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 / 145 psi
Min. product pressure:	Full vacuum
Air pressure:	5 - 7 bar / 500 to 700 kPa / 72.5 to 101.5 psi

Temperature	
Temperature range:	-10 °C to +140 °C / +14 °F to +284 °F (EPDM)

Positioner data	
Supply voltage:	24 VDC +/- 10%
Working temperature:	0 °C to 55 °C / 32 °F to 131 °F
Push-in fittings:	Ø6 mm or ¼" / Push-in connector (external Ø6 mm or 1/4") or threaded ports G ⅛
Protection class:	IP65 and IP67
Position detection module:	Contact-free, wear-free
Communication:	Analog

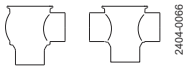
8692 Positioner – Top control with display	
Setpoint setting:	0/4-20 mA or 0/5-10V
Output resistance:	0/4-20 mA: 180Ω 0/5-10V: 19Ω
Power consumption:	< 5W
Cable gland:	2 x M16 (cable-ø10 mm), terminal screws (1.61 ft²)
Max. wire diameter:	1.5 mm² / 0.06 in²

8694 Positioner – Basic control without display	
Setpoint setting:	0/4-20 mA
Output resistance:	180Ω
Power consumption:	< 3,5W
Cable gland:	2 x M16 (cable-ø10 mm) , terminal screws (1.61 ft²)
Max. wire diameter:	1.5 mm² / 0.06 in²

Physical Data

Materials	
Positioner Base:	PPS, stainless steel
Positioner Cover:	PC
Positioner Seals:	EPDM
Product wetted steel parts:	1.4404 (316L)
External finish:	Semi-bright (blasted)
Internal finish:	Bright (polished), internal Ra < 0.8 µm / < 32 µ inch
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



200 300

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:

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

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

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

Where:

Q =Product flow rate in m^3 per hour

SG =Specific gravity of product

Δ P = Pressure drop across valve in psi

(inlet pressure minus outlet pressure)

Example of Cv Calculation:

Determine the proper size valve for 175 GPM of water.

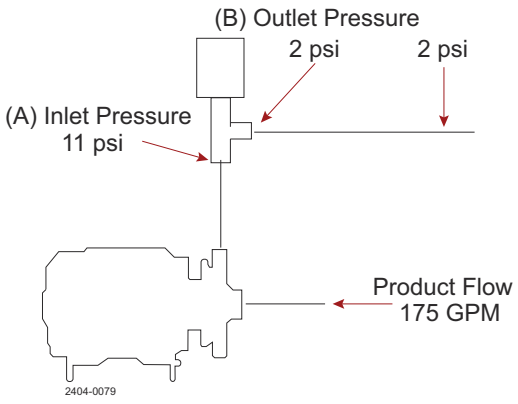
Inlet pressure of 11 psi

Outlet pressure of 2 psi

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

Δ P = 11 psi - 2 psi = 9 psi

$$Cvq = \frac{175}{\sqrt{9}} = 58.3$$



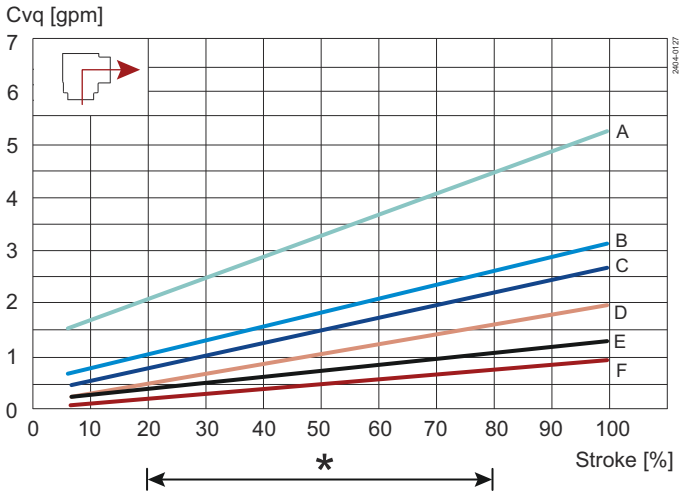
How to Use Data to Select Valve Size

After the Cv 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 Cv factor (58.3) is marked on the chart. You will find that a 2" valve crosses 1 Cv curve, 2½" 1 curve, 3" 3 curves and 4" 3 curves. The correct valve size to use is 2" because Cv 58.3 crosses the curve closest to the optimum operating point 50%. Alternatively the 4" valve is also close to the 50%.

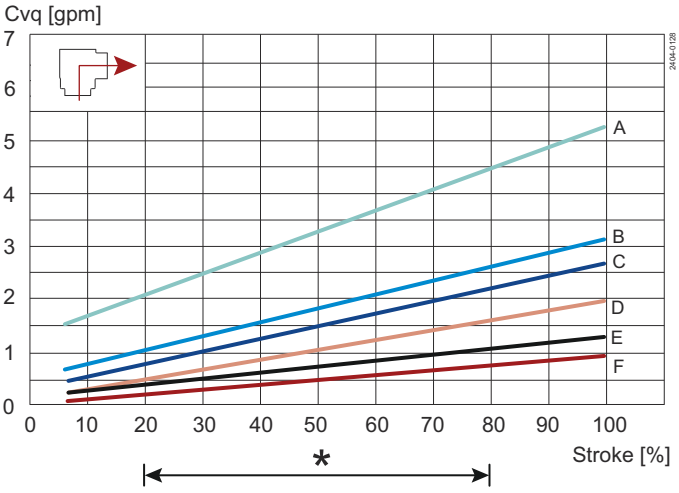
Pressure drop/capacity diagrams

For Δ P = 14.5 psi (1bar)



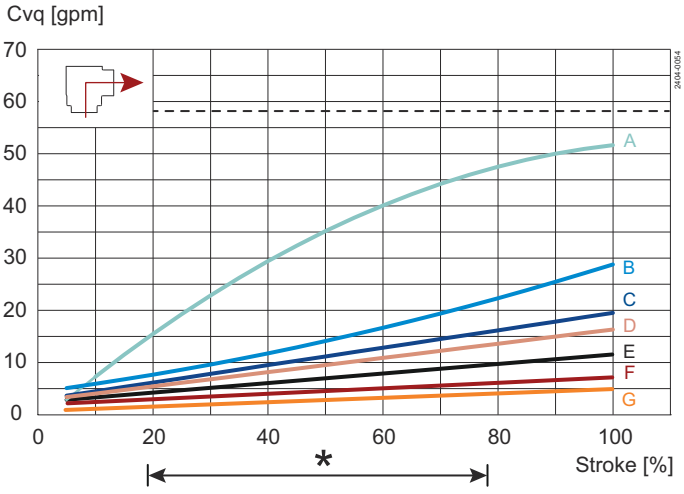
A = Cv 6.9
B = Cv 3.7
C = Cv 3.1
D = Cv 2.2
E = Cv 1.7
F = Cv 1.2

Figure 1. Valve size ISO 1”



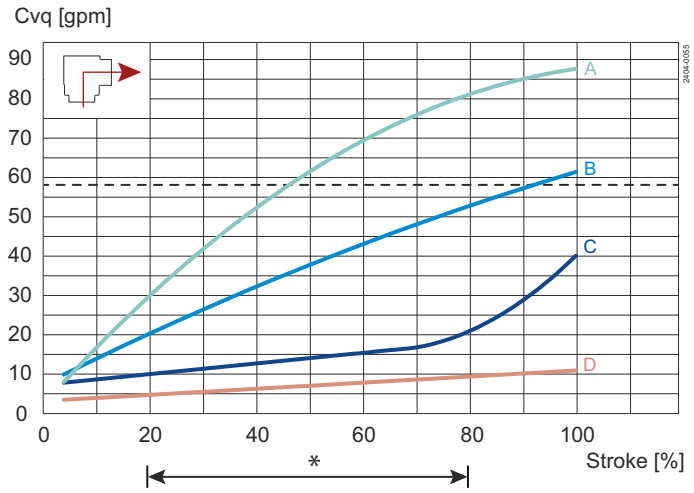
A = Cv 6.9
B = Cv 4
C = Cv 3.6
D = Cv 2.7
E = Cv 1.8
F = Cv 1.4

Figure 2. Valve size DN25



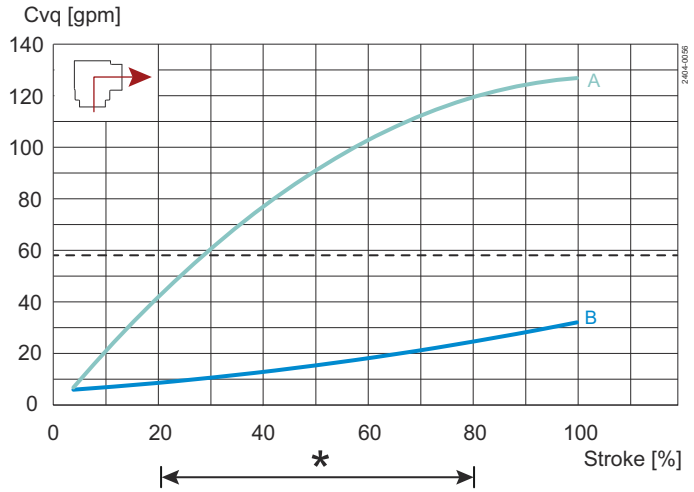
A = Cv 52
B = Cv 28
C = Cv 19
D = Cv 16
E = Cv 11
F = Cv 7
G = Cv 5

Figure 3. Valve size ISO 1.5”/DN40



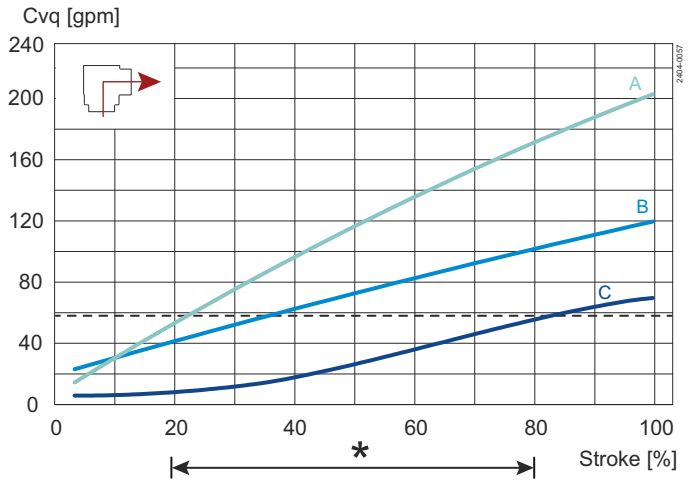
A = Cv 88
B = Cv 60
C = Cv 35
D = Cv 11

Figure 4. Valve size ISO 2”/DN50



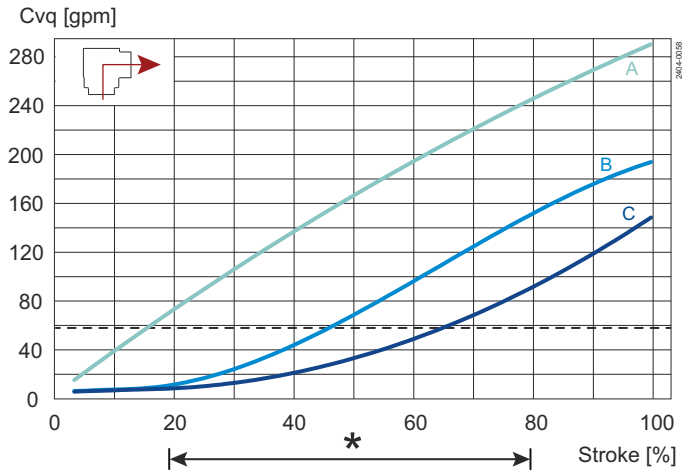
A = Cv 126
B = Cv 30

Figure 5. Valve size ISO 2,5”/DN65



A = Cv 202
B = Cv 119
C = Cv 69

Figure 6. Valve size ISO 3”/DN80



A = Cv 290
B = Cv 193
C = Cv 148

Figure 7. Valve size ISO 4”/DN100

* Recommended working area

Note! For the diagrams the following applies

Medium: Water (68° F)

Measurement: In accordance with VDI 2173:

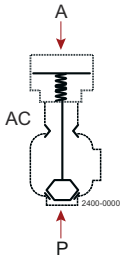
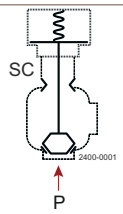
-------- (dotted line) = Cv 58.3

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

Pressure data

Shut-off valves

Max. pressure in psi without leakage at the valve seat

Actuator / Valve body combination and direction of pressure	Air pressure [PSI]	Plug position	Valve size [mm]				
			DN40/38	DN50/51	DN65/63.5	DN80/76.1	DN100/101.6
	87	NO	110.23	139.24	81.22	104.43	69.62
		NC	91.23	104.43	60.92	63.82	60.92

A = Air
P = Product pressure
AC = Air closes
SC = Spring closes

Dimensions (inch)

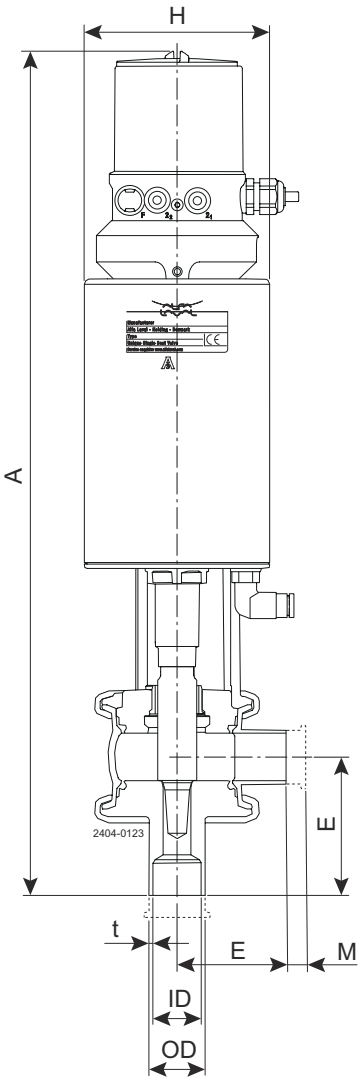


Figure 8. Needle valve

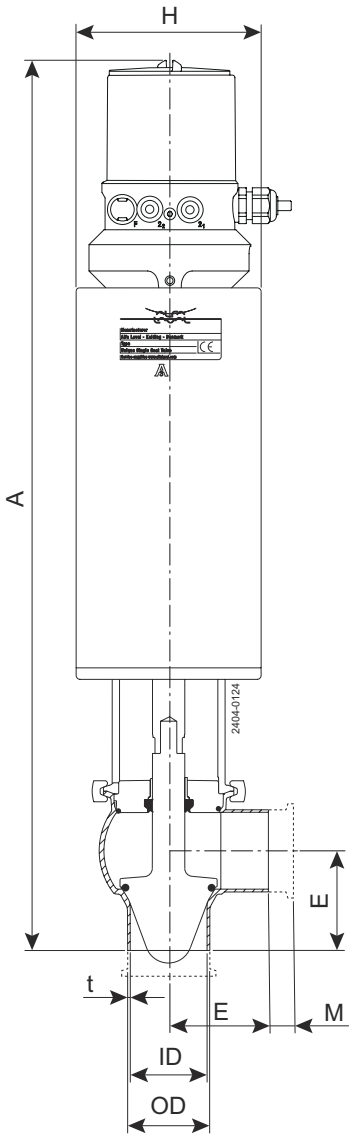


Figure 9. RV-ST valve

Size	1"[1]	1.5"	2"	2.5"	3"	4"
A (with positioner 8694)	17.68	17.70	19.63	20.66	21.97	23.76
A (with positioner 8692)	19.13	19.15	21.1	22.12	23.4	25.21
OD	0.98	1.5	2.0	2.5	3	4
ID	0.86	1.37	1.88	2.37	2.87	3.84
t	0.06	0.06	0.06	0.06	0.06	0.08
E	1.97	1.95	2.40	3.19	3.39	4.69
H	3.35	3.35	4.53	4.53	6.20	6.20
M/ Clamp	0.5	0.5	0.5	0.5	0.5	0.63
Weight (lb)	6.83	16.09	20.94	23.15	36.16	41.01

[1] Dimensions for Needle valve

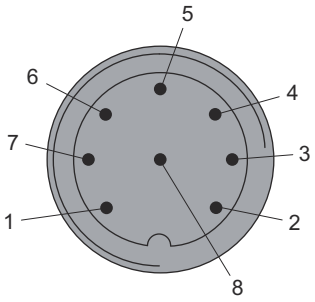
Air Connections Compressed air:

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

Electrical connections

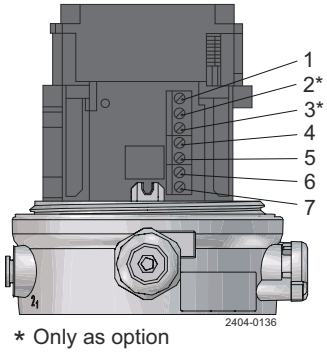
Type 8694
Without Display

Without fieldbus communication 24 V DC



Pin	Pin Assignment
1	Setpoint + (0/4-20 mA)
2	Setpoint GND
3	Operating voltage GND
4	Operating voltage +24 V DC
5	Digital input +
6	Digital input GND
7	Analogue Position feedback GND
8	Analogue Position feedback +

Cable gland



* Only as option

Input signal

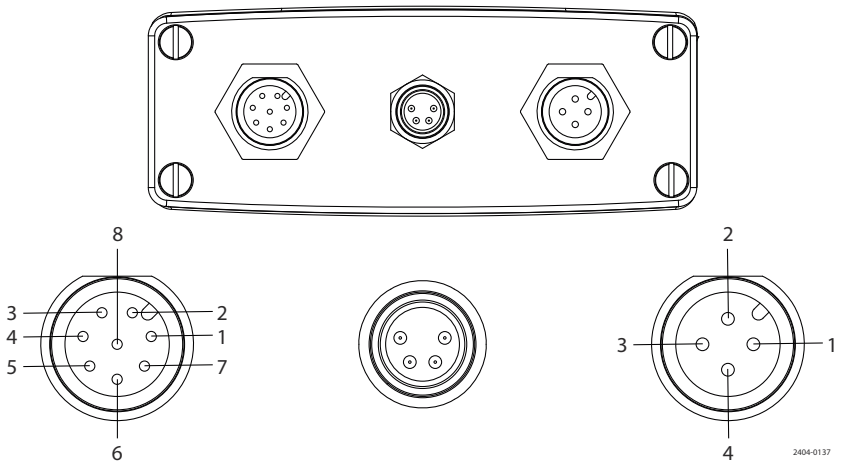
Terminal	Pin Assignment
4	Setpoint +
5	Setpoint GND
1	Digital input +
6	Power supply +
7	Power supply GND

Output signal with analogue feedback option

Terminal	Pin Assignment
2	Analogue feedback +
3	Analogue feedback GND

Type 8692
With Display

Multipole connection

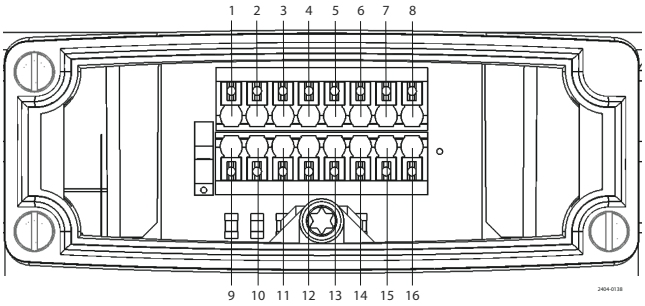


Pin	Pin Assignment
1	Setpoint + (0/4-20 mA or 0/5-10V)
2	Setpoint GND

Pin	Pin Assignment
1	Analogue feedback +
2	Analogue feedback GND
3	Digital output 1
4	Digital output 2
5	Digital output GND
6	Digital input +

Pin	Pin Assignment
1	Operating voltage +24 V DC
2	Operating voltage GND

Cable gland



Terminal	Pin Assignment
1	Analogue feedback GND
2	Analogue feedback +
3	Digital output GND
4	Digital output 2
5	Digital output 1
6	Digital input +
7	Setpoint GND
8	Setpoint +
9	Not assigned
10	Not assigned
11	Not assigned
12	Not assigned
13	Not assigned
14	Digital input GND
15	Operating voltage GND
16	Operating voltage +24 V DC

How to contact Alfa Laval

Up-to-date Alfa Laval contact details for all countries are always available on our website at www.alfalaval.com