

Alfa Laval Unique RV-P

Regulating valves

Introduction

The Alfa Laval Unique RV-P Regulating Valve is an automatic hygienic regulating valve with an electro-pneumatic actuator for use in applications that require precision control of flow as well as pressure, temperature, and tank fluid levels.

Application

The Unique RV-P Regulating Valve is designed for precise flow control in the dairy, food, beverage, biotechnology, pharmaceutical and many other industries.

Benefits

- Precision flow control
- Advanced hygienic valve design
- Dedicated protection
- Reliable operation
- Large operating range

Standard design

Built on the Alfa Laval Unique SSV platform, the Unique RV-P Regulating Valve consists of valve body, valve plug, lip seal, and an external normally open (NO) actuator with bonnet. The actuator is fitted to the valve body by means of a clamp. The Kv value is flexible as lower element can be exchanged. Manual and aseptic versions are available. Upon request, the valve can also be supplied with a normally closed (NC) actuator.

Working principle

The Alfa Laval Unique RV-P Regulating Valve is controlled from a remote location by means of compressed air. An actuator with an integrated IP converter IP converter transforms the electrical signal to a pneumatic signal. This signal conversion is based on a highly accurate and reliable contactless AMR sensor, making it insensitive to vibrations and pressure shocks. The pneumatic signal is transmitted to the integrated positioner which operates by means of the force-balance principle, ensuring that the position of the actuator piston is directly proportional to the input signal. Signal range and zero point can be adjusted individually. The actuator can be used for split-range operation by using a different measuring spring.

Certificates



Authorized to carry
the 3A symbol



TECHNICAL DATA

Valves

Max. product pressure:	1000 kPa (10 bar)
Min. product pressure:	Full vacuum
Temperature range:	-10°C to 140°C (EPDM)
Flow range Kv ($\Delta P = 1\text{bar}$):	0.5 to 110 m ³ /h
Max. pressure drop:	500 kPa (5 bar)

Actuator

Air quality

Air connection:	6/4 air tube with air fitting R1/8" (BSP)
Max. pressure:	600 kPa (6 bar)
Working pressure:	400 kPa (4 bar)
Max. size of particles:	0.01 mm
Max. oil content:	0.08 ppm
Dew point:	10°C below ambient temp. or lower
Max. water content:	7.5 g/kg

I/P converter

Signal range:	4 - 20 mA (standard)
Input resistance:	200 Ω
Inductivity/capacitance:	Negligible

PHYSICAL DATA

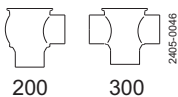
Materials, Valves

Product wetted steel parts:	1.4404 (316L)
Other steel parts:	1.4301(304)
Product wetted seals:	EPDM
External finish:	Semi-bright (blasted)
Internal finish:	Bright (polished) RA<0.8 μm

Materials, Actuator

Actuator cases:	Aluminium with plastic coating
Diaphragms:	NBR with reinforced fabric insert
Springs:	Stainless steel uncovered/spring steel epoxy resin coated
Actuator stem:	Polyamide
Screws, nuts:	Stainless steel, polyamide
Other parts:	Stainless steel

Valve body combinations



Accuracy

Deviation:	$\leq 1.5\%$
Hysteresis:	$\leq 0.5\%$
Sensitivity:	$< 0.1\%$
Influence of air supply pressure:	$\leq 0.1\%$ between 1.4 and 6 bar
Air consumption at steady state condition:	With 0.6 bar signal pressure and supply pressures up to 6 bar $\leq 100\text{ l/h}$
Ambient temperature:	-25°C to +70°C
Protection class:	IP 66

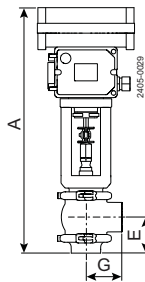
Flow sizes/tube connections

Kv	Seat diam. (mm)	Tube connections (mm)		Actuator (type no.)	
		ISO	DIN/DN	NO	NC
0.5 E	6	38	40	3277-5	3277-5
1.0 E	10	38	40	3277-5	3277-5
2 E	12	38	40	3277-5	3277-5
4 E	14	38	40	3277-5	3277-5
8 E	23	38	40	3277-5	3277-5
16 E	29	38	40	3277-5	3277-5
25 E	38	51	50	3277-5	3277-5
32 E	48.5	51	50	3277-5	3277-5
40 E	42	63.5	65	3277-5	3277-5
64 L	51	63.5	65	3277-5	3277-5
75 L	51	76.1	80	3277-5	3277-5
110 L	72	101.6	100	3277-5	3277-5

Options

- A. Male parts or clamp liners in accordance with required standard.
- B. Product wetted seals of HNBR or Fluorinated rubber (FPM).
- C. Profibus communication
- D. Aseptic configuration Max 8 bar

Dimensions (mm)

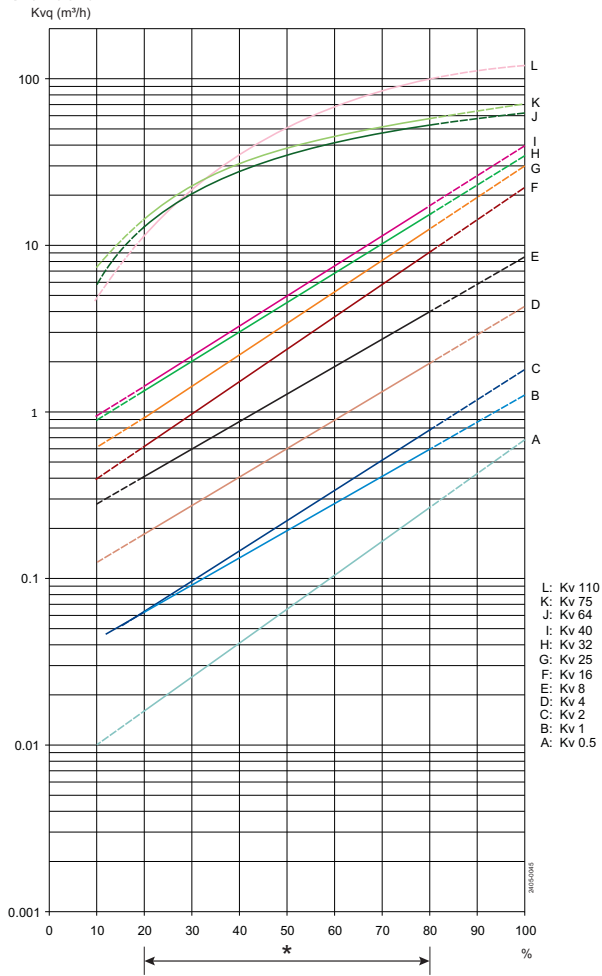


Size	38		51		63.5		76.1		101.6		DN40	DN50	DN65	DN80	DN100	
	NO/NC	NO/NC	NO/NC	NO/NC	NO	NC	NO/NC	NO/NC	NO	NC						
A- std	410	423	405	439	463	481	412	425	411	447	465	483				
A- aseptic	411	426	412	446	470	488	414	427	418	454	472	490				
E	56	63	67	85	96	96	57	64	70	89	98	98				
G	49.5	61	81	86	119	119	49.5	62	78	87	120	120				
H	168	168	168	168	168	280	168	168	168	168	168	280				
OD	38	51	63.5	76.1	101.6	101.6	41	53	70	85	104	104				
ID	34.8	47.8	60.3	72.9	97.6	97.6	38	50	66	81	100	100				
t	1.6	1.6	1.6	1.6	2	2	1.5	1.5	2	2	2	2				
M/ISO clamp	21	21	21	21	21	21	-	-	-	-	-	-				
M/DIN clamp	-	-	-	-	-	-	21	21	28	28	28	28				
M/DIN male	-	-	-	-	-	-	22	23	25	25	30	30				
M/SMS male	20	20	24	24	35	35	-	-	-	-	-	-				
Weight kg	8.2	9.3	9.7	11.2	15.4	24.9	8.2	9.3	9.7	11.2	15.4	24.9				

Capacity diagram

For $\Delta P = 100 \text{ kPa (1bar)}$.

Standard



*Recommended working area

Note!

For the diagram the following applies:

Medium: Water (20°C).

Measurement: In accordance with VDI 2173.

Alfa Laval recommend max. flow velocity in tubing and valves to be 5 m/sec.

Pressure drop calculation

The Kv designation is the flow rate in m^3/h at a pressure drop of 1 bar when the valve is fully open (water at 20°C or similar liquids).

To select the Kv value it is necessary to calculate the Kv_q value using the following formula:

$$Kv_q = \frac{Q}{\sqrt{\Delta p}}$$

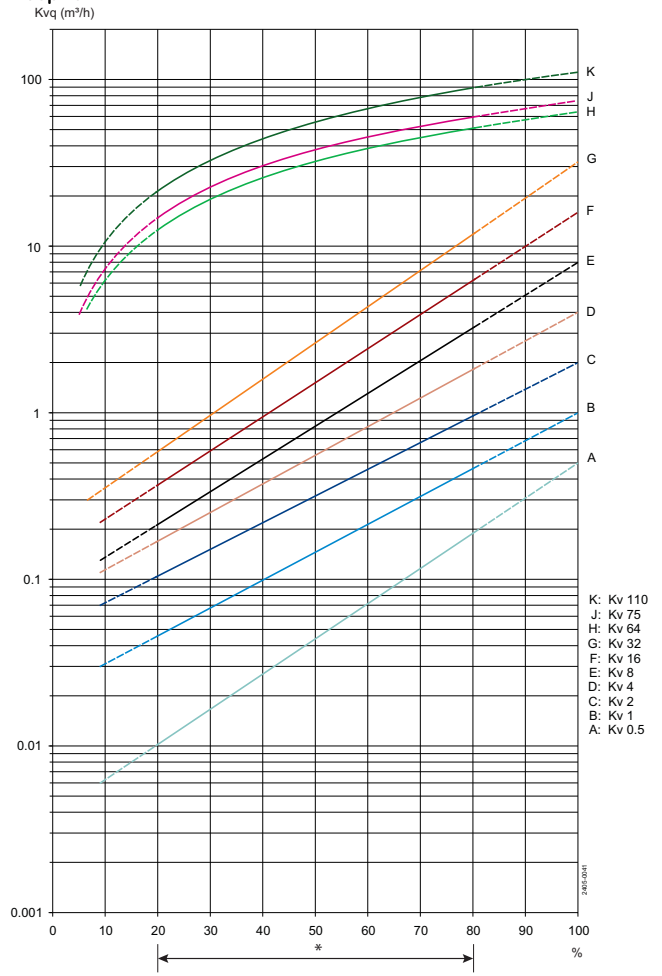
Where:

Kv_q = Kv value at specific flow and specific pressure drop

Q = Flow rate (m^3/h)

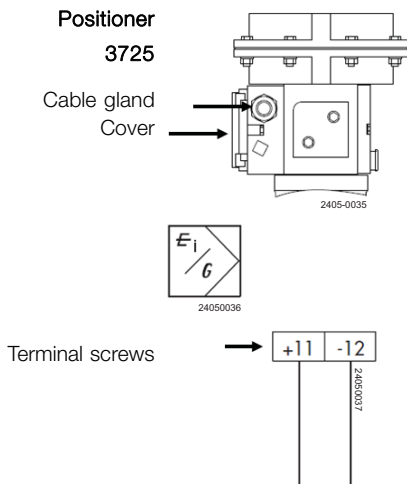
ΔP = Pressure drop over valve (bar)

Aseptic



Electrical connection

Electrical connection - Analoug 4-20 mA

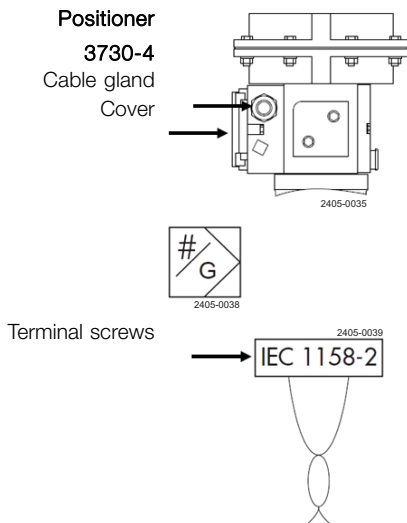


4-20 mA control signal

Route the two-wire line to the screw terminals marked "11 and 12", whereby the correct polarity has to be ensured

1. Open the cover of the positioner for electrical connection
2. Fit the cable through the cable gland and connect the cable wires to the terminal screws. (+11 and -12)
3. Tighten the cable gland and close the cover of the positioner

Electrical connection - Profibus PA



Bus control signal

Route the two-wire bus line to the screw terminals marked "IEC 1158-2", whereby no polarity has to be observed

1. Open the cover of the positioner for electrical connection
2. Fit the bus cable through the cable gland and connect the cable wires to the terminal screws. (IEC 1158-2)
3. Tighten the cable gland and close the cover of the positioner

By searching on positioner type 3730-4 you can either retrieve the GSD files for PROFIBUS PA communication directly from the World Wide Web server of Samson or the PROFIBUS User Organization

Alfa Laval Unique RV-ST

Regulating valves

Introduction

The Alfa Laval Unique RV-ST Regulating Valve is the third generation of the Alfa Laval single-seat regulating valve designed to meet the highest process demands of hygiene and safety. Built on a well-proven platform from an installed base of more than a million valves, it is ideal for high-volume, hygienic liquid processing applications that require precision control of flow rate or pressure.

RV-ST has a vast range of Kv-values to fit customers exact needs. 1½"-4" sizes come with a plug seal to also function as a shut-off valve, where 1" sizes do not have a plug seal.

Application

This pneumatic single-seat regulating valve is ideal for use as a hygienic product valve in the dairy, food, beverage, chemical, pharmaceutical and many other industries.

Benefits

- Reliable, automated performance
- Versatile, modular design
- Outstanding precision flow
- Easy to maintain
- Large operating range


Standard design

The Alfa Laval Unique RV-ST Regulating Valve with positioner consists of valve body, valve stem, EPDM plug seal, actuator with advanced electro-pneumatic process controller, and stem bushings threaded to the actuator shaft. The control unit comes in two versions: with or without display.

Working principle

The Alfa Laval Unique RV-ST Regulating Valve is controlled from a remote location by means of a digital electro-pneumatic process controller. Few straightforward moveable parts ensure reliable operation.

Certificates

 Authorized to carry the 3A symbol



TECHNICAL DATA

Pressure

Max. product pressure:	10 bar (1000 kPa)
Min. product pressure:	Full vacuum
Air pressure:	5 - 7 bar (500 to 700 kPa)

Temperature

Temperature range:	-10°C to +140°C (EPDM)
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Positioner data

Supply voltage:	24 VDC +/- 10%
Working temperature:	0 to 55 °C
Push-in fittings:	ø6mm or 1/4"
Protection class:	IP65 and IP67
Position detection module:	Contact-free, wear-free
Communication:	Analog

8692 Positioner – Top control with display

Setpoint setting:	0/4 to 20mA and 0 to 5 5/10V
Output resistance:	0/4 to 20 mA: 180Ω 0 to 5/10V: 19Ω
Power consumption:	< 5W
Cable gland:	2xM16x1,5 (cable-ø10mm)
Max. wire diameter:	1.5 mm ²

8694 Positioner – Basic control without display

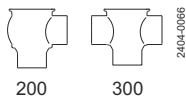
Setpoint setting:	0/4 to 20mA
Output resistance:	180Ω
Power consumption:	< 3,5W
Cable gland:	2xM16x1,5 (cable-ø10mm)
Max. wire diameter:	1.5 mm ²

PHYSICAL DATA

Materials

Material:	PPS, stainless steel
Cover:	PC
Seals:	EPDM
Product wetted steel parts:	1.4404 (316L)
External finish:	Semi-bright (blasted)
Internal finish:	Bright (polished), internal Ra < 0.8 µm
Other steel parts:	1.4301 (304)
Plug seal:	EPDM (optional HNBR or FPM)
Other product wetted seals:	EPDM (optional HNBR or FPM)
Other seals:	NBR

Valve Body Combinations



Other valves in the same basic design

- Unique Single Seat
- Standard valve
- Reverse acting valve
- Long stroke valve
- Manually operated valve
- Aseptic valve

Options

- Male parts or clamp liners in accordance with required standard
- Product wetted seals in HNBR or FPM
- Maintainable actuator

- External surface finish blasted
- Optional plug seal: HNBR or FPM (Not relevant for 1" / DN25 sizes)



Note! For further details, see instruction manual.

Valve Sizing

Flow Coefficients (Kv)

The following formula and flow coefficient values enable you to select the correct regulating valve for your application.

Formula for water and other products with a specific gravity equal to 1.0:

$$Kvq = \frac{Q}{\sqrt{\Delta P}}$$

Formula for products with a specific gravity other than to 1.0:

$$Kvq = \frac{Q}{\sqrt{\Delta P/SG}}$$

Where:

Q =Product flow rate in m³ per hour

SG =Specific gravity of product

Δ P = Pressure drop across valve in bar

(inlet pressure minus outlet pressure)

Example of Kv Calculation:

Determine the proper size valve for 60 m³ per hour of water.

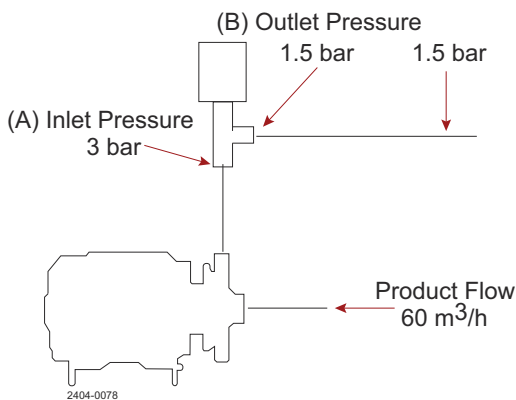
Inlet pressure of 3 bar

Outlet pressure of 1,5 bar

Solution: Inlet pressure (A) minus outlet pressure (B):

$$\Delta P = 3 \text{ bar} - 1,5 \text{ bar} = 1,5 \text{ bar}$$

$$Kvq = \frac{60}{\sqrt{1,5}} = 49$$



How to Use Data to Select Valve Size

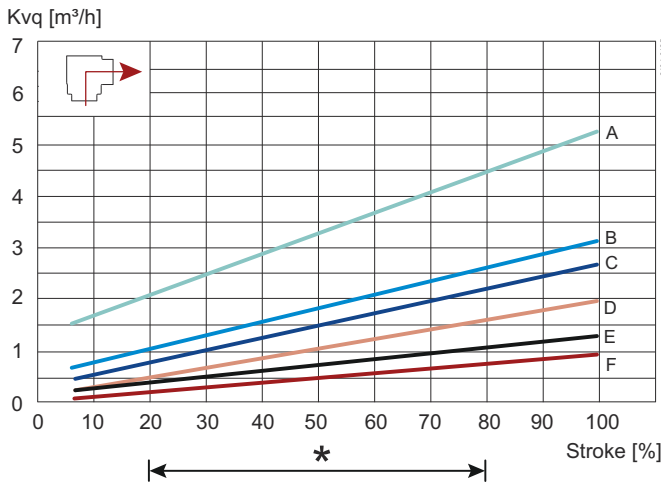
After the Kv factor for a specific application has been calculated, locate the factor on the following diagrams. Choose the curve closest to the 50% stroke.

Using the above example, refer to the chart on the following diagrams you will find that the Kv factor (49) is marked on the chart. You will find that a 2" valve crosses 1 Kv curve, 2½" 1 curve, 3" 3 curves and 4" 3 curves. The correct valve size to use is 2"

because Kv 49 crosses the curve closest to the optimum operating point 50%. Alternatively the 4" valve is also close to the 50%.

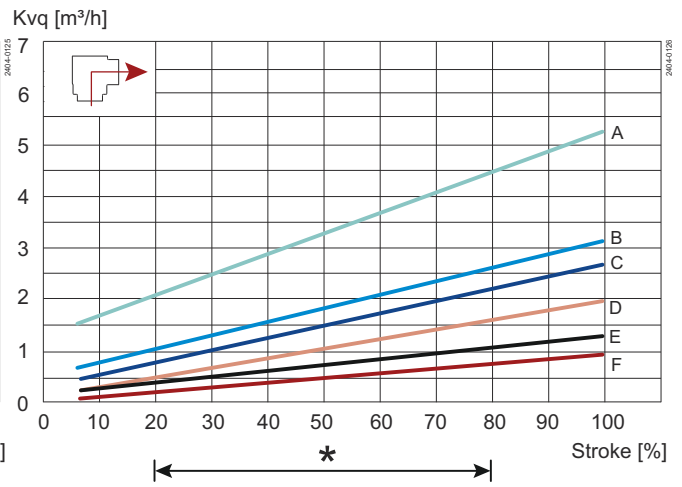
Pressure drop/capacity diagrams

For $\Delta P = 100 \text{ kPa}$ (1bar)



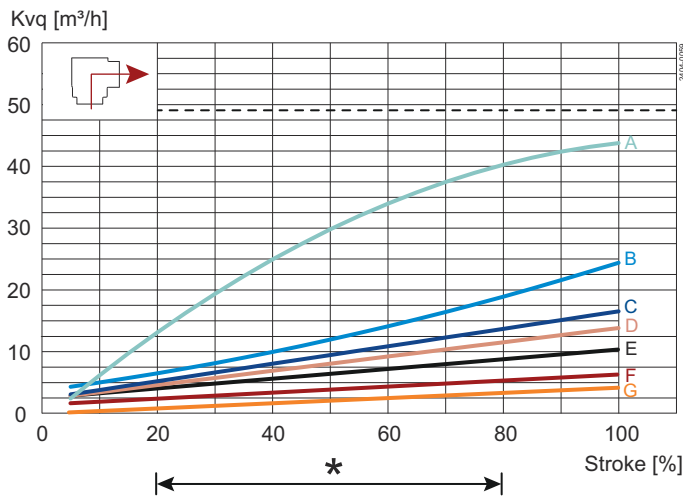
A = Kv 6 C = Kv 2,7 E = Kv 1,5
 B = Kv 3,2 D = Kv 1,9 F = Kv 1

Figure1. Valve size ISO 1"



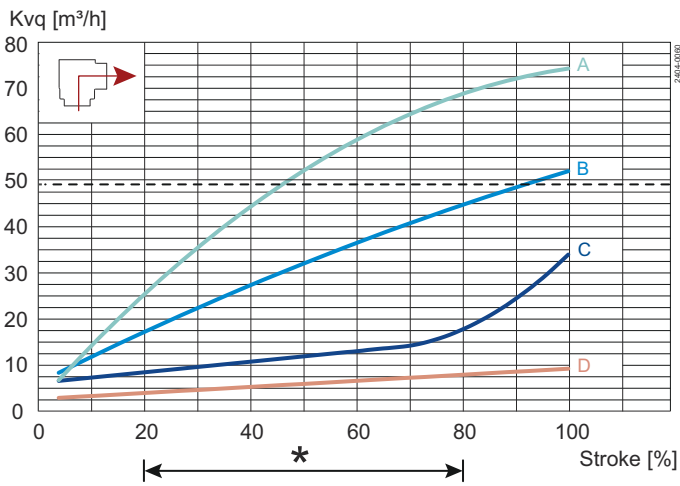
A = Kv 6 C = Kv 3,1 E = Kv 1,6
 B = Kv 3,5 D = Kv 2,3 F = Kv 1,2

Figure2. Valve size DN25



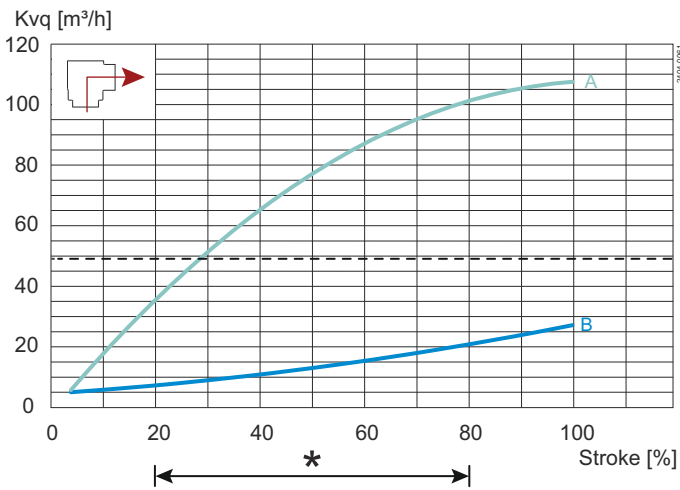
A = Kv 44 E = Kv 10
 B = Kv 25 F = Kv 6
 C = Kv 16 G = Kv 4
 D = Kv 14

Figure3. Valve size ISO 1.5"/DN40



A = Kv 75
 B = Kv 52
 C = Kv 34
 D = Kv 9

Figure4. Valve size ISO 2"/>(DN50



A = Kv 106
 B = Kv 27

Figure5. Valve size ISO 2,5"/>(DN65

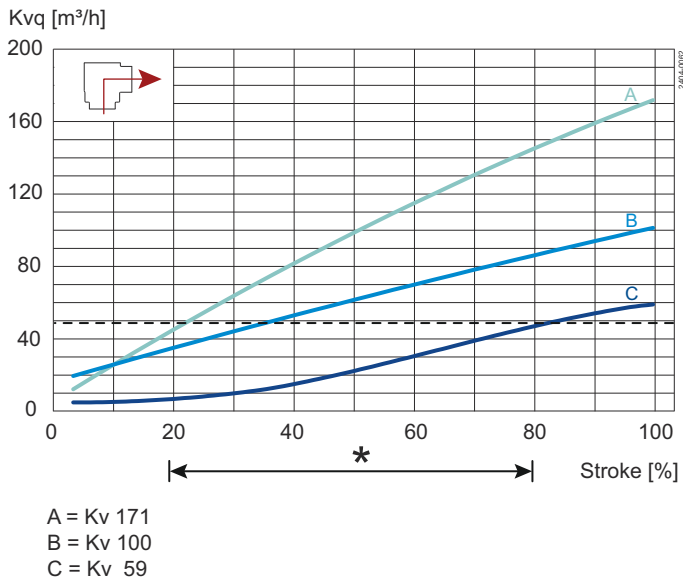


Figure6. Valve size ISO 3"/DN80

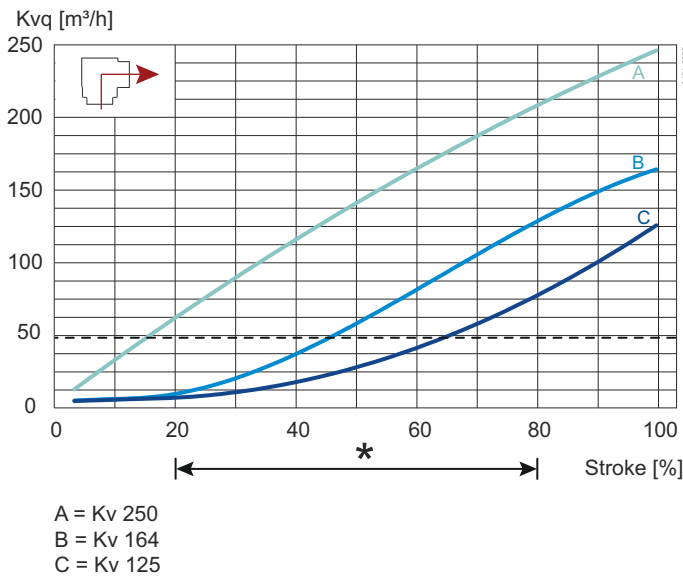


Figure7. Valve size ISO 4"/DN100

* Recommended working area



Note! For the diagrams the following applies

Medium: Water (20° C)

----- (dotted line) = Kv 49

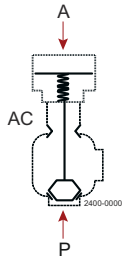
Alfa Laval recommend max. flow velocity in tubing and valves to be 5 m/sec.

Pressure data

Shut-off valves

Max. pressure in bar without leakage at the valve seat

Actuator / Valve body combination and direction of pressure	Air pressure [bar]	Plug position	Valve size [mm]				
			DN40/38	DN50/51	DN65/63.5	DN80/76.1	DN100/101.6



6

NO

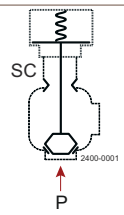
7.60

9.60

5.60

7.20

4.80



NC

6.29

7.20

4.20

6.40

4.20

A = Air

P = Product pressure

AC = Air closes

SC = Spring closes

Dimensions (mm)

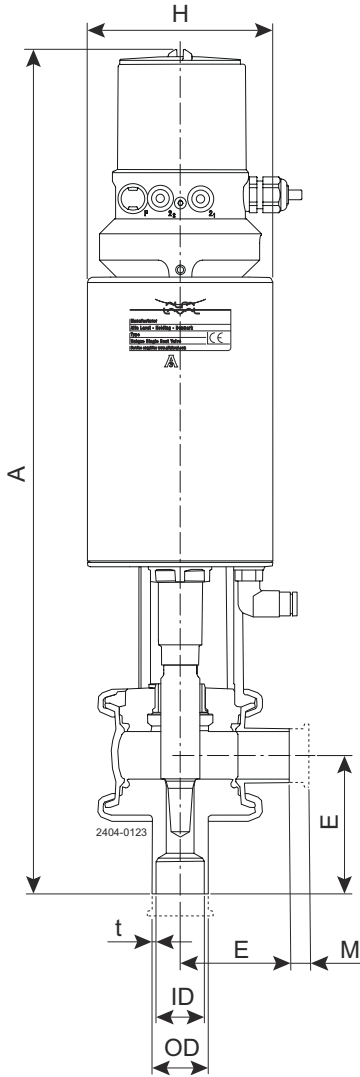


Figure8. Needle valve

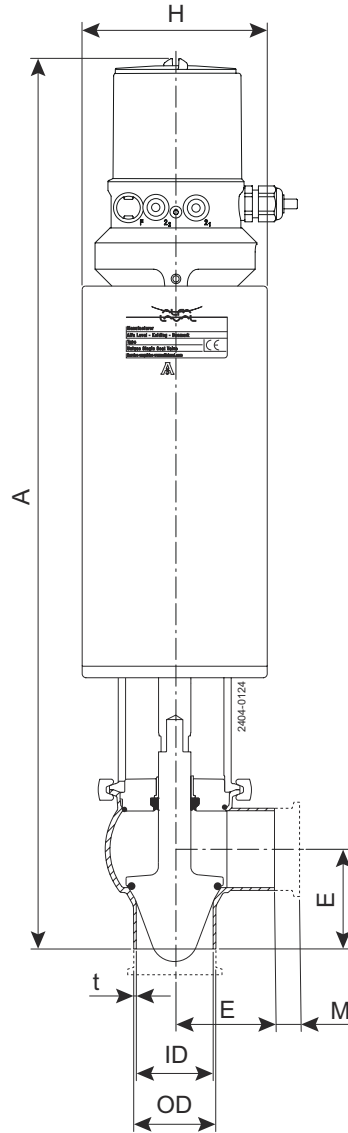


Figure9. RV-ST valve

Size	25 ¹	38	51	63.5	76.1	101.6	DN ¹	DN	DN	DN	DN	DN
	mm	mm	mm	mm	mm	mm	25	40	50	65	80	100
A (with positioner 8694)	449	450	499	525	558	603	451	451	500	525	562	606
A (with positioner 8692)	486	487	536	562	595	640	488	488	537	562	599	643
OD	25	38	51	63.5	76.1	101.6	29	41	53	70	85	104
ID	21.8	34.8	47.8	60.3	72.9	97.6	26	38	50	66	81	100
t	1.6	1.6	1.6	1.6	1.6	2	2	1.5	1.5	2	2	2
E	50	49.5	61	81	86	119	50	49.5	61	78	86	120
H	85	85	115	115	157.5	157.5	85	85	115	115	157.5	157.5
M/ISO clamp	21	21	21	21	21	21						
M/DIN clamp							21	21	21	28	28	28
M/DIN male							22	22	23	25	25	30
M/SMS male	20	20	20	24	24	35						
Weight (kg)	3.1	7.3	9.5	10.5	16.4	18.6	3.2	7.3	9.5	10.5	16.4	18.6

¹ Dimensions for Needle valve

Air Connections Compressed air:

R 1/8" (BSP) internal thread for actuator.

Electrical connections

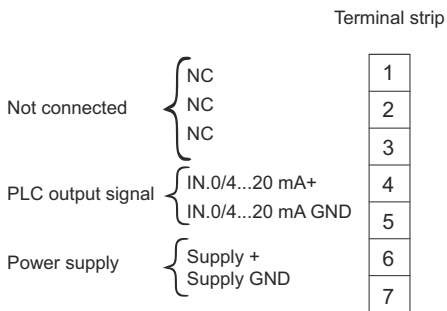


Figure10. Positioner 8694

without display

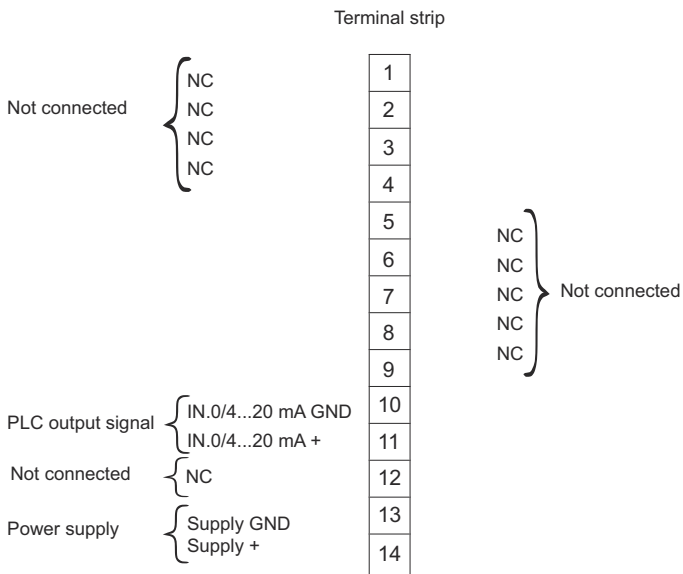


Figure11. Positioner 8692

without display