	INSTRUCTIONS FOR INSTALLATION AND SERVICE	RV 501 RV 502
	CONTROL VALVE	
	PM - 041/17/10/GB	

The instructions for installation and service of valves RV501 and RV502 (further in text only RV50x) are binding for users to ensure proper function of valves. The user must keep the rules said here while servicing, installation and using. Technical details of individual execution are specified in catalogue data sheets. If the usage of the valves is different from mentioned herein, the guarantee terms are not valid any more.

1. Technical Description and Valve Function

1.1 Description

Control valves RV501 are one-seated valves designed to create a lot of combinations of controlling appliances. Valve is pressure balanced, with multi-step throttling system, designed to be cavitation and noise free.

Control valves RV502 with extended outlet have multi-step throttling system (with orifice plate) designed to eliminate high differential pressures. Valve has pressure balanced throttling system, which assures low noise, low wearing during big pressure drop operation.

Valves are delivered with weld ends or as flanged with sealing surface according to customer's request.

The valves can be actuated with electric actuators. Producers of actuators are for example ZPA Pečky, Regada Prešov, Auma, Schiebel and Flowserve

Used actuators allow 3-point controlling or controlling by signal 0(4)-20mA or 0-10V. They can be equipped with the signalization of end positions and transmitter of position.

1.2 Application

Control valves RV50x can have linear plug or equal percentage plug. It is especially designed for industrial applications, such as heating plants, power plants or control of technologic processes.

For reliable function of the valves, the producer recommends to install the filter of mechanical impurities.

Installation of the filter is necessary for valve with micro-throttling system ($Kvs \leq 0.16$).

Recommended strainer dimensions:

DN, Type	Recommended maximum mesh size
DN 25, $Kvs \leq 0.16$	0,25 mm
DN 25-65	0,6 mm
DN 80-150	1,0 mm

The max. permissible operating pressure values correspond to EN 12 516-1.

1.3 Technical data

Series	RV 501
Type of valve	Control valve, one seat, straight- way, pressure balance plug
Nominal diameter DN	15 - 150
Nominal pressure PN	16 - 160
Body material	Cast steel - 1.0619 (GP 240GH), Alloy steel - 1.7357 (G17CrMo5-5)
Weld extension material	1.0425 (P 265 GH), 1.7335 (13CrMo4-5)
Seat material	17 021.6 (1.4006) + hard metal overlay
Plug material	17 023.6 (1.4078) hardened
Operating temperature	material 1.0619, 1.0425 (-10 to 400°C), material 1.7357, 1.7335 (-10 to 550°C)
Connecting flanges	For PN 16 -160 acc. to EN 1092-1
Flanges sealing surface	Type B1 (raised face) acc.to EN 1092-1 Type F (female face) acc.to EN 1092-1 Type B2 (plain face) acc.to EN 1092-1
Weld ends	Acc. to ČSN 13 1075
Control system	from one to three-step press.reduc., perforated plug-seat (cage), shaped plug for DN 15, 25
Flow characteristic	Linear, equal percentage
Leakage	Class III. acc. to EN 1349
Packing set	Graphite

Series	RV 502
Type of valve	Control valve, one seat, straight-way, pressure balance plug, with extended outlet and with orifice plate in outlet
Nominal diameter DN	inlet DN 25 -150, outlet DN 25 - 700
Nominal pressure PN	inlet PN 16-160, outlet PN 16-100
Body material	Cast steel - 1.0619 (GP 240GH), Alloy steel - 1.7357 (G17CrMo5-5)
Weld extension material	1.0425 (P 265 GH), 1.7335 (13CrMo4-5)
Seat material	17 021.6 (1.4006) + hard metal overlay
Plug material	17 023.6 (1.4078) hardened
Operating temperature	material 1.0619, 1.0425 (-10 to 400°C), material 1.7357, 1.7335 (-10 to 550°C)
Connecting flanges	For PN 16 -160 acc.to EN 1092-1
Flanges sealing surface	Type B1 (raised face) acc.to EN 1092-1 Type F (female face) acc.to EN 1092-1 Type B2 (plain face) acc.to EN 1092-1
Weld ends	Dle ČSN 13 1075
Control system	From one to two-step press. reduc., perforated plug-seat (cage), orifice plate
Flow characteristic	Linear, equal percentage
Leakage	Class III. acc. to EN 1349
Packing set	Graphite

1.4 Recommended differential pressures

Regarding to pressure balance plug and forces of used actuators, application of valve for high differential pressures is not limited by process medium pressure, but only by type of throttling system.

For valves series RV 501, maximum operating differential pressure is recommended to 4.0 MPa for one step reduction when perforated plug and perforated cage are used, and to 2.0 MPa for one step reduction when shaped plugs are used.

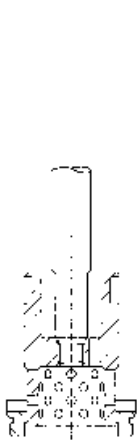
For valves series RV 502, maximum operating differential pressure is recommended to 5.0 MPa for one step reduction when perforated plug and perforated cage are used. Using for some other parameters should by consulted with producer.

1.5 Operating medium

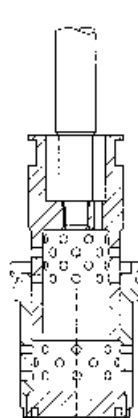
Valves are designed to regulate pressure and flow of liquids, steams and gases without mechanical impurities. Sort of common operating medium can be water, steam and other medium with no special demand on valve body material. Using for some other medium should by consulted with producer.

1.6 Multi-step pressure reduction

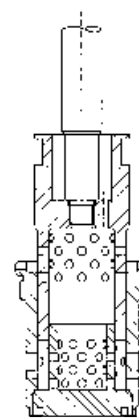
For valves working with above-critical differential pressure ($p_2/p_1 < 0.54$) or with pressure drop higher then recommended is useful to use two-step or three-step reduction to lower noise, ensure long service life of valve inner parts and prohibit them from cavitation.



One - step reduction



Two - step reduction



Three - step reduction

1.7 Application of orifice plates (RV 502)

In case of above-critical flow, the producer recommends to install one or more orifice plates 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 recommend to consult it with the producer.

2. Directions for installation and operating of valve

2.1 Preparation before installation

The valves are delivered from the company assembled, adjusted and tested. Before valve's installation into pipeline you must check the data on the name-plate with data mentioned in accompanying documentation. Then check if the valve or the actuator are not damaged and dirty. Pay attention especially to inner spaces and packing surfaces of valve.

The chemicals are applied during the manufacturing, to preserve the valves prior the corrosion. The protecting solution "Konkor" (oil base) is used at inner surface. The grease is applied at flange's faces or welding ends.

In case, the preserving agent should contaminate the medium, it is necessary to rinse/clean the valve with suitable cleaning agent/solution.

The flange's faces and welding ends must be prior the installation always degreased.

2.2. Installation of valve into pipeline

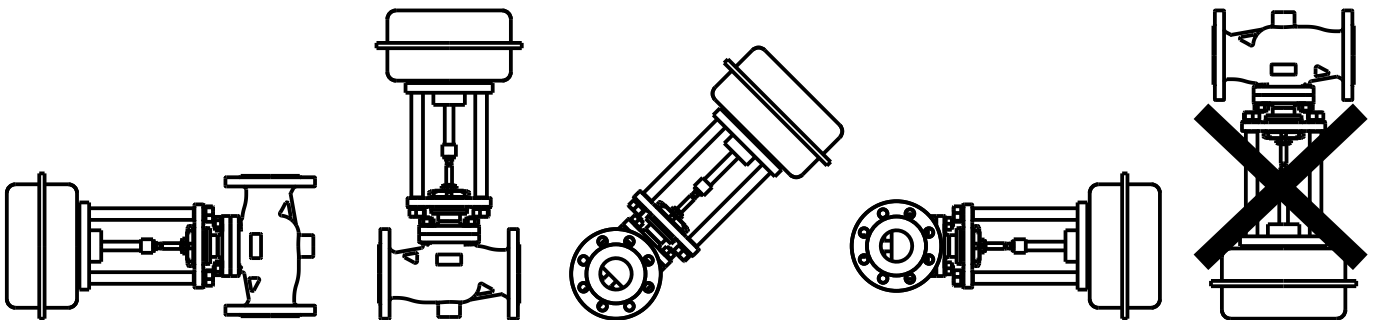
The valve must be installed in such direction, that the arrows on the valve body correspond to the process medium flow.

The valves with inlet **DN 15 – 150** can be installed in any position, except the position with actuator under the valve.

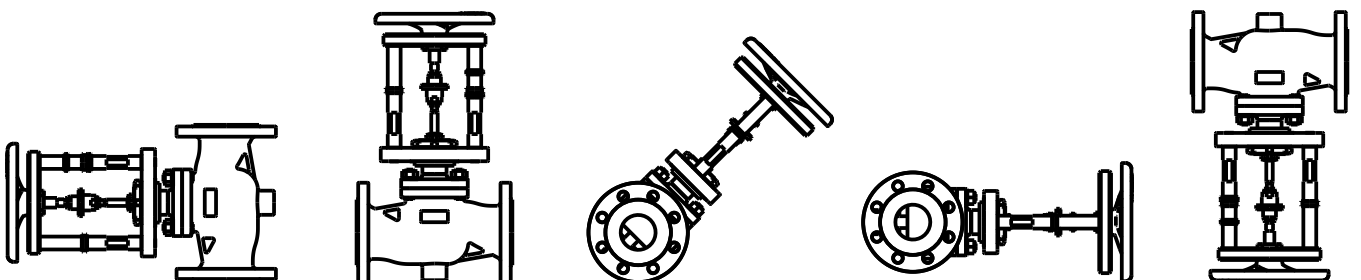
Protection of actuator against the radiant heat can be necessary in case of high temperature application. As a basic provision can be made pipeline insulation, actuator turning aside from vertical position, etc.. When the valve is installed into pipeline and actuator is turned aside from vertical position then it is necessary to ensure suitable supporting of actuator.

For proper function of control valve, below-mentioned instructions must be obeyed:

- no excessive forces can be transferred from pipeline to valve.
- the pipeline must be cleaned from dirt before valve installation.
- the valve can not be installed just behind the bend. Pipeline should be straight min. 6x DN in front of the valve. For 502 RV, the length of straight outlet section shall be 20 times the outlet DN, but in all cases a minimum of 4m.
- the inlet valve DN 150 must be adapted to the space above the valve, so that it was possible to use the lifting device.
- it is recommended to keep clean space around the valve for easy manipulation and service.
- installation itself must be done precisely.

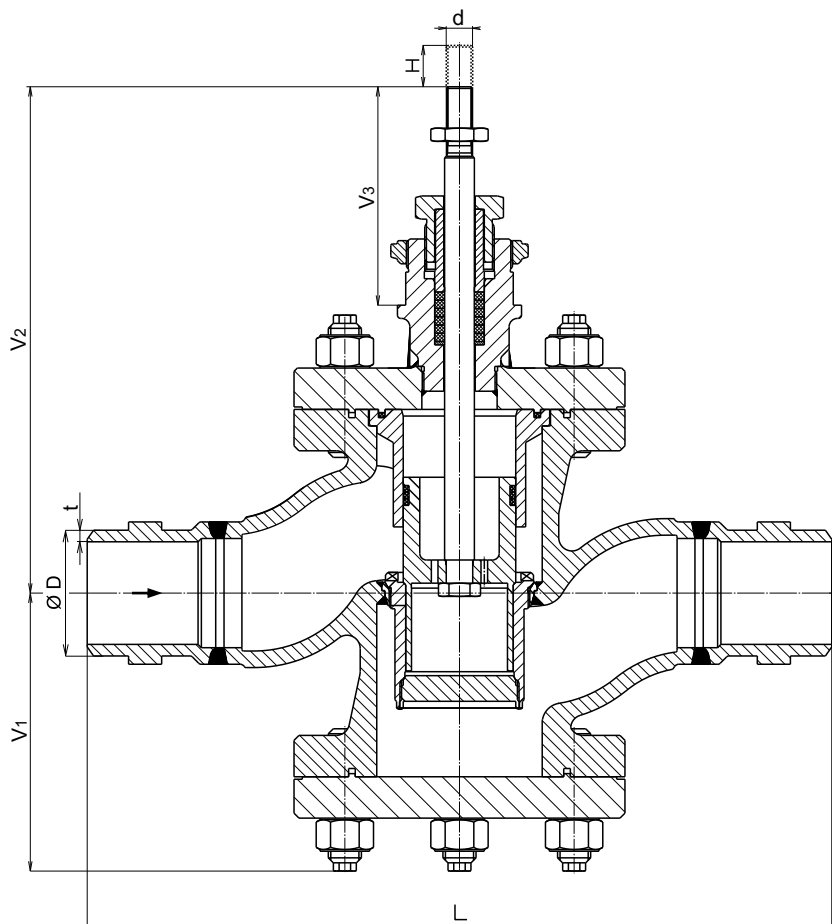


Installation position for valves with electro- or pneumatic actuators



Installation position for valves with hand wheel

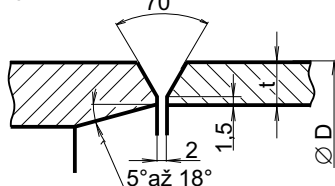
Control valve RV 501 - welding



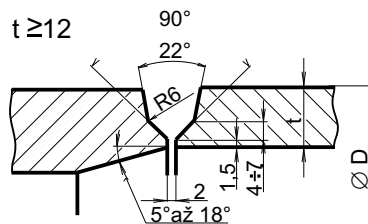
Dimensions and weights of valves RV 501, weld ends connection

DN	PN 16 PN 25 PN 40 PN 63 PN 100 PN 160						PN 16 - 160							
	t	t	t	t	t	t	D	L	V ₁	V ₂	V ₃	H	d	m
	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[kg]
15	2.6	2.6	2.6	2.6	2.6	2.9	21.3	220	30	246	130	16	M 10x1	6.5
25	2.6	2.6	2.6	2.6	2.9	4.0	33.7	270	103	254	130	16		11
40	2.6	2.6	2.6	2.9	3.6	5.0	48.3	300	129	265	130	25	M 16x1.5	22
50	2.9	2.9	2.9	3.2	4.5	6.3	60.3	390	150	291	130	25		30
65	3.2	3.2	3.2	3.6	5.0	7.0	76.1	450	175	310	130	25		45
80	3.6	3.6	3.6	4.0	5.6	8.0	88.9	480	180	320	130	40		67
100	4.0	4.0	4.0	5.0	7.0	10	114.3	580	204	345	130	40		78
125	4.5	4.5	4.5	5.6	8.0	12.5	139.7	580	204	345	130	40	90	
150	5.0	5.0	5.0	7.0	10	14	168.3	720	264	453	190	63	M 20x1.5	220

$t \leq 12$

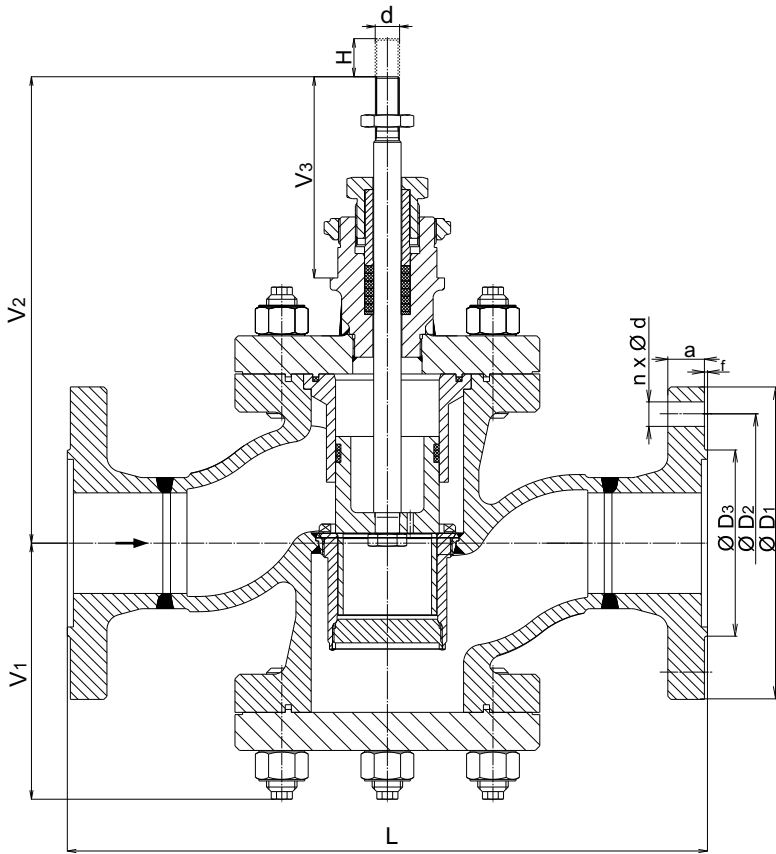


$t \geq 12$



Other shapes of weld ends according to customer requirements.

Control valve RV 501 - flanged



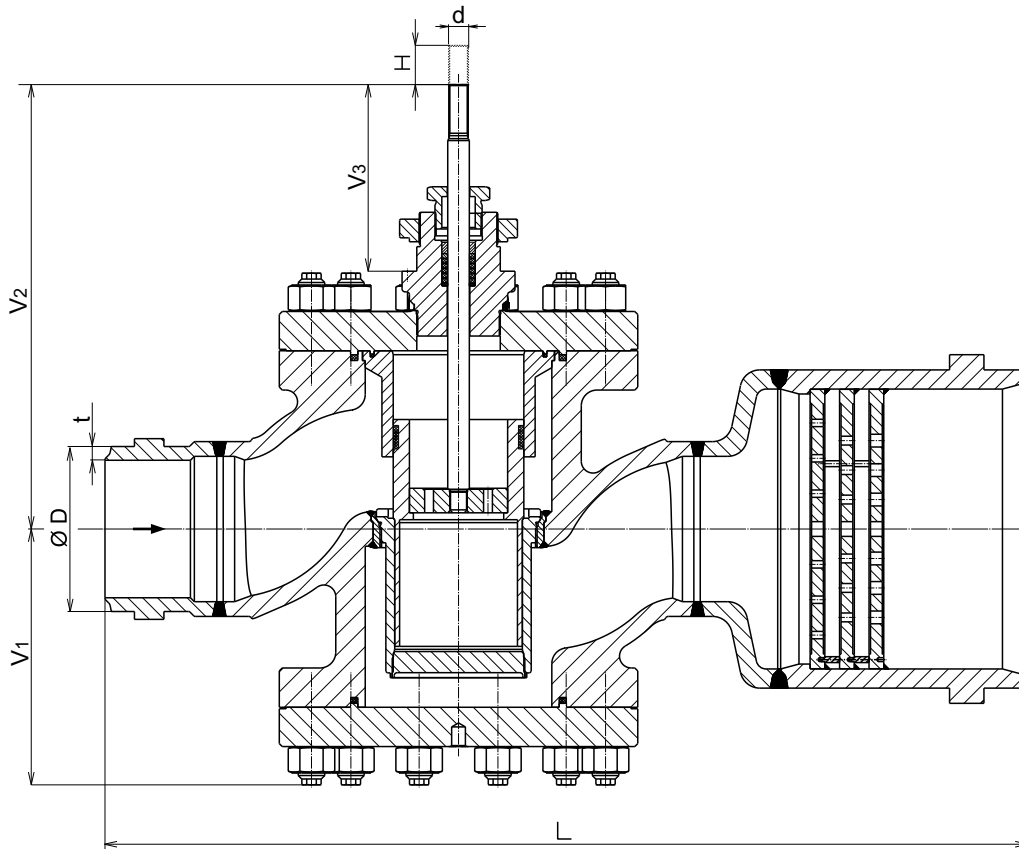
Dimensions and weights of valves RV 501, flanged connection

DN	PN 16					PN 25					PN 40					PN 63				
	D ₁ [mm]	D ₂ [mm]	a [mm]	D ₄ [mm]	n [ks]	D ₁ [mm]	D ₂ [mm]	a [mm]	D ₄ [mm]	n [ks]	D ₁ [mm]	D ₂ [mm]	a [mm]	D ₄ [mm]	n [ks]	D ₁ [mm]	D ₂ [mm]	a [mm]	D ₄ [mm]	n [ks]
15	95	65	16	14	4	95	65	16	14	4	95	65	16	14	4	105	75	20	14	4
25	115	85	18	14	4	115	85	18	14	4	115	85	18	14	4	140	100	24	18	4
40	150	110	18	18	4	150	110	18	18	4	150	110	18	18	4	170	125	26	22	4
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

DN	PN 100					PN 160					PN 16 do 160									
	D ₁ [mm]	D ₂ [mm]	a [mm]	D ₄ [mm]	n [ks]	D ₁ [mm]	D ₂ [mm]	a [mm]	D ₄ [mm]	n [ks]	D ₃ [mm]	V ₁ [mm]	V ₂ [mm]	V ₃ [mm]	L [mm]	f [mm]	H [mm]	d	m [kg]	
15	105	75	20	14	4	105	75	20	14	4	45	30	246	130	230	2	16	M10x1	8	
25	140	100	24	18	4	140	100	24	18	4	68	103	254	130	260		16		13	
40	170	125	26	22	4	170	125	28	22	4	88	129	265	130	300		25		24	
50	195	145	28	26	4	195	145	30	26	4	102	150	291	130	350	3	25	M16x1,5	34	
65	220	170	30	26	8	220	170	34	26	8	122	175	310	130	420		25		50	
80	230	180	32	26	8	230	180	36	26	8	138	180	320	130	450		40		73	
100	265	210	36	30	8	265	210	40	30	8	162 ¹⁾	204	345	130	520		40		86	
125	315	250	40	33	8	315	250	44	33	8	188	204	345	130	520		40		86	
150	355	290	44	33	12	355	290	50	33	12	218 ²⁾	264	453	190	680	63	M20x1,5	240		

¹⁾ for PN 16 ... 158 mm
²⁾ for PN 16 ... 212 mm

Control valve RV 502 - welding



Dimensions and weights of valves RV 502, weld ends connection

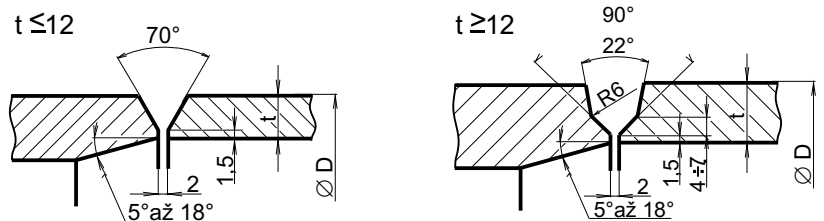
DN	V ₁	V ₂	V ₃	L	H	d	m
	[mm]	[mm]	[mm]	[mm]	[mm]		[kg]
25/40	103	254	130	300	16	M 10x1	13
40/80	129	265	130	460	25	M 16x1.5	26
50/100	150	291	130	550	25		35
65/125	175	310	130	610	25		53
65/200	175	310	130	665	25		75
80/150	180	320	130	670	40		81
100/200	204	345	130	765	40		98
125/250	204	345	130	785	40		---
150/200	264	453	190	900	63	M 20x1.5	245
150/300	264	453	190	940	63		318
150/500	264	453	190	1100	63		428

There are only recommended combinations of DN for inlet and outlet of the valve.

Pozn: Missing data will be specified later by the producer.

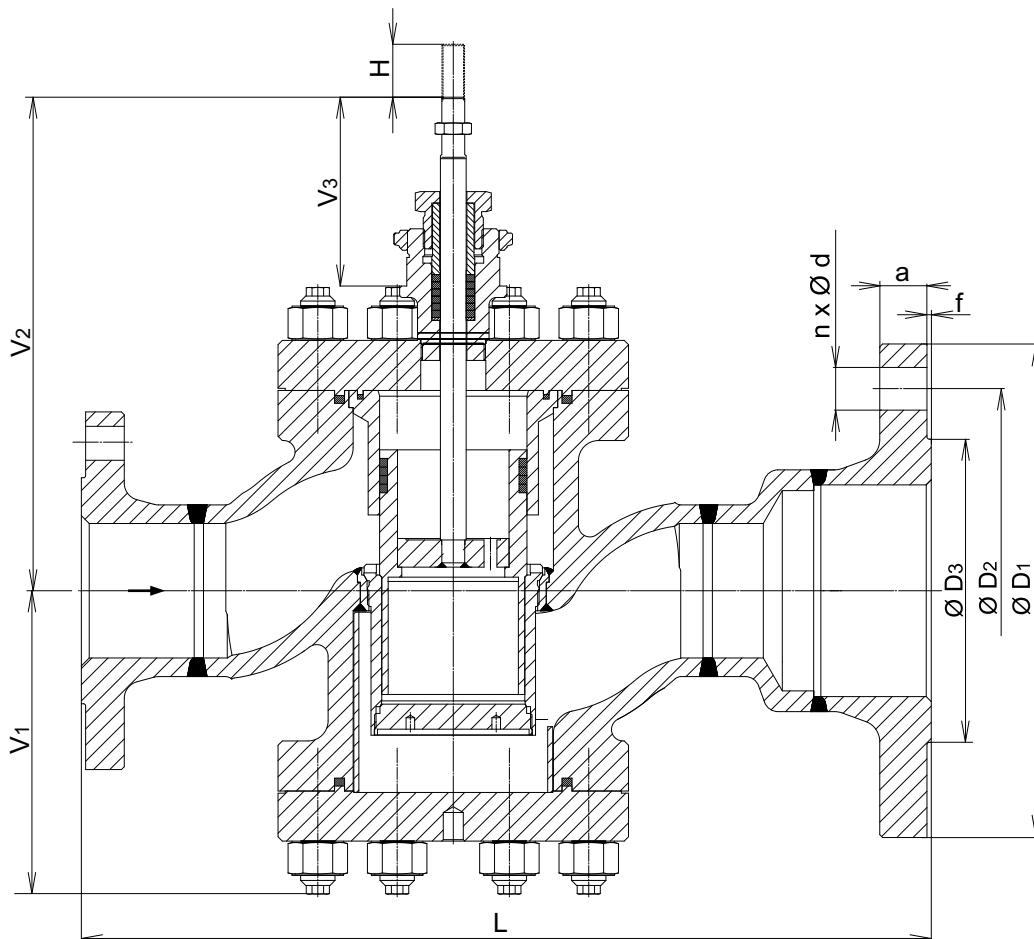
Weld ends connection dimensions

	PN 16 - 160	PN 16	PN 25	PN 40	PN 63	PN 100	PN 160
DN	D	t	t	t	t	t	t
	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
25	33.7	2.6	2.6	2.6	2.6	2.9	4
40	48.3	2.6	2.6	2.6	2.9	3.6	5
50	60.3	2.9	2.9	2.9	3.2	4.5	6.3
65	76.1	3.2	3.2	3.2	3.6	5	7
80	88.9	3.6	3.6	3.6	4	5.6	8
100	114.3	4	4	4	5	7	10
125	139.7	4.5	4.5	4.5	5.6	8	12.5
150	168.3	5	5	5	7	10	14
200	219.1	6.3	6.3	6.3	8	12.5	---
250	273	7	7	7	10	16	---
300	323.9	8	8	8	12.5	18	---
400	406.4	11	11	11	14	20	---
500	508	14	14	14	18	25	---
600	610	18	18	18	23	---	---
700	721	23	23	23	---	---	---



Other shapes of weld ends according to customer requirements.

Control valve RV 502 - flanged



Dimensions and weights of valves RV 502, flanged connection

DN	V ₁	V ₂	V ₃	L	L _c	H	d	m
	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]		[kg]
25/40	103	254	130	---	---	16	M10x1	17
40/80	129	265	130	---	480	25	M16x1,5	34
50/100	150	291	130	---	---	25		50
65/125	175	310	130	470	620	25		73
80/150	180	320	130	---	650	40		108
100/200	204	345	130	609	720	40		127
125/250	204	345	130	---	---	40	M20x1,5	---
150/300	264	453	190	785	950	63		308
150/500	264	453	190	---	---	63		---

There are only recommended combinations of DN for inlet and outlet of the valve.

L_c - length L for valve with 3 orifice plates

Note: Specified weights should be considered as approximate. Missing data will be specified later by the producer.

Flange connection dimensions

DN	PN 16					PN 25					PN 40					PN 63				
	D ₁ [mm]	D ₂ [mm]	a [mm]	D ₄ [mm]	n [ks]	D ₁ [mm]	D ₂ [mm]	a [mm]	D ₄ [mm]	n [ks]	D ₁ [mm]	D ₂ [mm]	a [mm]	D ₄ [mm]	n [ks]	D ₁ [mm]	D ₂ [mm]	a [mm]	D ₄ [mm]	n [ks]
25	115	85	18	14	4	115	85	18	14	4	115	85	18	14	4	140	100	24	18	4
40	150	110	18	18	4	150	110	18	18	4	150	110	18	18	4	170	125	26	22	4
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

DN	PN 100					PN 160					PN 16 - 160	
	D ₁ [mm]	D ₂ [mm]	a [mm]	D ₄ [mm]	n [ks]	D ₁ [mm]	D ₂ [mm]	a [mm]	D ₄ [mm]	n [ks]	D ₃ [mm]	f [mm]
25	140	100	24	18	4	140	100	24	18	4	68	2
40	170	125	26	22	4	170	125	28	22	4	88	
50	195	145	28	26	4	195	145	30	26	4	102	3
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	
150	355	290	44	33	12	355	290	50	33	12	218 ²⁾	4
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

2.2.1 Actuator's connection to electric network

These works can be done only by the experienced workers. It is necessary to keep all safety rules. It is also necessary to follow instructions for installation, operating and service of electric actuator published by producer. Transmitter of position and signalization switches are placed under the cover of actuator, in the case they are as part of the delivery.

In regard of the valve being delivered assembled together with its actuator from the company, basic adjusting and setting of actuator is carried out. The valve is adjusted in closed position by torque switch (so that the valve will be really tight closed) meanwhile the switching off the actuator is adjusted in open position by limit switch. In case the actuator is dismantled from the valve body for any reason such as the valve installation into pipeline etc., it is necessary to check the setting again after the assembly possibly to carry out the complete setting of actuator again. Producer does not take over the guarantee if the damage was caused by improper setting or adjusting of the actuator. In case of need, it is possible to ask for such service from service organization of the producer.

The length of the cables to actuator should be selected so that the actuator could be disassembled from the valve without any need for the cables unplugging from the actuator's terminal board.

WARNING: It's necessary to observe the mechanical stroke indicator placed at actuator's yoke or directly at the electromotor, if the valve is operated (opened or closed) by hand wheel. The extra care must be taken near to OPEN and CLOSE position. Neither position nor torque switches are in function in such case and there is a danger of valve or actuator serious damage. It's strongly prohibited to use any mechanical tools (force boosters) for hand wheel operation.

2.2.2 Pneumatic actuator connection

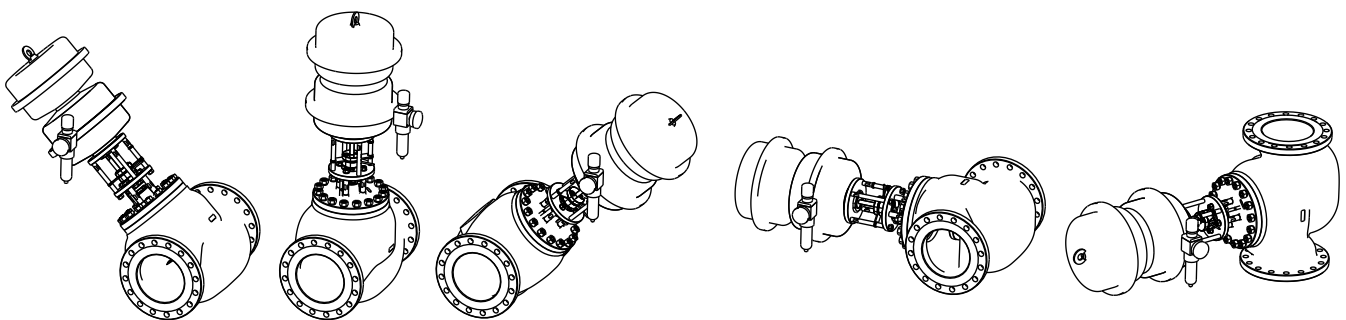
These work may be carried out by trained personnel only. It is necessary to follow instructions for installation, operation and maintenance of pneumatic actuators issued by the producer of the actuator.

Connection of pneumatic actuator to air supply is done by plastic, copper or stainless-steel tubes, recommended dimension is 8x1 mm. The 12x1 mm tubes are recommended for the actuators with membrane area larger than 600 cm² or in case the length of air pipeline is more than 10m.

Before valve commissioning, the data, given in the actuator and positioner ID plate (especially air supply maximum pressure), should be checked/compared with given specification. If the pressure of air supply is higher, the pressure reduction valve must be used.

As the valve is supplied with actuator as a complet, the basic setting is also carried out. In case the actuator was removed from the valve, it is necessary to check this setting or set the actuator once again. The producer does not take over the damage caused by wrong setting of the actuator. In case of need, the assistance of our subsidiary LDM Service can be required.

In case of pressure air regulator (air supply to pneumatic actuator) fixed directly on the valve/actuator yoke, the regulator must be placed in vertical position (draincock/draincup down), see picture. If the valve mounting position is known during the valve-actuator assembly, the right position is set on the production line/during final test.



Examples of filter/regulator position

2.2.3 Checking after installation

Piping system should be pressured after valve installation and then checked if there is no leak. Check the packing set tightness as well. Then check the proper function of actuator by doing a few strokes.

2.3 Operating and Service

2.3.1 Packing set and exchange of packing set

Packing set is made of graphite cord rings. The sealing material gets worn and in case of any leakage it is necessary to tighten the packing screw, possibly add new sealing ring.

If there is need to exchange the packing set because of high leakage, first the actuator must be dismantled and then the gland bolt must be screwed out. The pipeline may not be under pressure during changing of packing set. After this, there is need to check the state of spindle surface and clean the inside of the packing box. The surface of spindle must be smooth and without damage. If necessary, the spindle must be exchanged. **The spindle may not be greased during the operation!**

After exchange of packing set, the gland bolt must be tightened (approximately one turn), to press the packing set to prevent any leakage. After installation of actuator, there is necessary to make test as in 2.2.3.

2.3.2 Electric actuators

Electric actuators have to be operated according to instructions given in „Actuator manual“. In case of malfunction of actuator, see the instructions or ask for professional repair man.

2.3.3 Warming-through and putting fittings out of operation

Warming-through fittings:

Fittings have to be filled and warmed-through by regulating the steam supply and drainage so that the trend of the temperature increase is observed, i.e. so that the increase in the temperature of fittings does not exceed the given temperature jump per minute (see the table). After the required temperature is reached, the operation of the steam piping is regulated depending on the need of the given appliance.

Valve	Carbon material of body	Alloy material of body
DN 15-150, PN 16-160	6°C/min	4°C/min

If the required temperature of the fitting needs to be reached faster, it is necessary to secure permanent warming-through, e.g. by means of a by-pass.

Putting fittings out of operation:

If possible, the decline of the temperature of alloy steel fittings that are cooling down is to be as slow as the temperature increase in warming-through. If a faster temperature decline is detected, the decline has to be slowed down until the temperature drops to 300 °C; then the piping is let cool down without any intervention. The cooling rate does not have to be monitored in fittings made of carbon steels.

2.3.4 Thermal and acoustic insulation

The type and dimensions of the insulation are as stated in the design. Only the insulation above the cover of the fitting has to have its height adjusted to provide a free access for monitoring the compression of the packing or for tightening.

2.4 Elimination of defects and malfunctions

If a defect is detected on the valve (leakage, leakage of packing or bonnet sealing, etc.), it is necessary to ensure its repair immediately otherwise a permanent damage may occur to sealing surfaces and other parts exposed to effects of leaking medium.

Prior to any repair work on the valve, make sure that piping system is free of pressure!

Defect	Possible cause	Elimination of defect
Valve leakage	- insufficient linear force of the actuator	- check the function and setting of the actuator possibly positioner
	- seizure of impurity in seat area	- open and close the valve fully
	- damaged sealing surfaces of the plug and seat	- it is necessary to lap plug and seat or replace damaged parts - requires trained personnel
Packing leakage	- sealing force of graphite packing is too low	- tighten the graphite packing or add another sealing ring (see 2.3)
	- packing is worn or damaged	- change the whole packing set (see 2.3.1) - requires trained personnel
	- damaged stem	- replace packing and stem - requires trained personnel
Leakage of bonnet	- low adherence pressure to gasket - damaged gasket	- tighten screws - to change bonnet gasket - requires trained personnel
Leakage of body	- damage caused by aggressiveness, abrasion, or erosion of media	- it is need to change of body - trained personnel required
Increased noise	- exceeding of operating parameters - presence of undesirable particle in throttling system	- must be consulted with the producer - it is necessary to disassemble valve, clean the throttling system, eventually change the damaged parts - requires trained personnel
Stem won't move	- no supply to actuator (electric or pneumatic)	- electric actuators: check supply and feeding voltage - pneumatic actuators: check supply and feeding pressure
	- actuator control signal failure	- measure the value of input control signal
	- the defect of actuator or its accessories	- follow the instructions for actuator or require trained personnel
	- graphite packing tightened too much	- loosen the packing and retighten it just to ensure tightness
	- seizure inside the valve due to impurities	- it is necessary to dismantle the valve and replace damaged parts - trained personnel required
Stem jerky movement	- insufficient actuator force	- compare parameters of the product with the real parameters - if OK, ensure responsible service personnel
	- damaged positioner	- follow the instructions issued by its producer, possibly ensure trained service personnel
Valve won't move in full range of its stroke	- wrong setting of end position switches	- check the setting of the switches
	- pneumatic and electrohydraulic actuators: hand wheel got stuck in wrong position	- adjust the hand wheel into its basic position
	- pneumatic actuators: feeding pressure is too low	- ensure the required pressure of supply air
	- pneumatic actuators wrongly adjusted or defected positioner	- readjust the positioner acc. to instructions issued by its producer
	- impurities inside the valve	- close and open the valve fully, possibly ensure trained service personnel

If the valve is in guarantee period, it is necessary to ensure authorised service for all service except tightening of graphite packing!

2.5 Spare parts

Spare parts are not part of valve delivery. They must be ordered separately. For the spare parts order, following data must be written: type of a valve, nominal diameter DN, Serial valve's number, name of a spare part.

Recommend spare parts for 3 and 5 years of operation:

Parts for 3 years of operation	Additional parts for 5 years of operation *)
<ul style="list-style-type: none"> - packing set (stuffing box complete) - bonnet gasket - bonnet gasket-inner - plug's sealing rings (only for balanced plug with graphite rings sealing) - plug's wiping rings 	<ul style="list-style-type: none"> <u>balanced plug's sealing – graphite rings</u> - plug with stem (welded assembly) - seat (seat cage) - plug's guide

*) It's recommended for 5-years spare parts ordering to order 2 sets for 3-years operation and 1 set of additional parts for 5-years operation.

2.6 Guarantee conditions

The producer does not guarantee the operation and safety of the product under conditions different from data given in the catalogue data sheet. Any using of the valve under different conditions shall be consulted with the producer. Defects of the valve caused by impurities in process medium shall be considered as out of guarantee terms. The producer does not take over the guarantee if any change was made by the user without prior written consent from the producer (except the packing tightening).

2.7 Transportation and storage

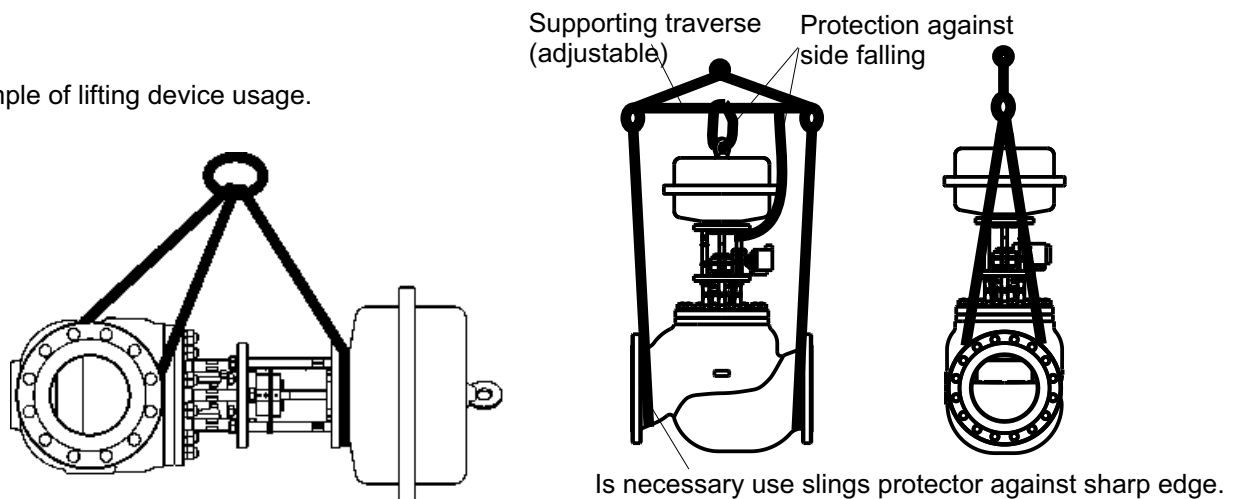
During transport and storage, the valve must not be exposed to water or placed in environment with relative humidity exceeding 90 %.

With respect to used actuators, the temperature during transport and storage shall be within the range of -20 to 55°C. Weld ends must be protected with blinds (these are part of delivery).

Suitable tools/devices should be used for valve lifting during the transport and installation (e.g. lifting harness entwined around weld ends, actuator yoke etc.).

Never lift the valve by the lifting device fixed on the actuator only!

Example of lifting device usage.



It is necessary to make sure the valve can not be damaged during transport. **Special attention shall be paid to the valve stem, stroke indicator and outside accessories fixed to the actuator.** If the valves are stored for more than 3 years, the producer recommends to carry out professional inspection of the valves.

2.8 Waste disposal

Packaging and the valves (after their scrapping) shall be disposed off in the common way, e.g. by handing over to a specialized company for a disposal (body and metal parts - metal scrap, packaging + other non-metallic parts - communal waste).

Ordering codes for valves RV 50x:

		XX	X X X	X X X	X X X X	XX	XX	X X X	XX
1.Valve	Control valve	RV							
2.Type of valve	Control valve, straight-way		501						
	Control valve, straight-way with extended outlet		502						
3.Actuator	Electric actuator			E					
	Pneumatic actuator			P					
	Handwheel			R					
	Electric actuator Modact MTN Control			EYA					
	Electric actuator Modact MTP Control			EYA					
	Electric actuator Modact MTN, MTP			EYB					
	Electric actuator Modact MTR			EPD					
	Electric actuator ST 2, STR 2, STR 2PA			EPM					
	Electric actuator AUMA SA 07.2			EAA					
	Electric actuator AUMA SA Ex 07.2			EAB					
	Electric actuator AUMA SAR 07.2			EAC					
	Electric actuator AUMA SAR Ex 07.2			EAD					
	Electric actuator Schiebel AB5			EZE					
	Electric actuator Schiebel exAB5			EZF					
	Electric actuator Schiebel rAB5			EZG					
	Electric actuator Schiebel exrAB5			EZH					
	Pneumatic actuator Flowserve PB 502			PFB					
	Pneumatic actuator Flowserve PB 700			PFC					
	Pneumatic actuator Flowserve PO 1502			PFD					
4.Connection	Raised flange				1				
	Female flange				2				
	Plain flange				3				
	Weld ends				4				
5.Body material	Cast steel 1.0619 (-20 to 400°C)				1				
	Alloy steel 1.7357 (-20 to 550°C)				7				
	Other material				9				
6.Packing set	Graphite				5				
7.Multi-step reduction	One-step reduction					1			
	Two-step reduction					2			
	Three-step reduction					3			
8.Flow characteristic	Linear - leakage class III.						L		
	Equal percentage - leakage class III.						R		
9.No. of orifice plates	RV 501 - 0							X	
	RV 502 - max.3								
10.Nominal pressure PN /e.g./	PN 63								
	PN 100								
	PN 160								
11.Operating temper.°C	Acc. to sort of medium							XXX	
12.Nominal diameter	DN - on request								XX

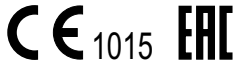
Ordering example:

Two-way control valve DN 80, PN 160, with electric actuator Modact MT Control, body mat. cast steel 1.0619, weld ends, packing set - graphite, two-step pressure reduction, linear characteristic, is marked as:

RV 501 EYA 4152 L0 160/400-80

Maximum permissible working pressure acc. to EN 12516-1[MPa]

Material	PN	Temperature [°C]									
		100	150	200	250	300	350	400	450	500	550
Cast steel 1.0619	16	1.50	1.42	1.34	1.23	1.11	1.04	0.96	0.59	---	---
	25	2.34	2.22	2.10	1.92	1.74	1.62	1.50	0.92	---	---
	40	3.74	3.55	3.36	3.07	2.78	2.59	2.40	1.47	---	---
	63	5.90	5.59	5.29	4.84	4.38	4.08	3.78	2.32	---	---
	100	9.36	8.88	8.40	7.68	6.96	6.48	6.00	3.68	---	---
	160	14.98	14.21	13.45	12.29	11.14	10.37	9.60	5.89	---	---
Alloy steel 1.7357	16	1.60	1.60	1.60	1.60	1.60	1.49	1.37	1.26	1.00	0.47
	25	2.50	2.50	2.50	2.50	2.50	2.33	2.13	1.97	1.56	0.73
	40	4.00	4.00	4.00	4.00	4.00	3.73	3.41	3.15	2.50	1.17
	63	6.30	6.30	6.30	6.30	6.30	5.87	5.38	4.97	3.93	1.85
	100	10.00	10.00	10.00	10.00	10.00	9.31	8.53	7.89	6.24	2.93
	160	16.00	16.00	16.00	16.00	16.00	14.91	13.66	12.62	9.99	4.70



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