

**02 - 03.5**

10.07.GB

**Steam-conditioning station  
RS 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	$\frac{Q}{100} \sqrt{\frac{\rho_1}{\Delta p}}$	$\frac{Q}{100} \sqrt{\frac{\rho_1}{\Delta p}}$
	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

## Dimensions and units

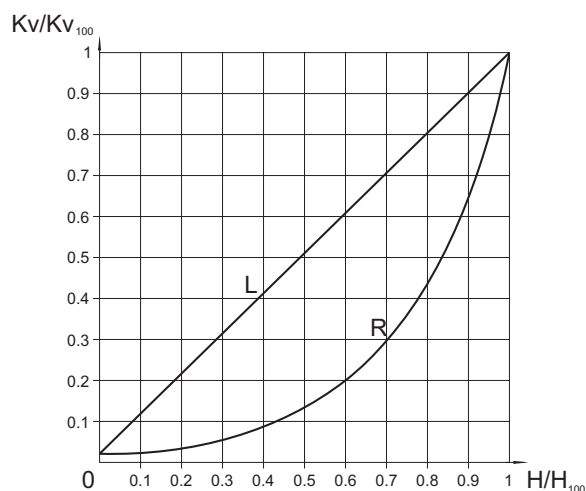
Marking	Unit	Name of dimension
$Kv$	$m^3/hour$	Flow coefficient under conditions of units of flow
$Kv_{100}$	$m^3/hour$	Flow coefficient at nominal stroke
$Kvs$	$m^3/hour$	Valve nominal flow coefficient
$Q$	$m^3/hour$	Flow rate in operating conditions ( $T_1, p_1$ )
$Q_n$	$Nm^3/hour$	Flow rate in normal 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 ( $T_1$ )
$\Delta p$	MPa	Valve differential pressure ( $\Delta p = p_1 - p_2$ )
$\rho_1$	$kg/m^3$	Process medium density in operating conditions ( $T_1, p_1$ )
$\rho_n$	$kg/Nm^3$	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

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)

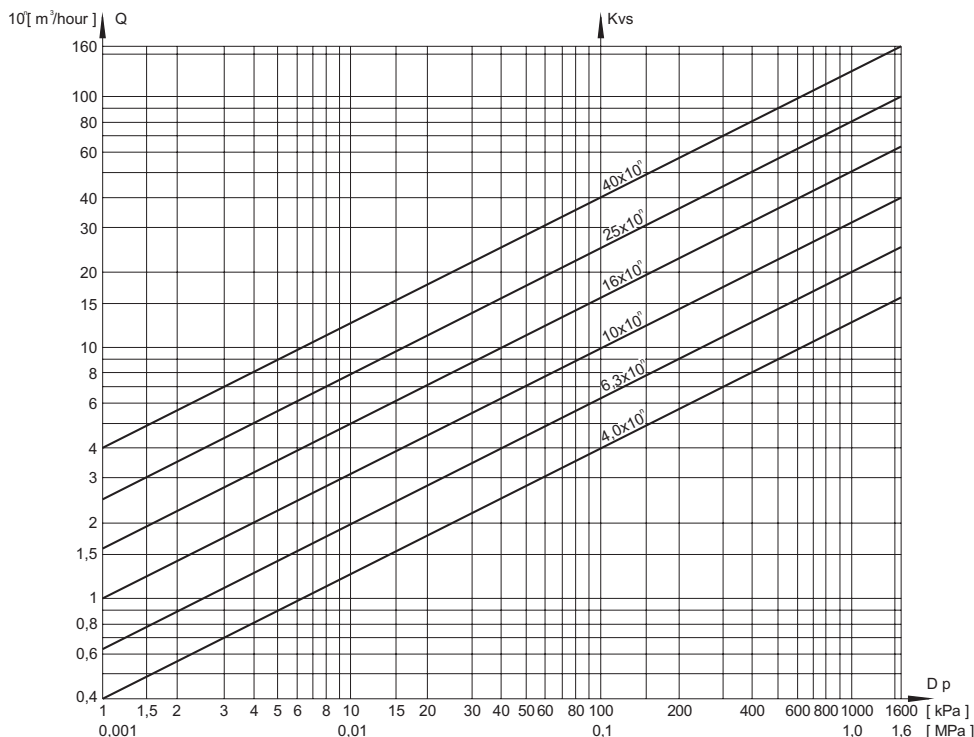
$$Kv/Kv_{100} = 0.0183 \cdot E^{(4 \cdot H/H_{100})}$$

## 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.

## Diagram for the valve Kvs value specification according to the required flow rate of water Q and the valve differential pressure $\Delta p$



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/m<sup>3</sup>.

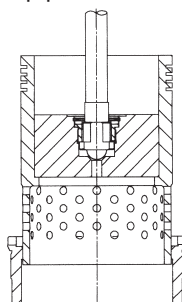
For the value  $Q = q \cdot 10^n$ , it is necessary to calculate with  $Kvs = k \cdot 10^n$ . Example: water flow rate of  $16 \cdot 10^{-1} = 1,6 \text{ m}^3/\text{hour}$  corresponds to  $Kv = 2,5 = 25 \cdot 10$  when differential pressure 40kPa.

### Application of multi-step pressure reduction

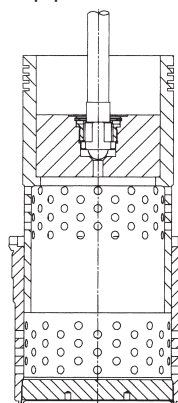
When the valves are designed for operation in above-critical differential pressure ( $p_2/p_1 < 0,54$  when throttling steam and gases), or when diff. pressure value is higher than the recom-

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.

### 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 702



**Steam-conditioning station**  
**Inlet DN 50, 100, 125, 150, 250**  
**Outlet DN 100 to 600**  
**PN 16 to 400**

### Description

Steam conditioning station RS 702 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 or VHP) with changeable flow. The valve is equipped with "Live Loading" packing.

The valves are supplied with weld ends.

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 Pe ky , Regada, AUMA, Schiebel and EMG - Drehmo.

### 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.

### 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 mentioned on page 23.

### 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. 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	RS 702		
Execution	Control valve, single-seated, straight-through, with press.-bal. plug, with extended outlet and orifice plate at outlet, with water injection into outlet pipe		
Range of nominal size	Inlet DN 50 to 250; outlet DN 50 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 SN EN 1349 (5/2001) Class III, execution with higher tightness Class V		
Packing	Graphite - Live Loading		

## Range of Kvs values

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

\*) Only for PN 160 and 250, for PN 320 and 400 Kvs<sub>max</sub> = 250 m<sup>3</sup>/h

Nominal values of Kvs are understood as multiplies of 10 of the basic figures mentioned in the following parenthesis 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 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 for RS 702 with weld ends \*)

DN	V <sub>1</sub>	V <sub>2</sub>	V <sub>3</sub>	V <sub>4</sub>	V <sub>5</sub>	L	H	m	m <sub>max</sub>
	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[kg]	[kg]
50/100	110	320	160	170	118	---	25	---	---
100/200	170	405	160	215	185	1025	40	---	---
125/250	225	466	160	---	---	---	63	---	---
150/200	225	466	160	215	185	---	63	---	---
150/300	225	466	160	250	241	---	63	---	---
250/500	345	675	210	---	---	1680	100	---	---

\*) There are only values of recommended combination of inlet and outlet dimensions mentioned in the table  
 m - weight of the valve without orifice plate  
 m<sub>max</sub> - weight of the valve with 3 orifice plates

Note: The values of weight are approximate. For missing data contact the producer.

## Weld ends connection dimensions

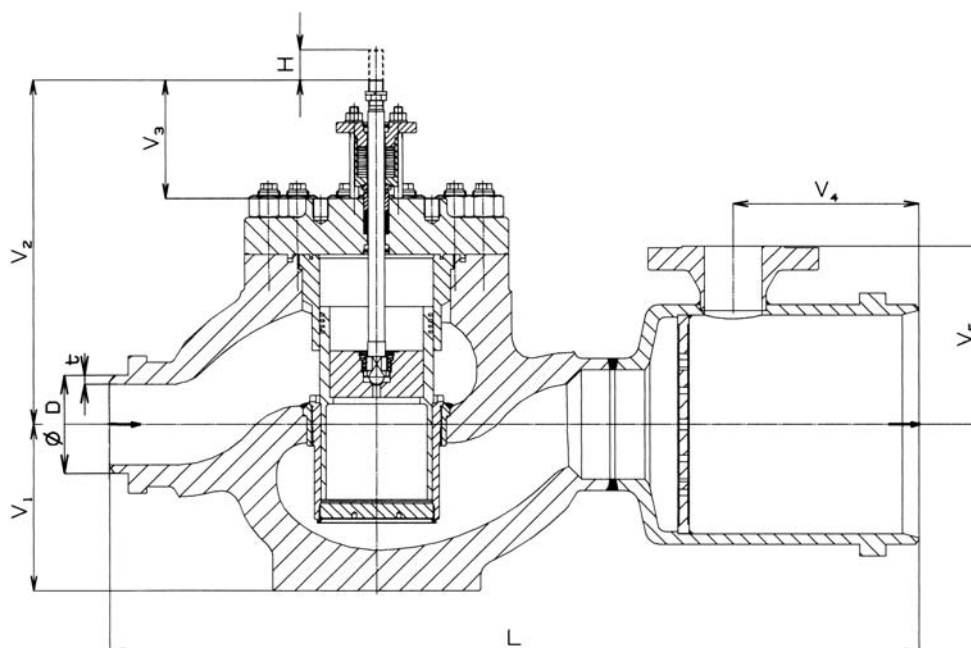
DN	PN							
	16 - 40	63	100	160	250	320*	400*	16-400
	t	t	t	t	t	t	t	D
	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
50	2.9	3.2	4.5	6.3	8	10	14.2	60.3
65	3.2	3.6	5	7	10	13	17.5	76.1
80	3.6	4	5.6	8	12.5	14.2	19	88.9
100	4	5	7	10	14	16	20	114.3
125	4.5	5.6	8	12.5	18	20	23	139.7
150	5	7	10	14	20	23	26	168.3
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					508
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

Steam-conditioning station RS 702 with weld ends



## Valve complete specification No. for ordering RS 702

		XX	XX X	XX X	XX X X	XX	(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		7 0 2							
3. Type of actuating	Electric actuator			E						
	Pneumatic actuator			P						
<sup>1)</sup> Pneumatic actuators only for DN 150	Electric actuator Modact MTR <sup>2)</sup>			E P D						
	Electric actuator Modact MTN Control <sup>2)</sup>			E Y A						
<sup>2)</sup> Applicable to max. DN 150	Electric actuator Modact MTN <sup>2)</sup>			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 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 <sup>1)</sup>			P F G						
	Pneumatic actuator Foxboro PO 1502 <sup>1)</sup>			P F D						
4. Connection	Weld ends				4					
5. Body material	Cast steel 1.0619 (-20 to 400°C)				1					
	Stainless steel 1.7357 (-20 to 600°C)				5					
<i>(operating temp. ranges are specified in parentheses)</i>	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)

**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 702 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 parameters of injection water possibly the type of injection nozzle (VH) acc. to the data sheet No. 02-03.2 or (VHP) acc. to the data sheet No. 02-03.3



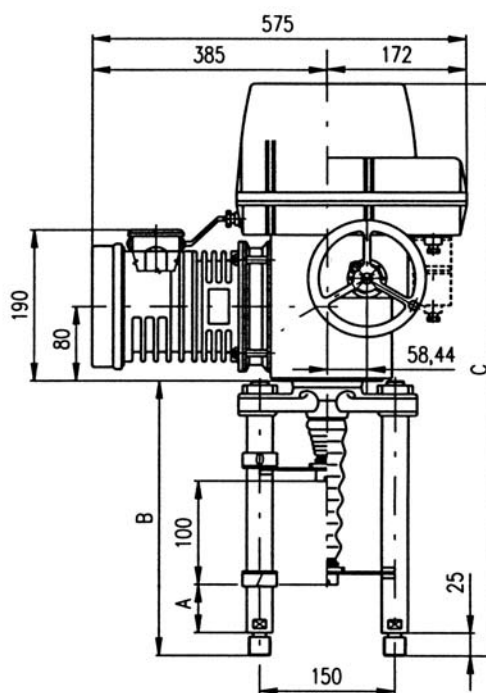
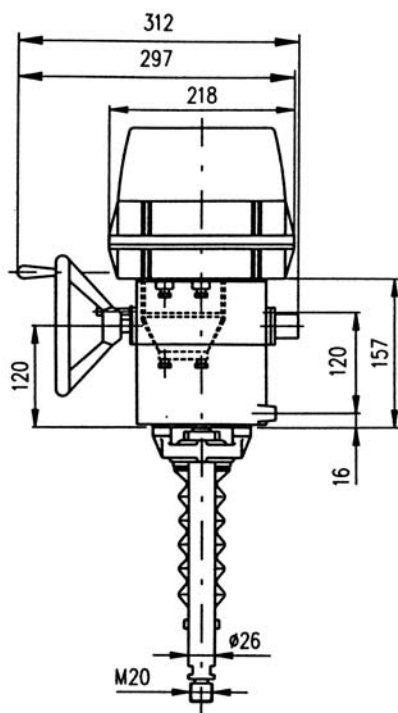


## Electric actuator Modact MTR Regada

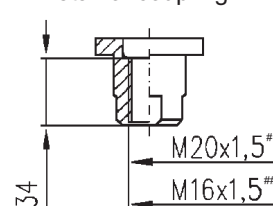
### Technical data

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



Detail of coupling



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

#) RS 702, DN 100+250  
##) RS 702, DN 50

## 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 <sup>1)2)</sup>	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											
	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 height / stroke		Pillar spacing / Bore of flange		Thread of stem <sup>3)</sup>		Dimensional drawing													
Columns	130/100		150/		M20x1.5 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				

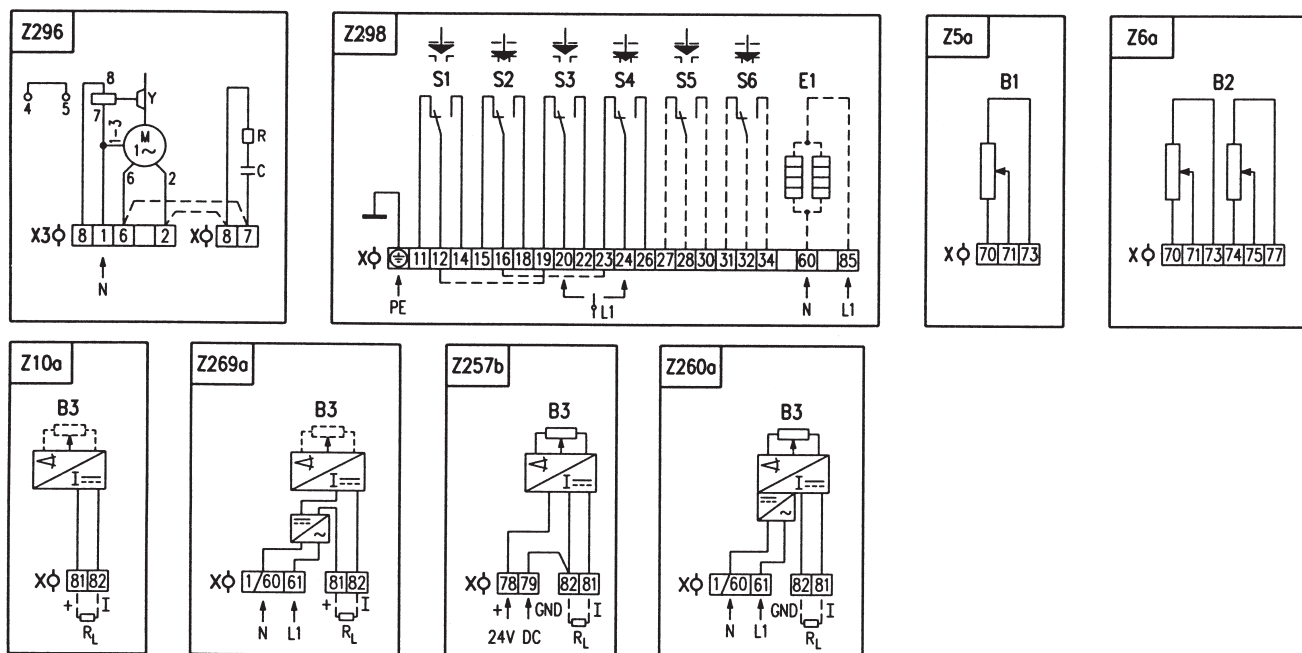
Combinations available and specification codes: A+B = 07

### Notes:

- 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<sub>L</sub> loading resistor



**Electric actuators Modact MTN and Modact MTN Control ZPA Pe ky**

**Technical data**

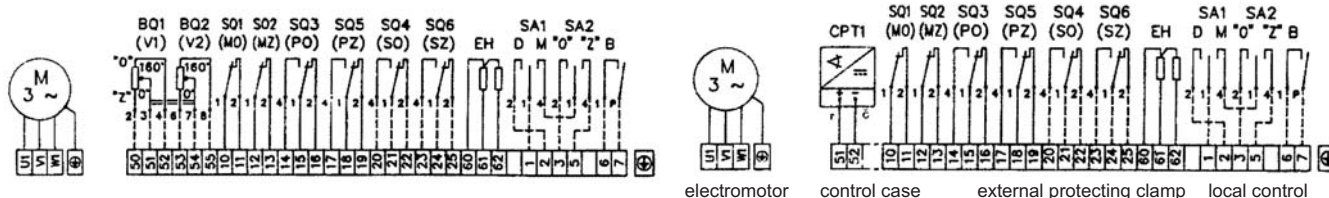
Type	Modact MTN Control	Modact MTN
Marking in valve specification No.	EYA	EYB
Voltage	3 x 220 V / 400 V (3 x 220 V/380V)	
Frequency	50 Hz	
Motor power	See specification table	
Control	3 - position control or continuous	
Nominal force	15000 and 25000 N	
Travel	10 to 100 mm	
Enclosure	IP 55	
Process medium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

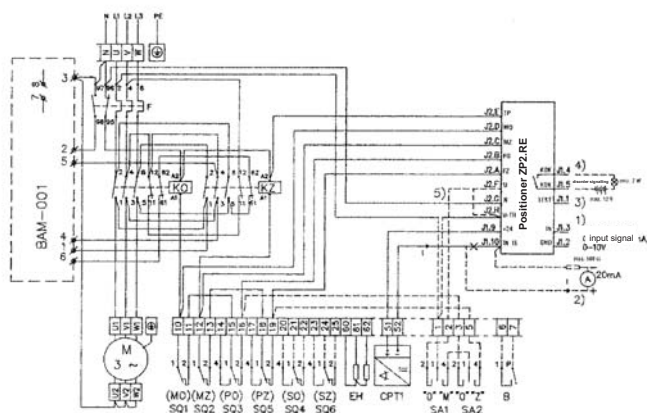
Position transmitter: resistance 2x100 W or without

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**

position closed	Columns pitch	B	150	Execution	Specification No.		RS 702
	Position "closed"	b	74		basic	additional	
		Clutch thread	g	130	Bg2II	52 442	XMXX
	I		M 20x1,5	Bg2I	52 442	XRXX	DN 100÷250
		II	M 16x1,5				
		III	M 10x1				

## 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 <sup>-1</sup>	Travel mm	Electromotor				Weight		Specification No.	
					Power W	rpm	In (400V) A	$\frac{I_z}{I_n}$	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 :

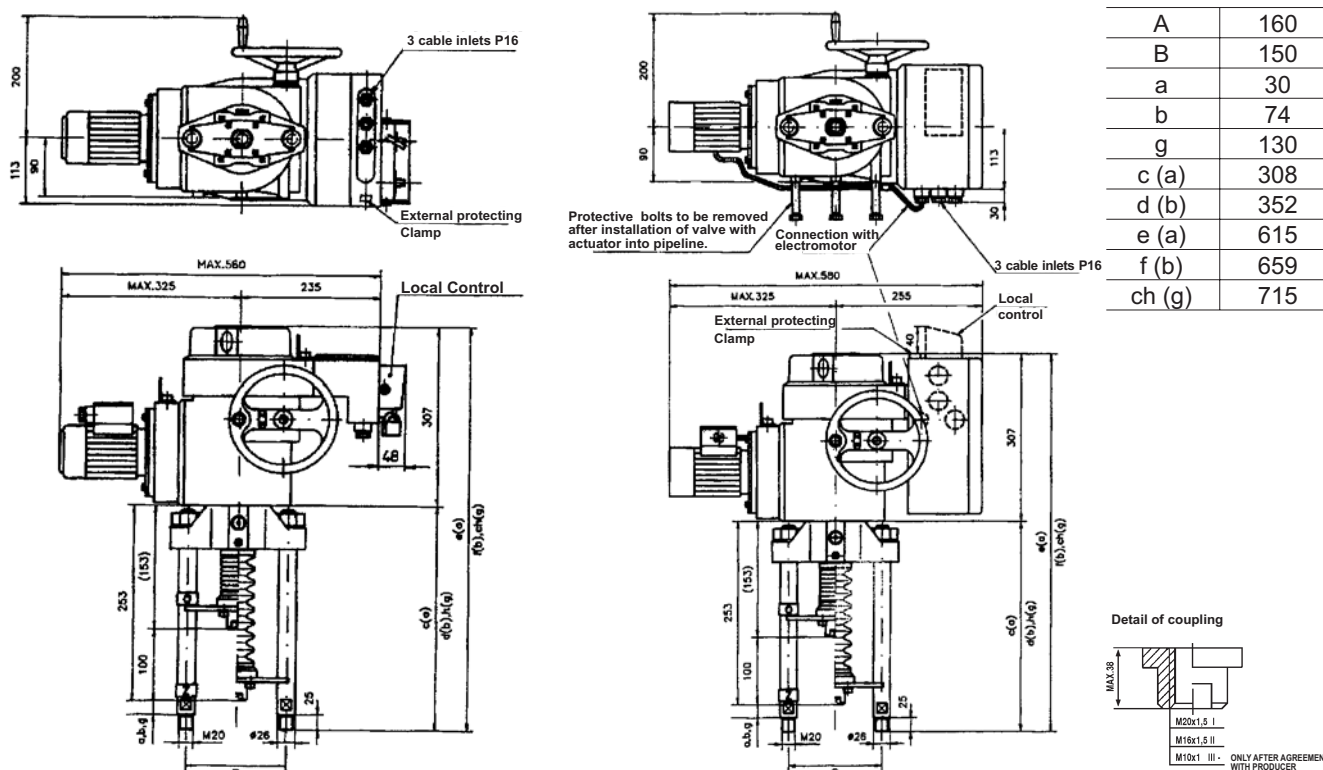
Via terminal board	6XXX
With conector KBSN (for Modact MTN execution only)	7XXX
Transmitter for Modact MTN	Capacity transmitter CPT 1/A 4 - 20 mA Resistance transmitter 2 x 100 Ω
	XXX0 XXX2

Additional electric equipment

		With resistance transmitter 2 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
		With brake BAM, without positioner	XXX5
		With brake BAM and with positioner	
	With local control	Without brake BAM and positioner	XXX7
		With brake BAM, without positioner	XXX8
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



# EYE, EYF EYG, EYH



## Electric actuators Modact MOP and Modact MOP Control ZPA Pečky

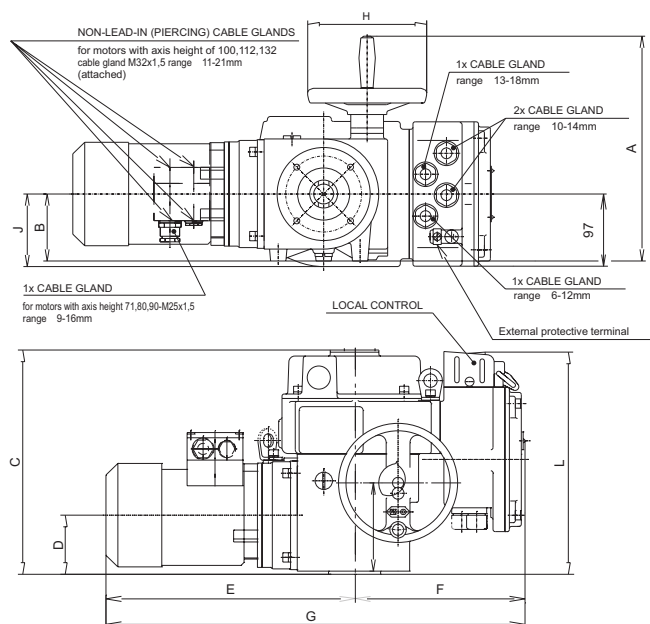
### Technical data

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

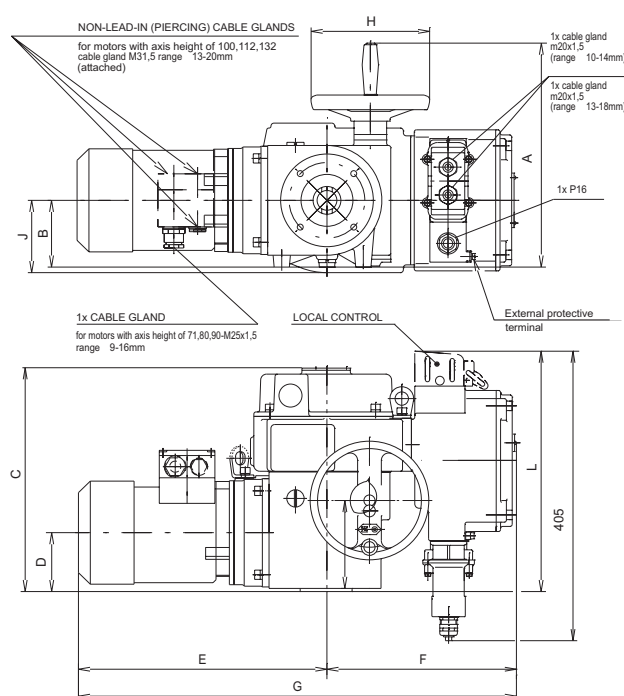
DIMENSIONAL DRAWING OF ACTUATORS MODACT MOP

52 030 a 52 031 EXECUTION WITH TERMINAL BOARD



DIMENSIONAL DRAWING OF ACTUATORS MODACT MOP

52 030 a 52 031 EXECUTION WITH CONECTOR

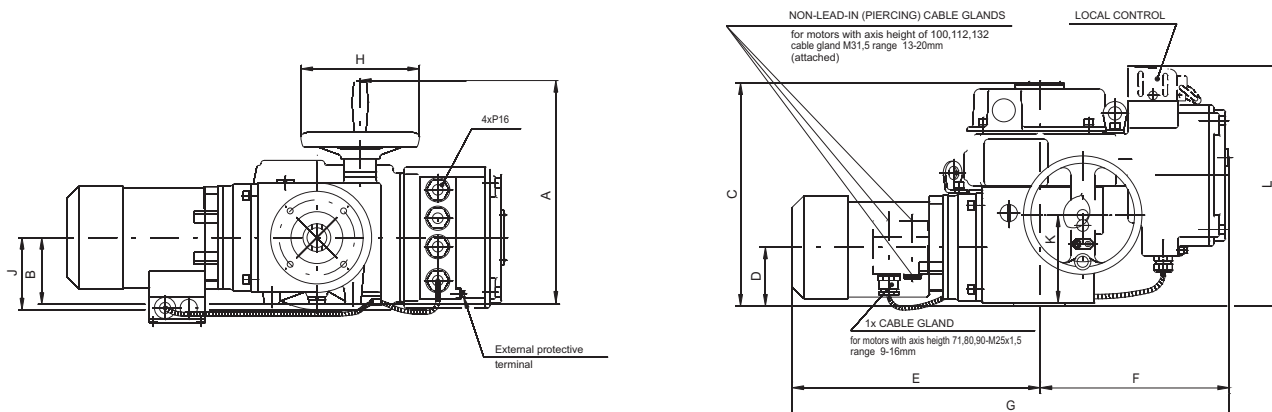


Type marking	A	B	C	D	E	F	G	H	J	K	L
52 030	305	90	300	78	334	228	562	160	99	120	300
52 031	376	120	328	92	436	228	664	200	-	144	328

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

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				
		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 <sub>n</sub> (400V)	I <sub>z</sub> / I <sub>n</sub>				
	(Nm)	(Nm)										
MOP 40/70 - 7	20-40	70	7	2-250	0,05	650	0,42	1,6	52 030			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					

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	





## 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  $\Omega$

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

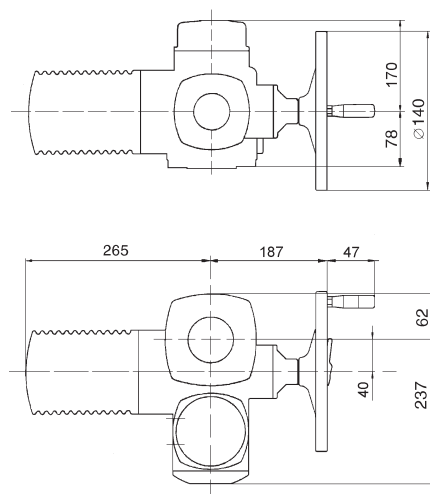
Electronic position transmitter RWG (potentiometer included), 4 - 20 mA, 3/4-wire

Inductive position transmitter IWG, 4 - 20 mA

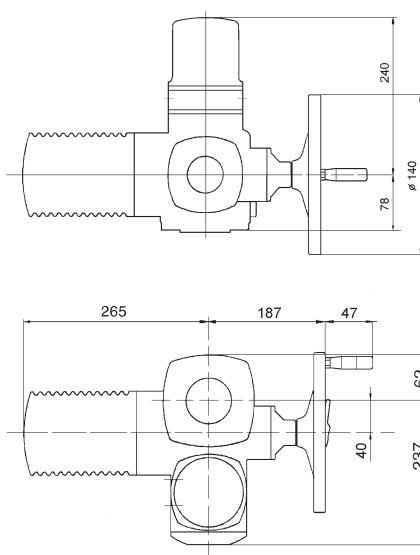
AUMATIC - for continuous control (specification of accessories acc. to catalogue of producer)

## Dimensions of actuators Auma

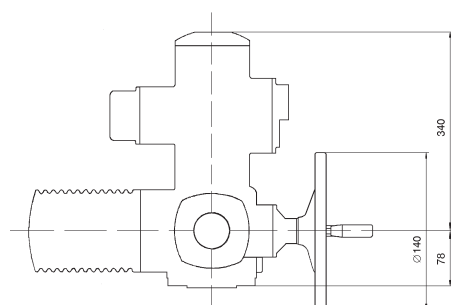
Normal execution



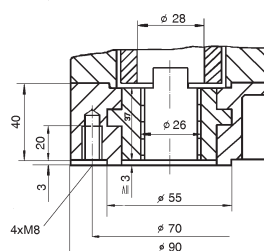
Ex version



Version with AUMATIC

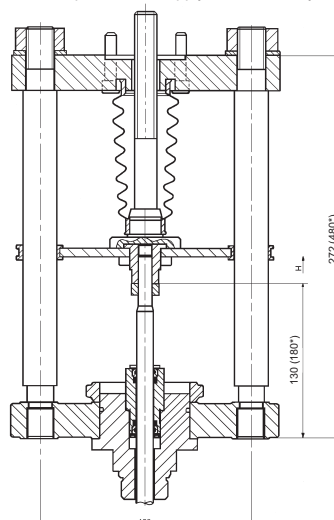
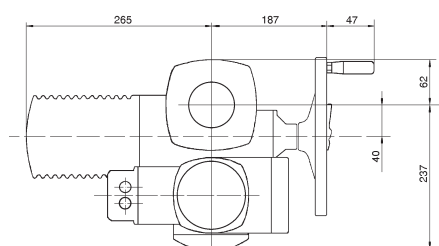


Output shaft A, flange F10



Attachement yoke (4 columns)

\* Data in parentheses apply to DN 250 only



**EZG**  
**EZH**



**Electric actuators ...AB5  
Schiebel**

**Technical data**

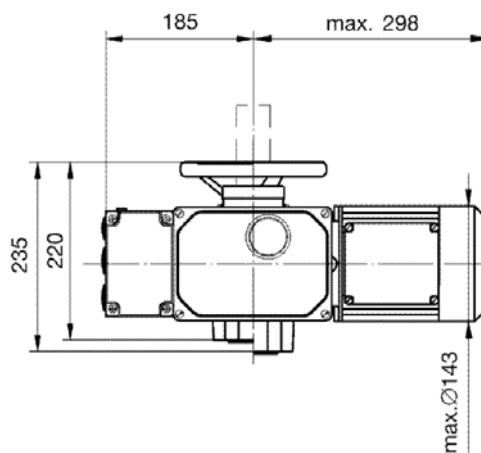
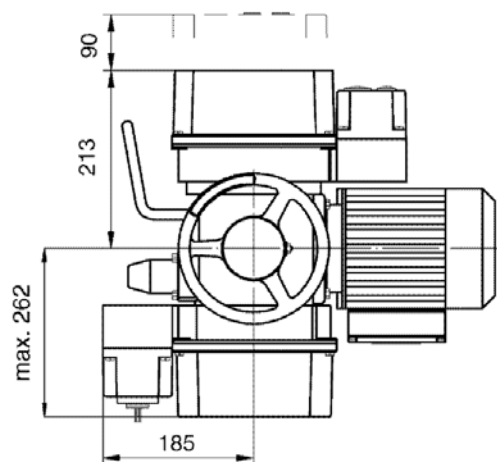
Type	rAB5	exrAB5
Marking in the valve's specification No.	EZG	EZH
Voltage	400 / 230 V; 230 V	400 / 230 V
Frequency	50 Hz	
Motor power	See specification table	
Control	3 - position control or with signal 4 - 20 mA	
Nominal force	25 Nm ~ 12,5 kN; 30 Nm ~ 15 kN	
Stroke	Acc. to valve's stroke 16, 25, 40, 63 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**

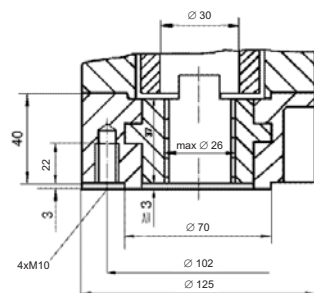
				XX	X	AB5	A	X	+	XXX								
Execution		Non-explosive		ex														
		Normal																
Duty		Control			r													
Actuator's size						AB5												
Output drive type (thread TR 20x4 LH, flange F10)							A											
Output speed (rpm)	Tripping torque	rAB5		rAB5		exrAB5		10-30 Nm	Motor 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

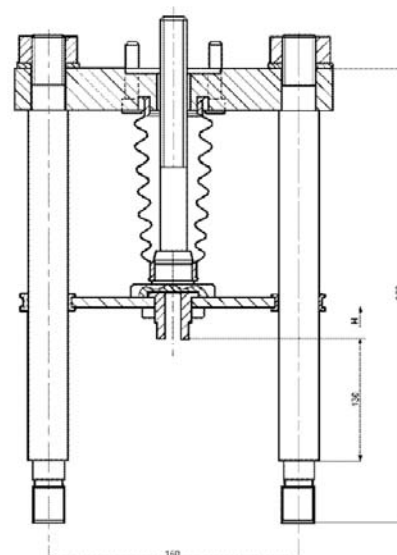
Actuator...AB5



Output shaft type A, flange F10



Attachement yoke (4 columns)





**EZK  
EZL**

## Electric actuators ...AB8 Schiebel

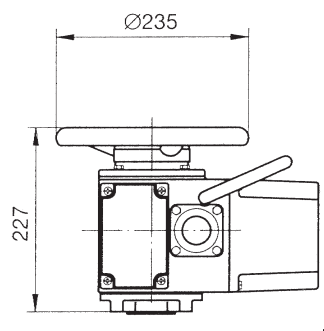
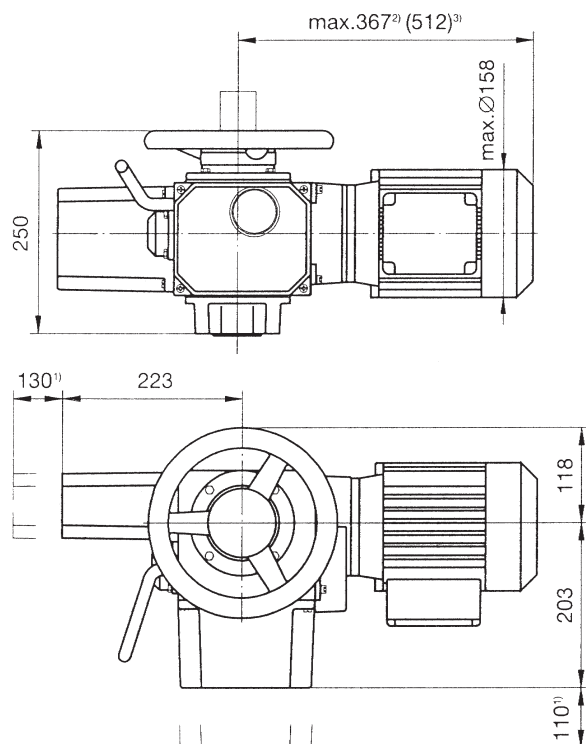
### Technical data

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	Acc. to valve's stroke 16, 25, 40, 63, 100 mm	
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

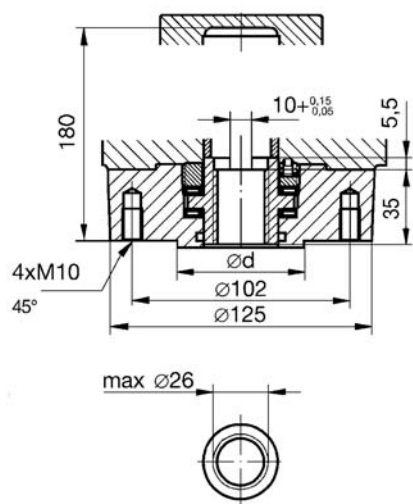
### Specification of actuator

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

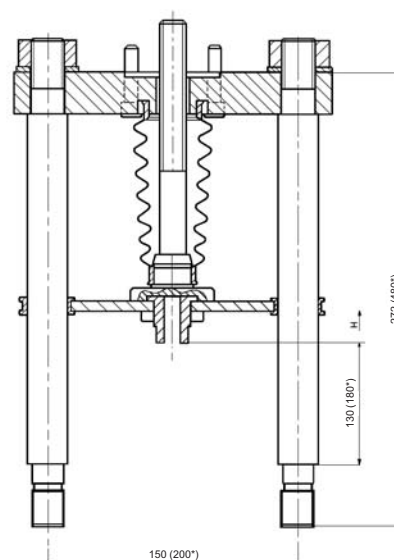


### Output shaft type A, flange F10



### 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 <sub>max</sub> = 0,6 Mpa, p <sub>min</sub> -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, 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<sup>6</sup> 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.

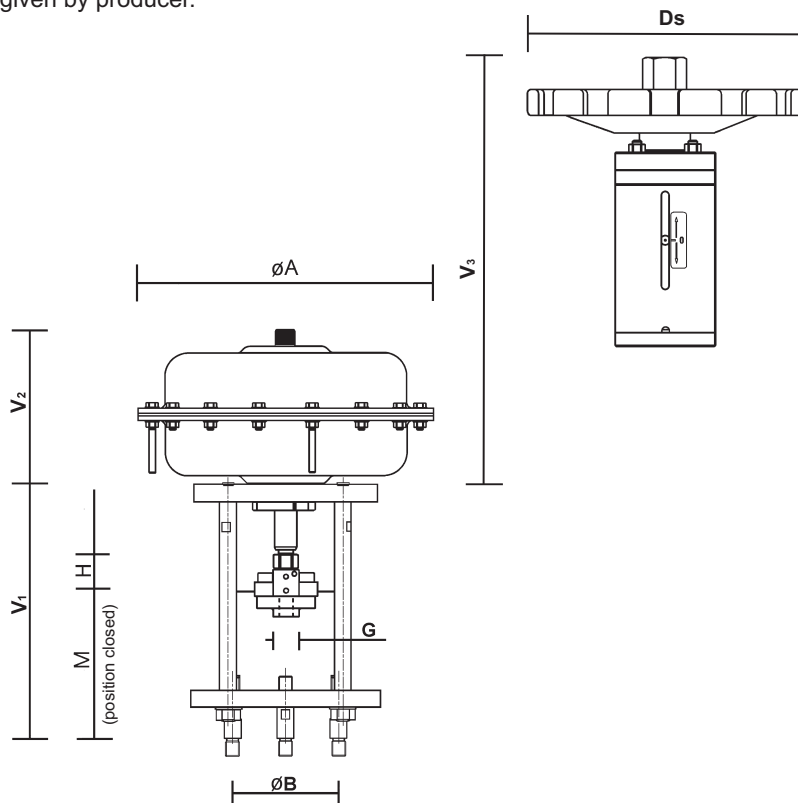
### Direct and indirect functions

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	PO 700	16	405	150	M10x1	160	278	227	600	350	65	82
50	PO 700	25	405	150	M16x1,5	160	278	227	600	350	65	82
100	PO 1502	40	550	150	M20x1,5	160	324	409	---	---	148	---
125, 150	PO 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

	PX XXXX	X	XX	X	X	X
Actuator type	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]
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 BFZOZC	Fail to close	60	2 - 3,5	2,5 - 3,5	5
	PO 1502 BFZOAC	Fail to open	60	2 - 3,5	2 - 3	4,5
125, 150	PO 1502 BFZOZD	Fail to close	80	2 - 3,5	2,3 - 3,5	5
	PO 1502 BFZOAD	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: