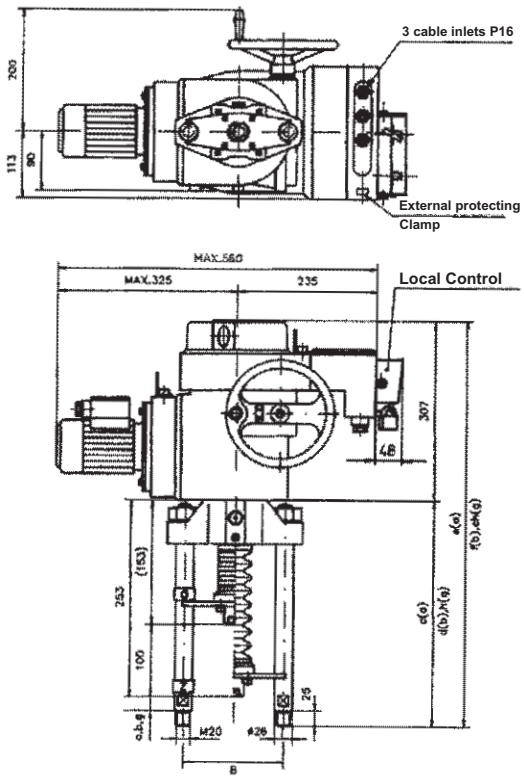
Typ	Power switch setting range kN	Direct power kN	Resetting speed mm.min^{-1}	Travel mm	Electromotor				Weight		Specification No.	
					Power W	rpm	In (400V) A	Iz / In	Aluminium	Cast	Basic	Additional
MT 15	11,5 - 15	17	50	10 - 100	180	900	0.67	2.5	33	45	52 442	XX0X
			80		180	900	0.67	2.5				XX1X
			125		250	1380	0.77	3.4				XX3X
			36		120	660	0.67	2.2				XX2X
			27		120	660	0.67	2.2				XXAX
MT 25	15 -25	32,5	50	10 - 100	180	900	0.67	2.5	33	45		XX4X
			80		180	900	0.67	2.5				XX5X
			125		250	1380	0.77	3.4				XX6X
			36		120	660	0.67	2.2				XX7X
			27		120	660	0.67	2.2				XX8X

Execution, electric connection :

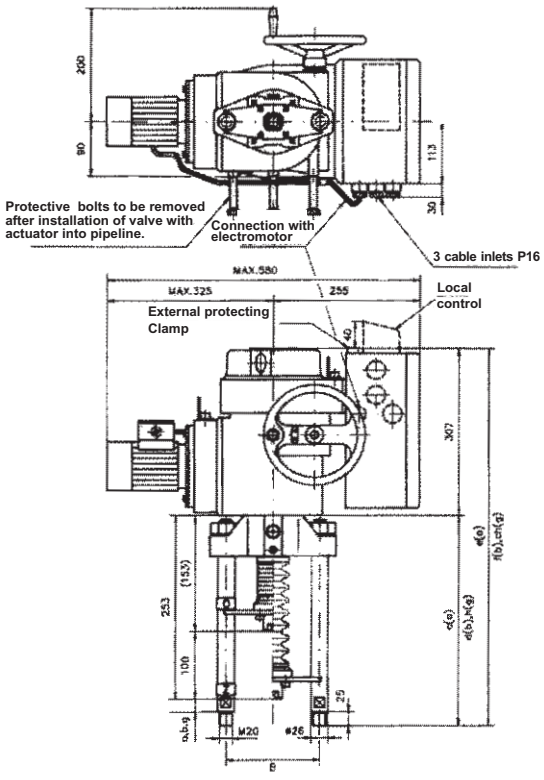
Via terminal board				6XXX
With conector KBSN (for Modact MTN execution only)				7XXX
Transmitter for Modact MTN	Capacity transmitter CPT 1/A 4 - 20 mA			XXX0
	Resistance transmitter 2 x 100 Ω			XXX2
Additional electric equipment			With resistance transmitter2 x 100 Ω	With capacity transmitter CPT 1/A
Modact MTN execution	With local control - terminal board		XXX3	XXX1
	With unlock control - conector KBNS		XXX3	XXX1
Modact MTN Control execution (with built-in contactor combination)	Without local control	Without brake BAM and positioner	XXX4	XXXA
		With brake BAM, without positioner	XXX5	XXXB
		With brake BAM and with positioner		XXXC
	With local control	Without brake BAM and positioner	XXX7	XXXD
		With brake BAM, without positioner	XXX8	XXXE
		With brake BAM and positioner		XXXF

Note : When execution with flasher is requested, please specify this requirement in writing - execution with flasher.

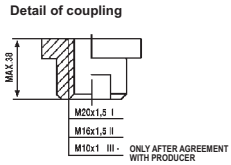
Dimensions of actuator Modact MTN



Dimensions of actuator Modact MTN Control



A	160
B	150
a	30
b	74
g	130
c (a)	308
d (b)	352
e (a)	615
f (b)	659
ch (g)	715



EYE, EYF
EYG, EYH

Electric actuators Modact MOP and Modact MOP Control ZPA Pečky

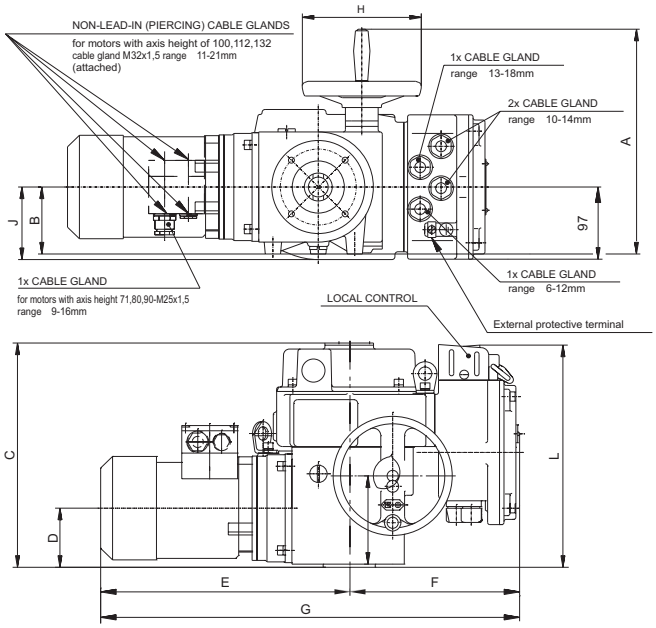
Technical data

Type	52 030 MOP	52 030 MOP Control	520 31 MOP	52 031 MOP Control
Marking in valve specification No.	EYE	EYF	EYG	EYH
Voltage	3x 230/400 V			
Frequency	50 Hz			
Motor power	See specification table			
Control	3 - position control or continuous			
Nominal force	20 Nm			
Travel	Acc. to given stroke			
Enclosure	IP 67			
Process medium max. temperature	Acc. to used valve			
Ambient temperature range	acc. to ČSN 33 2000-3, class AA7, AB7, AC1, AD5, AE5, AF2, AG2, AH2, Ak2, AL2, AM2, AN2, AP3, BA4, BC3			
Working condition	Loading S2 acc. to ČSN EN 60 034-1			
Weight	23 - 36 kg		33 - 59 kg	

Dimensions of Modact MOP

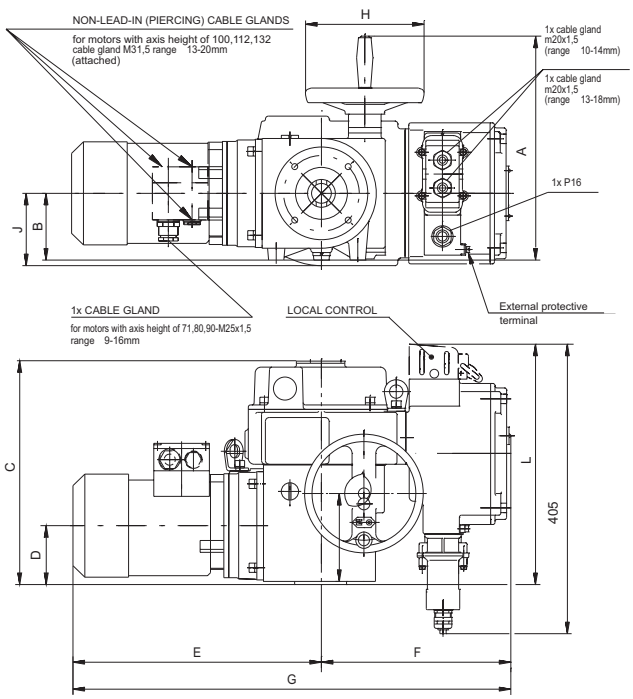
DIMENSIONAL DRAWING OF ACTUATORS MODACT MOP

52 030 a 52 031 EXECUTION WITH TERMINAL BOARD



DIMENSIONAL DRAWING OF ACTUATORS MODACT MOP

52 030 a 52 031 EXECUTION WITH CONECTOR

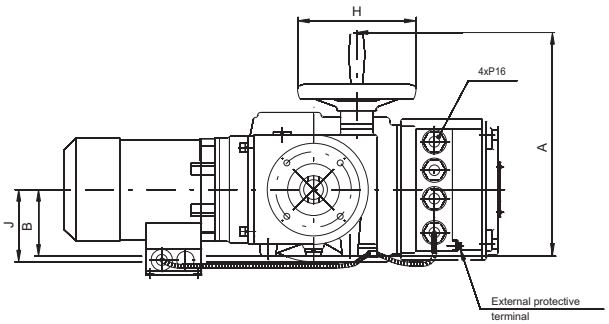


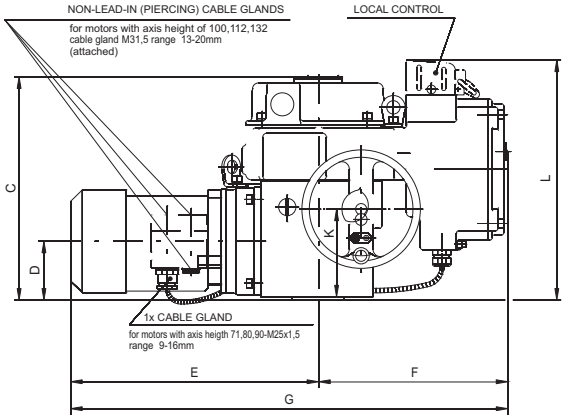
Type marking	A	B	C	D	E	F	G	H	J	K	L
52 030	305	90	300	78	334	228	562	160	99	120	300
52 031	376	120	328	92	436	228	664	200	-	144	328

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	350

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

			XX XXX	X	X	X	X	X
Connection dimensions	Output shaft type A	Via terminal board		5				
		With connector		F				
Local control, position indicator								
Resistance transmitter or execution without transmitter		Without local control, without position indicator			1			
		Local control			4			
		Local control for actuators Modact MOP Control			7			
Capacity transmitter CPT 1/A		Without local control, without position indicator			B			
		Local control			E			
		Local control for actuators Modact MOP Control			H			

Type marking	Moment		Running speed	Stroke	Electromotor				
	Tripping	Driving			Power	rpm	I_n (400V)	I_z / I_n	
	(Nm)	(Nm)	(1/min.)	(ot)	(kW)	(1/min.)	(A)	(-)	
MOP 40/70 - 7	20-40	70	7	2-250	0,05	650	0,42	1,6	J
MOP 40/65 - 9		65	9		0,06	830	0,34	2,0	0
MOP 40/55 - 15		55	15		0,09	870	0,47	2,0	1
MOP 40/75 - 25		75	25		0,18	1350	0,56	3,0	2
MOP 40/65 - 40		65	40		0,25	1350	0,76	3,0	3
MOP 40/50 - 50		50	50		0,25	2830	0,68	4,0	4
MOP 40/60 - 80		60	80		0,37	2740	1,00	3,5	5
MOP 80/135 - 7	40-80	135	7		0,09	630	0,36	2,2	K
MOP 80/140 - 9		140	9		0,12	890	0,60	2,5	6
MOP 80/135 - 15		135	15		0,18	835	0,62	2,3	7
MOP 80/105 - 25		105	25		0,25	1350	0,76	3,0	8
MOP 100/130 - 9	63-100	130	9		0,12	890	0,60	2,5	0
MOP 100/130 - 15		130	15		0,25	850	0,78	2,7	1
MOP 100/150 - 25		150	25		0,37	920	1,20	3,1	2
MOP 100/170 - 40		170	40		0,55	1395	1,45	3,9	3
MOP 100/150 - 63		150	63		0,75	1395	1,86	4,0	4
MOP 100/200 - 80		200	80		1,1	2845	2,40	6,1	E
MOP 100/150 - 100		150	100		1,1	1410	2,65	4,3	5
MOP 100/150 - 145		150	145		1,5	2860	3,30	5,5	F

	52 030	
	52 031	

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					O	
		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

EAA, EAB
EAC, EAD

Electric actuators SA 07.1, SA Ex 07.1, SAR 07.1, SAR Ex 07.1 Auma

Technical data

Type	SA 07.1	SA Ex 07.1	SAR 07.1	SAR Ex 07.1
Marking in valve´s specifcation No.	EAA	EAB	EAC	EAD
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 mm			
Enclosure	IP 67			
Process medium max. temperature	Acc. to used valve			
Ambient temperature range	-25 to 80℃	-25 to 40℃	-25 to 60℃	-25 to 40℃
Ambient humidity limit	100 %			
Weight	20 kg			

Specification of Auma actuators

		SA	X	XX		07.1
Type		SA				
Duty	Control		R			
	ON - OFF					
Execution	Normal					
	Non-explosive			Ex		
Actuator´s size						07.1

Output drive type A (thread TR 16x4 LH, flange size F07 for RS 502 DN 50÷100; thread TR 20x4 LH, flange F10 for RS 502 DN 150)

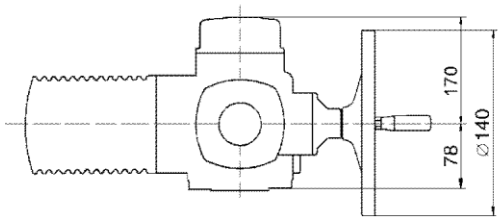
Output speed (rpm)		Tripping torque	SA 07.1 SAEX 07.1	SAR 07.1 SAREx07.1	Motor power [kW]	SA 07.1	SA Ex 07.1	SAR 07.1	SAR Ex 07.1
	4					0,025	0,025	0,025	0,025
	5,6					0,025	0,025	0,025	0,025
	8					0,045	0,045	0,045	0,045
	11		10-30 Nm	15-30 Nm		0,045	0,045	0,045	0,045
	16					0,09	0,09	0,09	0,09
	22					0,09	0,09	0,09	0,09
	32					0,18	0,18	0,18	0,18
	45					0,18	0,18	0,18	0,18

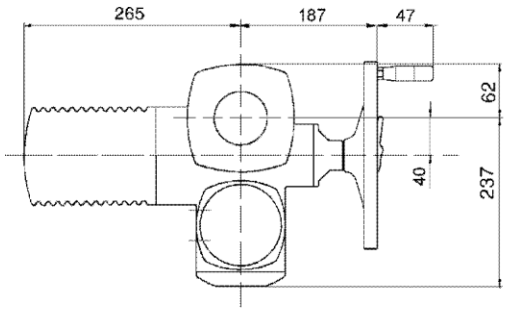
Accessories

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)
Other accessories acc. to catalogue of producer of actuators.

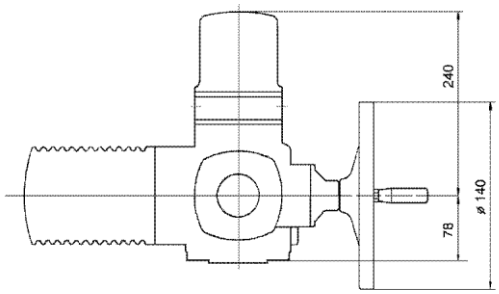
Dimensions of Auma actuators

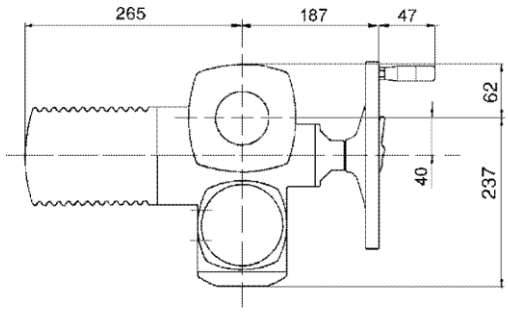
Normal execution



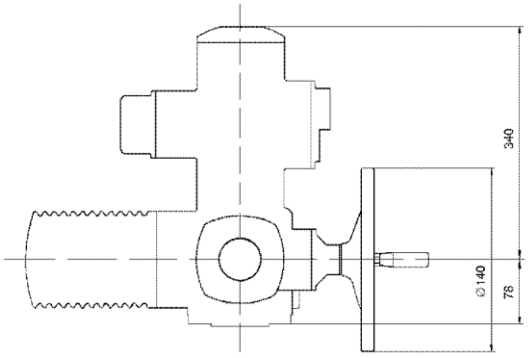


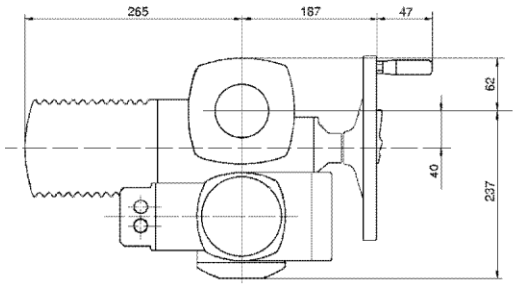
Ex execution



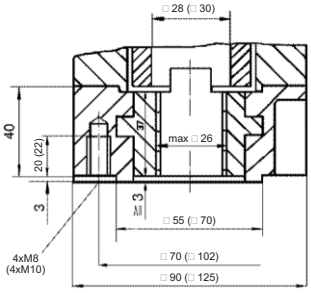


Version with AUMATIC

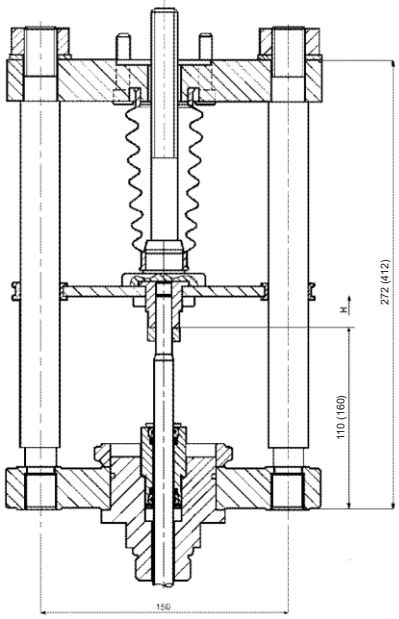




Output shaft type A, connection flange size F07, (F10)



Connection yoke



Values in parentheses apply to RS 502 DN 150/XXX

EZE, EZF
EZG, EZH

Electric actuators ...AB5
Schiebel

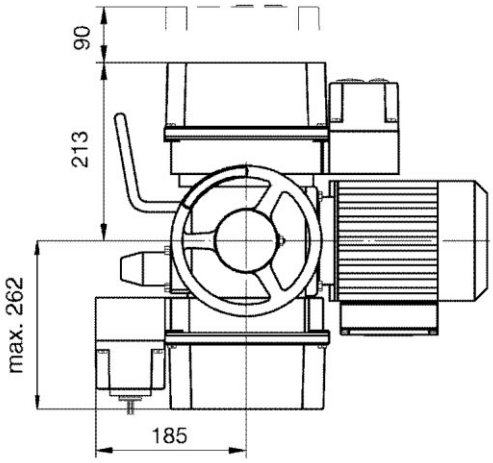
Technical data

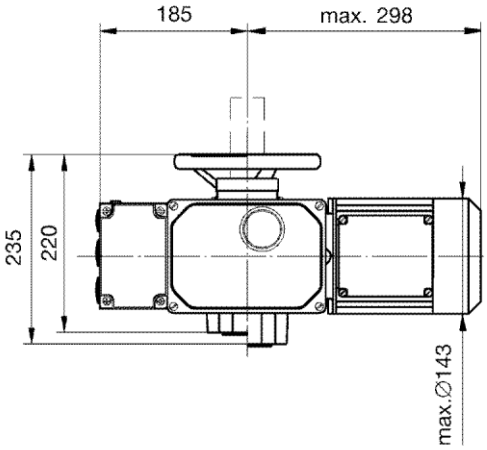
Type	AB5	exAB5	rAB5	exrAB5
Marking in the valve´s specification No.	EZE	EZF	EZG	EZH
Voltage	400 / 230 V; 230 V	400 / 230 V	400 / 230 V; 230 V	400 / 230 V
Frequency	50 Hz			
Motor power	See specification table			
Control	3 - position control or with signal 4 - 20 mA			
Nominal force	20 Nm ~ 10 kN; 30 Nm ~ 15 kN			
Stroke	Acc. to valve´s stroke 16, 25, 40, 63 mm			
Enclosure	IP 66	IP 65	IP 66	IP 65
Process medium max. temperature	Acc. to used valve			
Ambient temperature range	-25 to 80 °C	-20 to 40 °C	-25 to 80 °C	-20 to 40 °C
Ambient humidity limit	90 % (tropical version 100 % with condensation)			
Weight	16 kg	12 kg	16 - 18 kg	16 kg

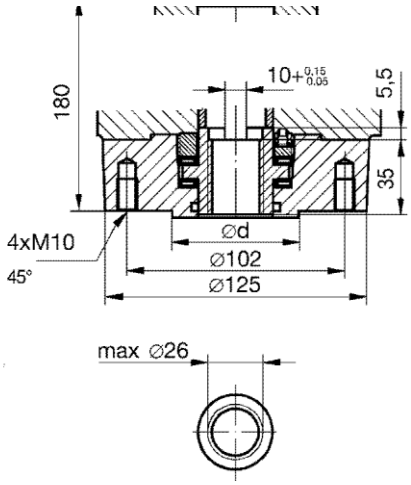
Specification of actuators

												XX	X	AB5	A	X	+	XXX
Execution					Non-explosive							ex						
					Normal													
Duty					Control								r					
					ON - OFF													
Actuator´s size														AB5				
Output drive type (thread TR 16x4 LH, connection flange F07, thread TR 20x4 LH, flange F10)															A			
Output speed (rpm)		Tripping torque	AB5 exAB5	rAB5 exrAB5	Motor power [kW]	AB5		rAB5		exAB5	exrAB5							
						400/230V	230V	400/230V	230V	400/230V	400/230V							
	2,5		10-60 Nm	10-30 Nm		0,09	0,09	0,09	0,09	0,09	0,09					2,5		
	5					0,12	0,12	0,12	0,12	0,12	0,12					5		
	7,5					0,09	0,12	0,09	0,09	0,09	0,09					7,5		
	10					0,12	0,25	0,12	0,12	0,18	0,18					10		
	15					0,18	0,25	0,18	0,18	0,18	0,18					15		
	20					0,18	0,55	0,18	0,18	0,37	0,37					20		
	30					0,37	0,75	0,37	0,37	0,37	0,37					30		
	40					0,37	1,10	0,37	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

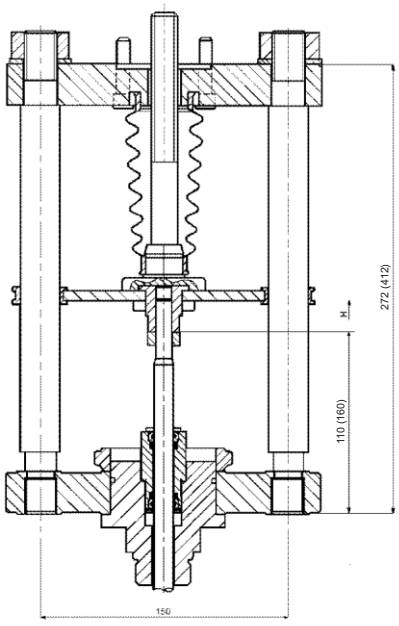
Dimensions of actuators ...AB5







Connection yoke



Values in parentheses apply to RS 502 DN 150/XXX

PFB
PFC
PFD

Pneumatic actuators Foxboro

Technical data

Type	PB 502		PB 700		PO 1501	
Marking in valve specification No.	PFB		PFC		PFD	
Feeding pressure	0,6 Mpa max					
Function	Fail to open	Fail to close	Fail to open	Fail to close	Fail to open	Fail to close
Control	Pneumatic signal of 20 - 100 kPa					
	Current signal of 0(4) - 20 mA					
Nominal force	According to table of nominal force values					
Stroke	40 mm		20 a 40 mm		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 controllling air into actuator. It is adjusted by switches and potentiometers.
Electropneumatic positioner (inteligent) type SRD 991	Device with electric input of 4 to 20 mA and outlet of controllling air into actuator. It is adjusted by PC and special software. Comunication HART, Fieldbus Foundation, PROFIBUS.
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 requied
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 10^6 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 for Foxboro actuators

Type	Actuator							Hand wheel		Weight [kg]	
										Actuator	Act. w. HW
	A	B	C	G	H	J	T	D_s	E		
	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]		
PB 502	352	82	460	M10x1	40	140	20	250	745	29	38
PB 700	405	65	545	M16x1.5	20	105	16	350	870	40	58
		82	550		40	140	20		875		
PB 1501	550	150	750	M20x1.5	80	160	---	---	---	148	---

Pozn.: Missing data to be given by producer.

Valve specification No. of Foxboro actuators

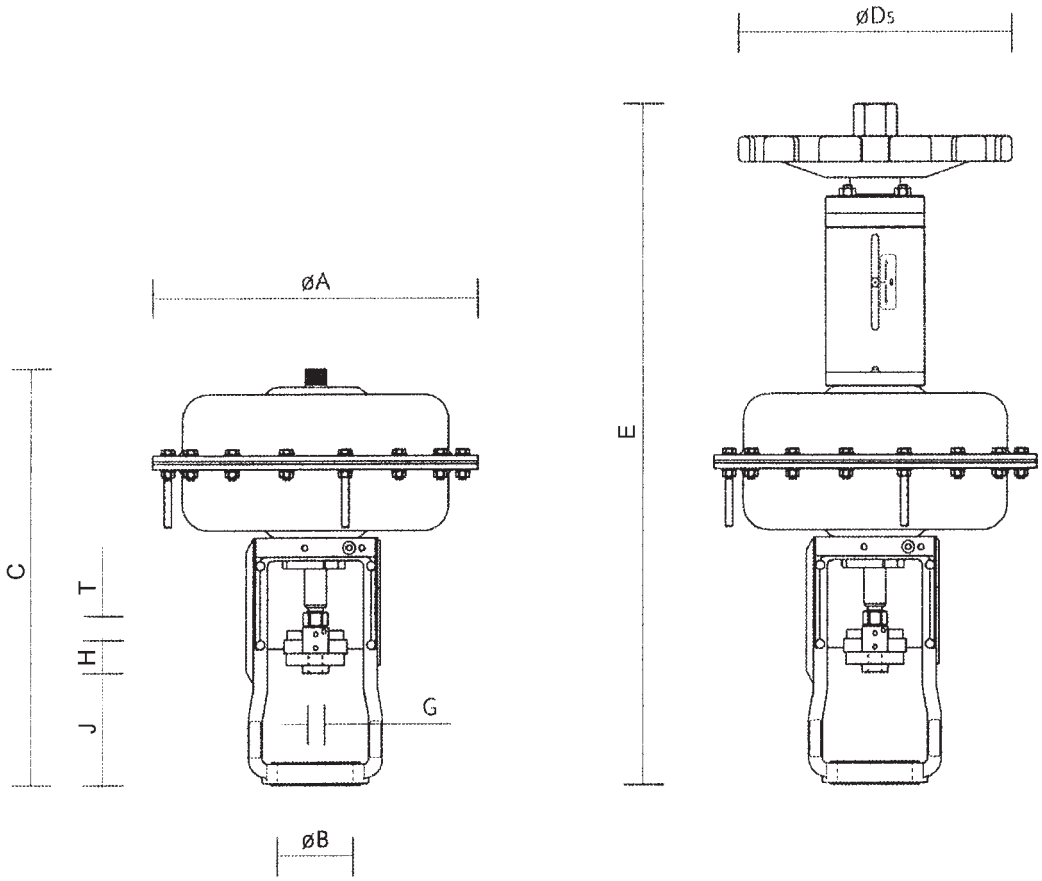
		PX XXXX	X	XX	X	X	X
Type of actuator		PB 502					
		PB 700					
		PO 1502					
Colour	White		B				
Spring range [bar]	2,0 - 3,5			FS			
	2,0 - 4,8			FY			
	1,8 - 2,7			JC			
	1,5 - 3,8			VI			
	1,5 -2,7			VC			
Hand wheel	Without wheel				O		
	Heavy wheel [1]				H		
Function	Fail to open					A	
	Fail to close					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]
50, 65	PB 700 BVIxZB	closing	40	1,5 - 3,8	2,36 - 3,8	5,3
	PB 700 BVIxAB	opening	40	1,5 - 3,8	1,5 - 2,93	5,3
80,100, 125	PB 700 BVIxZC	closing	60	1,5 - 3,8	2,26 - 3,8	5,3
	PB 700 BVIxAC	opening	60	1,5 - 3,8	1,5 - 3,03	5,3
150	PO 1502 BFSOZD	closing	80	2 - 3,5	2,3 - 3,5	5
	PO 1502 BFSOAD	opening	80	2 - 3,5	2 - 3,18	5

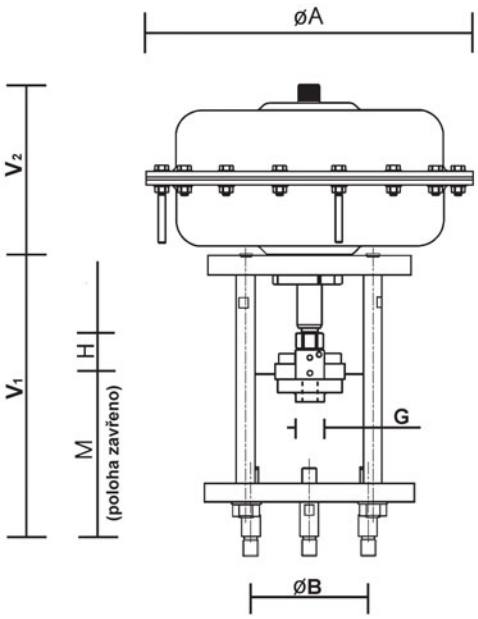
[1] only for PB 502 a PB 700 actuators

Dimensions for Foxboro actuators

PB 502, PB 700



PO 1501



Maximal permissible pressures [MPa]

Material	PN	Temperature [°C]									
		100	150	200	250	300	350	400	450	500	550
Cast steel	16	1.36	1.27	1.14	1.04	0.94	0.88	0.84	---	---	---
1.0619	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	---	---	---
Alloy steel	16	1.63	1.58	1.49	1.43	1.33	1.23	1.15	1.07	0.89	0.35
1.7357	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

Notes :