

Data sheet

Hand-operated regulating valves in stainless steel

Types REG-SA SS and REG-SB SS



In certain specific areas such as outdoor applications and corrosive atmospheres, such as coastal installations, there is a need for high surface protection to prevent failure due to corrosion.

Today's food safety standards often call for daily treatment with detergents to protect against bacteria growth, again producing a need for high surface protection.

REG-SA SS and REG-SB SS are angle-way and straight-way hand-operated regulating valves, which act as normal stop valves in closed position.

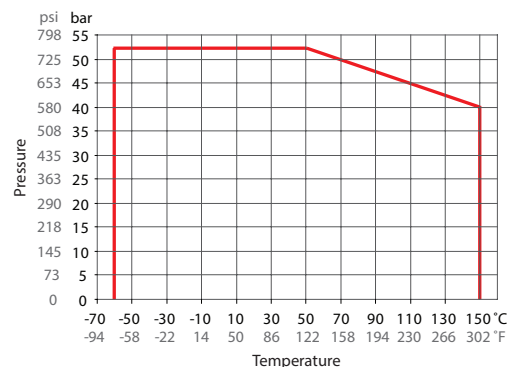
The valves are designed to meet the strict quality requirements on refrigerating installations specified by the international classification societies and are carefully designed to present favourable flow conditions and accurate linear characteristics.

The valves are equipped with vented cap and have internal backseating enabling the spindle seal to be replaced with the valve still under pressure.

Features

- Applicable to HCFC, HFC, R717 (Ammonia), R744 (CO₂), Propane, Butane, Iso-Butane and Ethane.
- Designed to give favourable flow conditions.
- Internal backseating enables replacement of the spindle seal whilst the valve is active, i.e. under pressure
- Housing is made of special cold resistant stainless steel approved for low temperature operations.
- Easy to disassemble for inspection and service.
- Butt-weld DIN and ANSI connections.
- Max. operating pressure: 52 bar g (754 psig)
- Temperature range: -60/+150°C (-76 +302°F).
- Compact and light valves for easy handling and installation.
- Classification: DNV, CRN, BV, EAC etc. To get an updated list of certification on the products please contact your local Danfoss Sales Company.

Pressure and temperature range



REG-SA SS/REG-SB SS DN15-DN40

Design
Housing

Made of stainless steel approved for low temperature operations.

Connections

Available with the following connections:

- Butt-weld DIN (EN 10220)
DN 15 - 40 (½ - 1½ in.)
- Butt-weld ANSI (B 36.19M)
DN 15 - 40 (½ - 1½ in.)

The cone

The valves are available in two different versions – REG-SA SS with an A cone and REG-SB SS with a B cone. The A cone is designed for expansion lines, while the B cone is designed for regulating purposes e.g. liquid lines.

The valve cone is designed to ensure perfect regulation and provide an extensive regulating area. Irrespective of the refrigerant used, it is easy to obtain the correct capacity. A cone seal ring provides perfect sealing at a minimum closing momentum.

The valve cone can be turned on the spindle, thus there will be no friction between the cone and the seat when the valve is opened and closed.

Made of polished stainless steel, ideal for O-ring sealing. Furthermore, parts of the spindle are heat treated to obtain anti-abrasive/adhesive properties.

Packing gland - REG-SA SS and REG-SB SS
The stainless steel packing gland comprises a spring loaded seal packing gland which ensures a perfect tightness in the range: -60/+150°C (-76/+302°F).

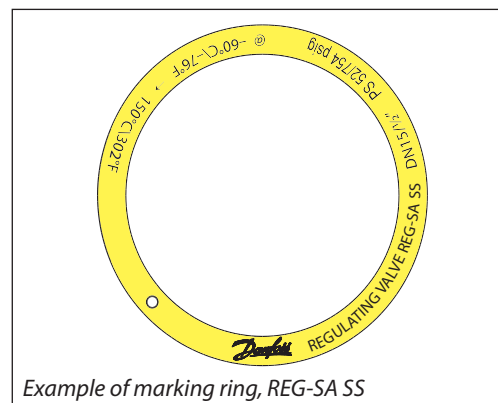
The packing glands are equipped with a scraper ring to prevent penetration of dirt and ice into the packing gland.

Installation

Install the valve with the spindle up or in horizontal position. The flow must be directed towards the cone.

The valve is designed to withstand high internal pressure. However, the piping system in general should be designed to avoid liquid traps and reduce the risk of hydraulic pressure caused by thermal expansion.

For further information refer to product instruction for REG-SA SS and REG-SB SS.


Pressure Equipment Directive (PED)

REG-SA/SB SS valves are approved according to the European standard specified in the Pressure Equipment Directive and are CE marked.

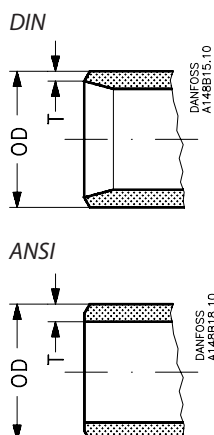


REG-SA SS and REG-SB SS valves		
Nominal bore	DN = < 25 mm (1 in.)	DN32-40 mm (1¼ - 1½ in.)
Classified for	Fluid group I	
Category	Article 3, paragraph 3	II

Technical data

- **Refrigerants**
Applicable to HCFC, HFC, R717 (Ammonia), R744 (CO₂), Propane, Butane, Iso-Butane and Ethane.
For further information please contact your local Danfoss Sales Company.
- **Temperature range**
-60/+150°C (-76/+302°F)

- **Max working pressure**
52 bar g (754 psi g)
- **Flow coefficients**
Flow coefficients for fully opened valves from $k_v = 0.15$ to $80 \text{ m}^3/\text{h}$ ($C_v = 0.17$ to $92.5 \text{ USgal}/\text{min}$).

Connections


Size	OD	T
Butt-weld DIN (EN 10220)		
15	mm	21.3
½	in.	0.839
20	mm	26.9
¾	in.	1.059
25	mm	33.7
1	in.	1.327
32	mm	42.4
1¼	in.	1.669
40	mm	48.3
1½	in.	1.902

Size	OD	T
Butt-weld ANSI (B 36.19M, SCHEDULE 40)		
15	mm	21.3
½	in.	0.839
20	mm	26.9
¾	in.	1.06
25	mm	33.7
1	in.	1.33
32	mm	42.4
1¼	in.	1.67
40	mm	48.3
1½	in.	1.9

Computation and selection

Introduction

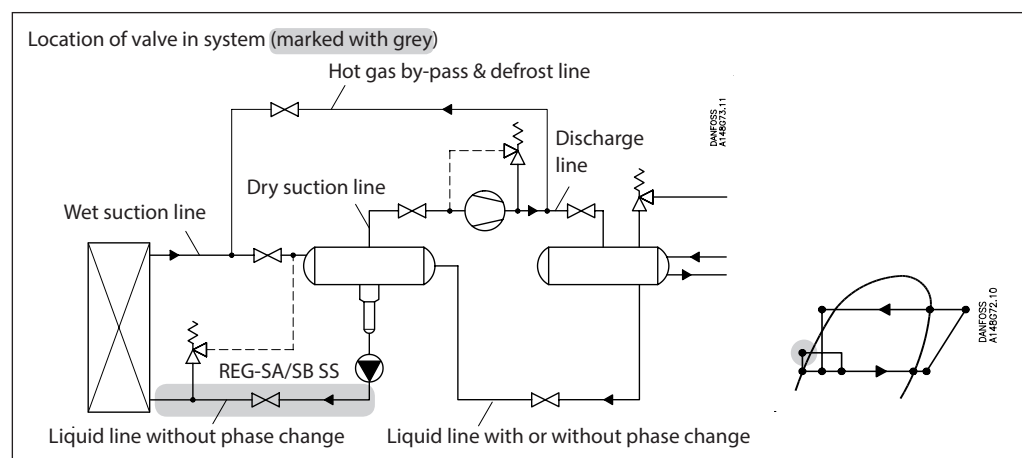
In refrigeration plants, regulating valves are primarily used in liquid lines in order to regulate the flow of refrigerant. The valves can, however, also be used as expansion valves. From a calculation point of view the two fields of application are very different.

Normal flow is the term used to describe the general case where the flow through the valve is proportional to the square root of the pressure drop across it and inversely proportional to the density of the refrigerant (Bernoullis equation).

This relationship between mass flow, pressure drop and density satisfies the majority of all valve applications with refrigerants and brines.

Normal flow is characterised by turbulent flow through the valve without any phase change. The following capacity curves are based on the above mentioned assumption.

Application of the regulating valves outside the normal flow area will reduce the capacity of the valve considerably. In such cases it is recommended to use "DIRcalc™" (Danfoss Industrial Refrigeration calculation programme).



Sizing regulating valve for liquid flow
 Liquid refrigerants: Use the liquid tables, fig. 6 - 10. For other refrigerants and brines, "Normal flow" (Turbulent flow); see below and use the flow coefficient tables (fig. 1 - 2).

SI-units

Mass flow:

$$k_v = \frac{G}{\sqrt{\rho \times 1000 \times \Delta p}} = G \times C_A \text{ [m}^3/\text{h]}$$

Volume flow:

$$k_v = \frac{\dot{V}}{\sqrt{\frac{1000 \times \Delta p}{\rho}}} \text{ [m}^3/\text{h]}$$

Imperial units

Mass flow:

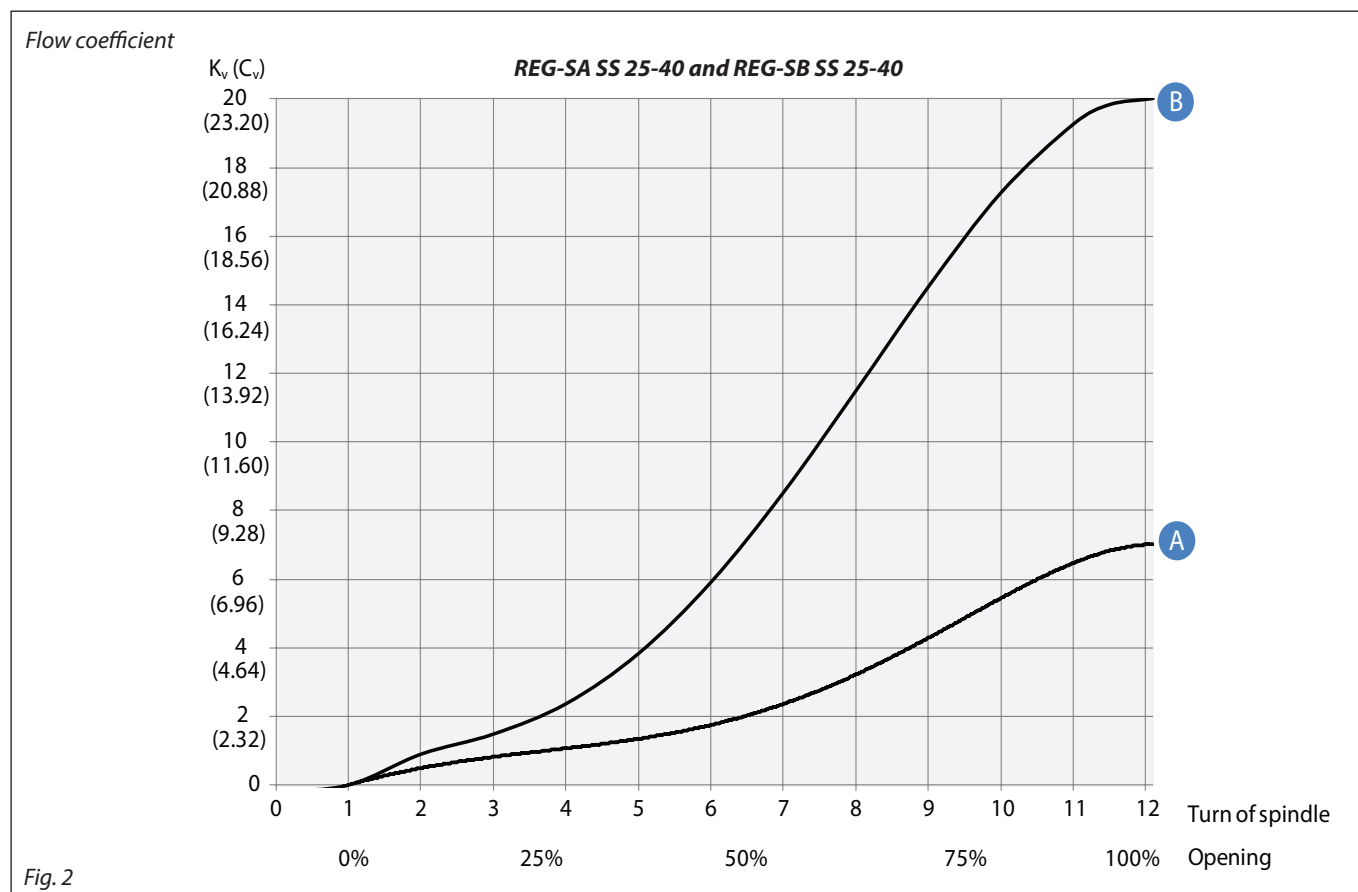
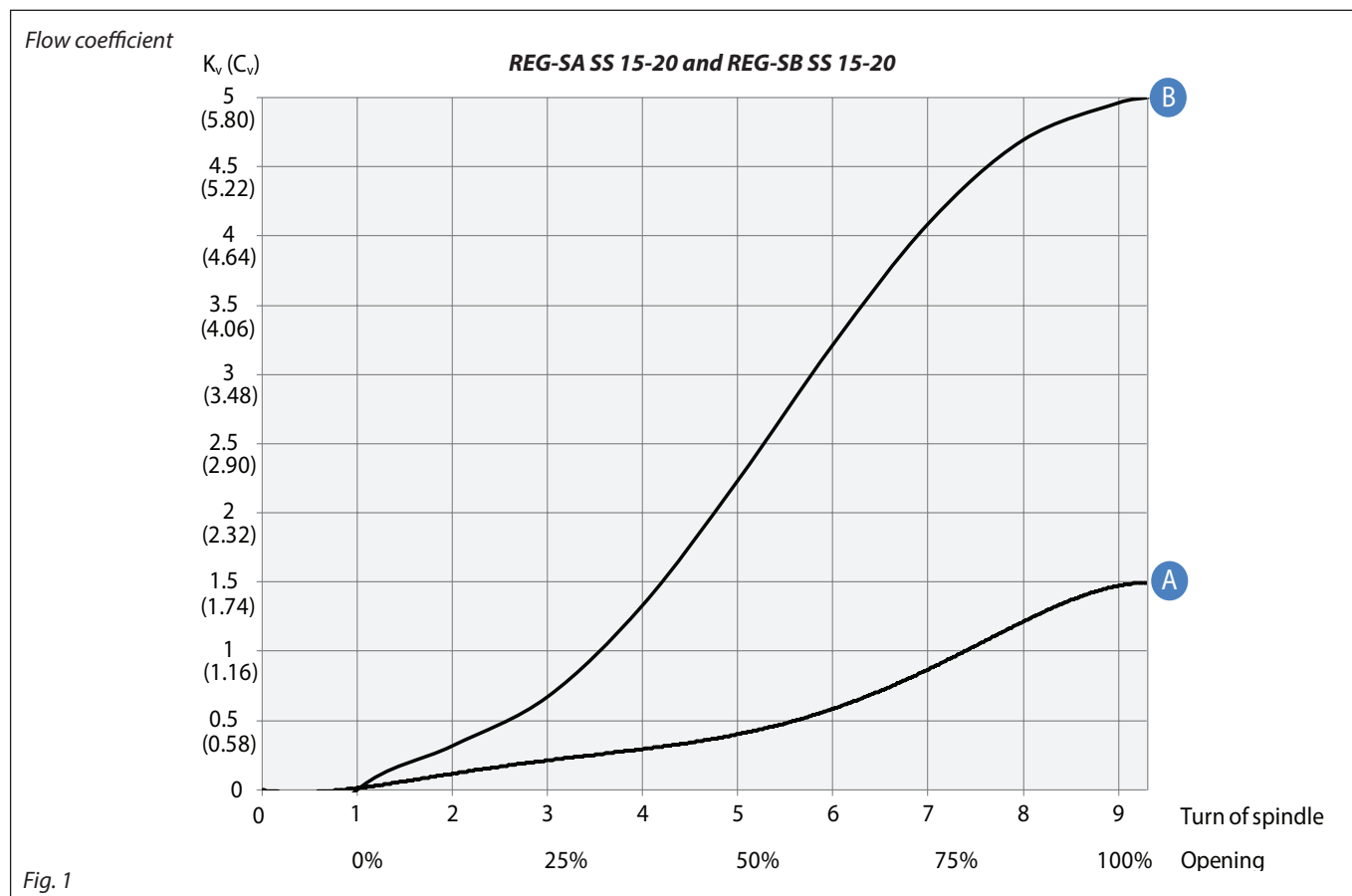
$$C_v = \frac{0.95 \times G}{\sqrt{\rho \times \Delta p}} = 31.6 \times G \times C_A \text{ [USgal/min.]}$$

Volume flow:

$$C_v = \frac{0.127 \times \dot{V}}{\sqrt{\frac{\Delta p}{\rho}}} \text{ [USgal/min.]}$$

k_v	[m ³ /h]	Quantity [m ³ /h] of water flowing through a valve at a pressure loss of 1 bar (according to VDE/VDI Norm 2173).	C_v	[US gal/min]	Quantity [US gal/min] of water flowing through a valve at a pressure loss of 1 psi.
P_1	[bar]	Pressure before the valve (upstream).	P_1	[psi]	Pressure before the valve (upstream).
P_2	[bar]	Pressure after the valve (downstream).	P_2	[psi]	Pressure after the valve (downstream).
Δp	[bar]	Actual pressure loss across the valve ($P_1 - P_2$).	Δp	[psi]	Actual pressure loss across the valve ($P_1 - P_2$).
G	[kg/h]	Mass flow through the valve.	G	[lb/min]	Mass flow through the valve.
\dot{V}	[m ³ /h]	Volume flow through the valve.	\dot{V}	[US gal/min]	Volume flow through the valve.
ρ	[kg/m ³]	Density of the refrigerant before the valve.	ρ	[lb/ft ³]	Density of the refrigerant before the valve.
C_A		Calculation factor (fig. 5).	C_A		Calculation factor (fig. 5).

Computation and selection



Computation and selection
(Continued)

Liquid R 717, density: 670 kg/m³ [42 lb/ft³]

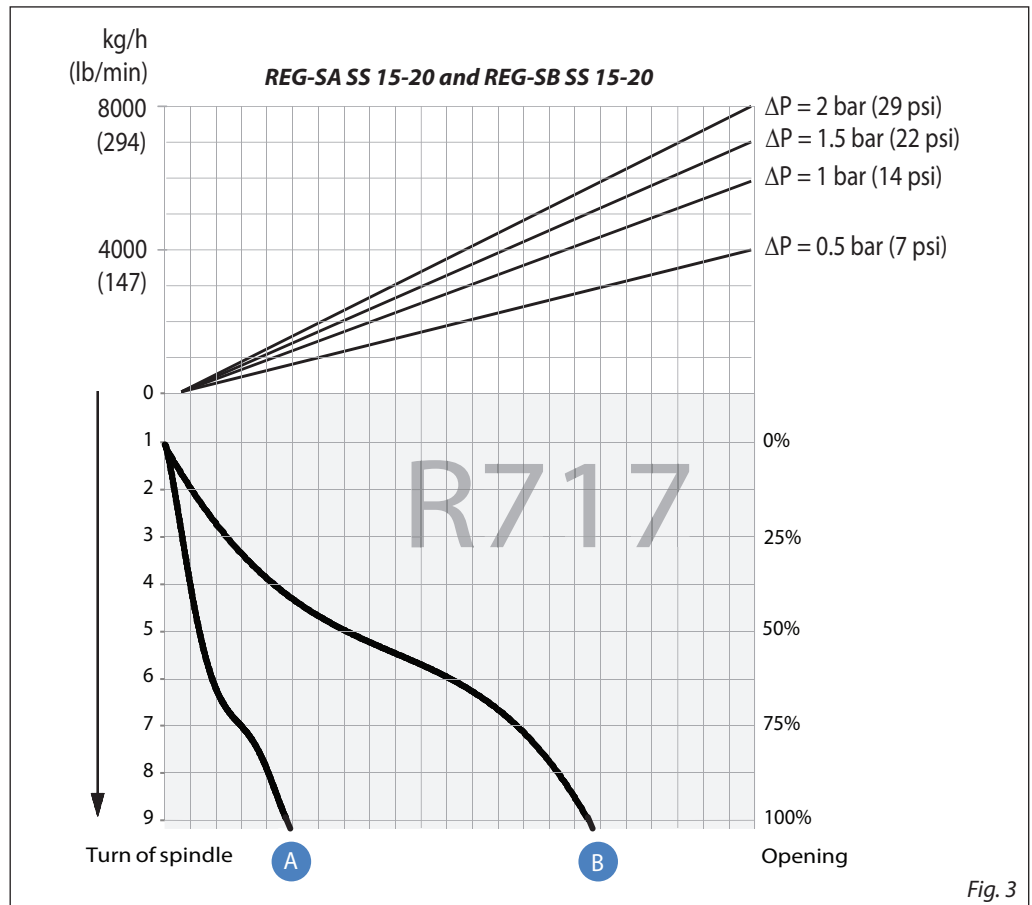


Fig. 3

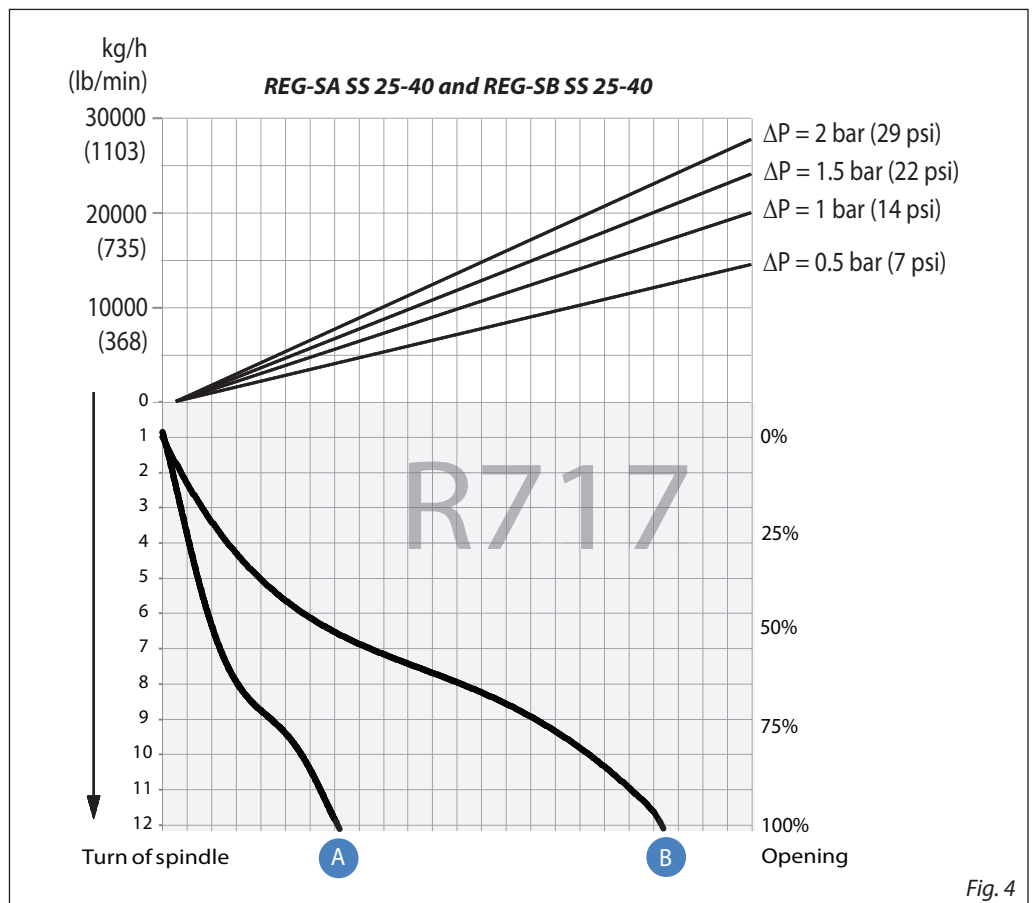
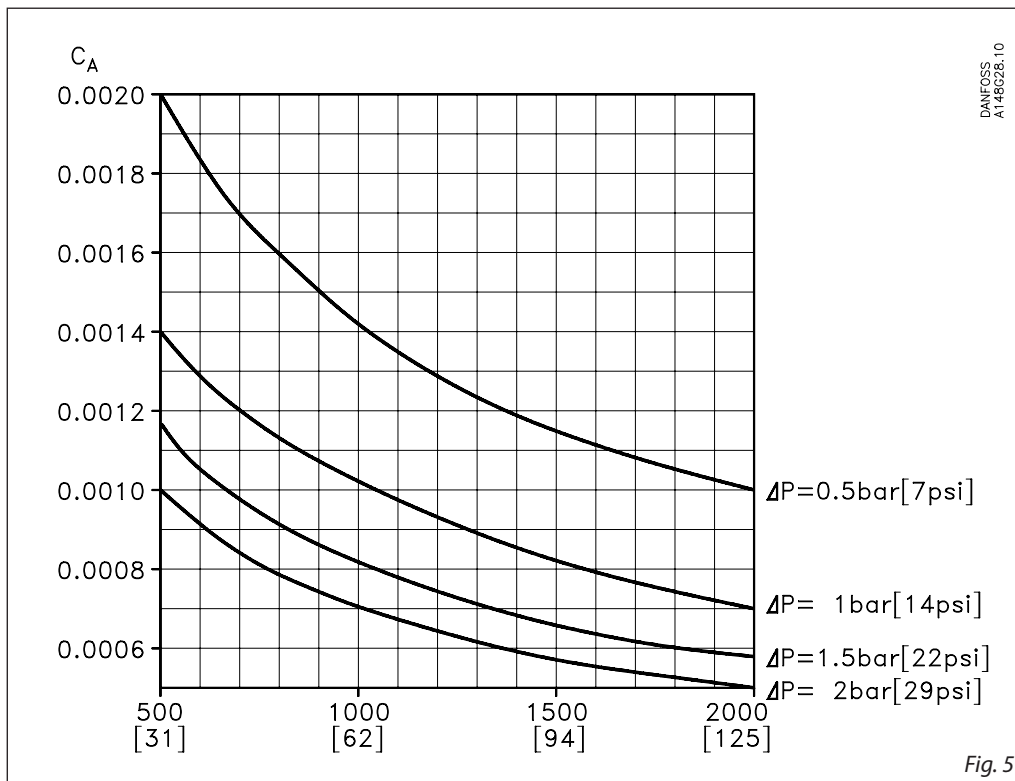


Fig. 4

For choice of valve size and connection see "Connections".

Computation and selection
(Continued)

Calculation factor C_A



Computation and selection

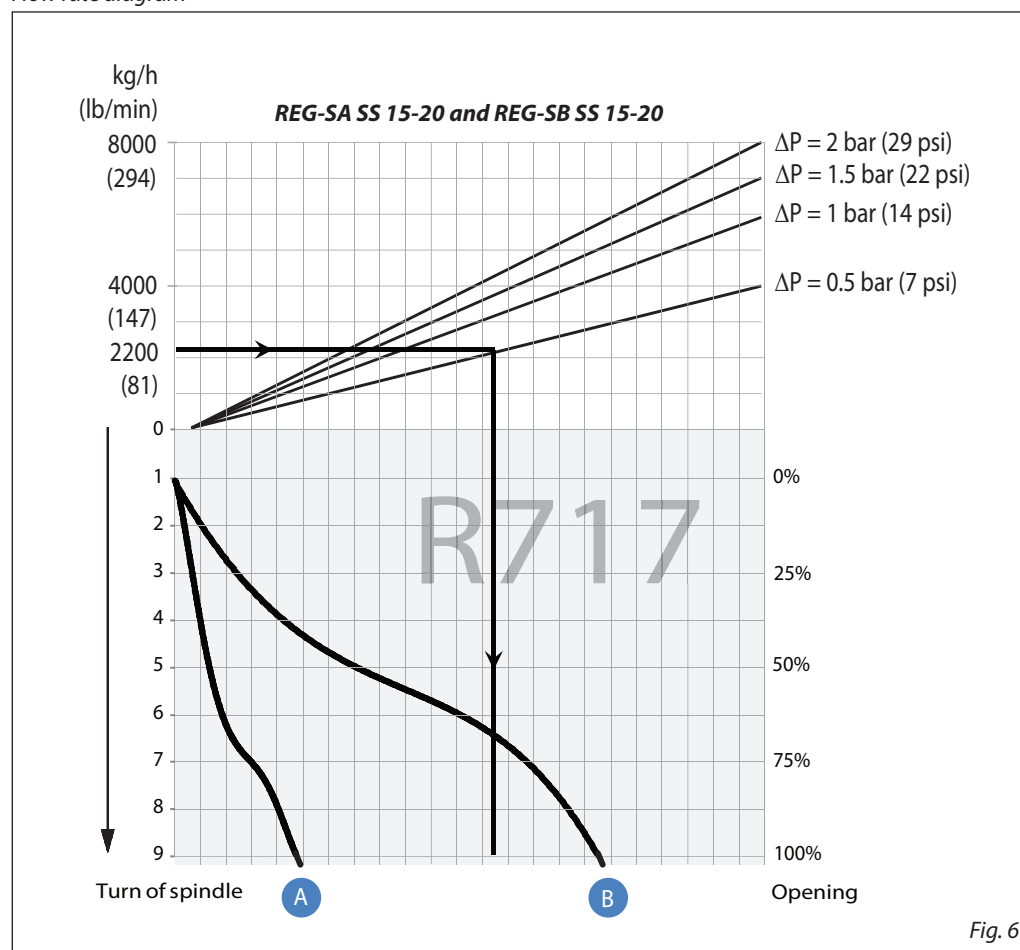
Example 1.

Refrigerant: R 717
 Refrigerant flow: 2200 kg/h
 Pressure drop: $\Delta p = 0.5$ bar

The above mentioned example is illustrated on the following flow rate diagram and shows that REG-SB SS 15 and 20 with cone B can be used. The main rule is that nominal regulation range should be below 85% opening degree. If the arrowline is crossing 2 cone curves, the smaller cone should be selected if opening degree < 85%.

The example is only correct if the density of the refrigerant is approx. 670 (kg/m³), and there must be no build-up of flash gas in the valve.

Flow rate diagram



Computation and selection

Example 2.

Brine, density ρ : 1150 [kg/m³]
 Brine flow G : 2,700 [kg/h]
 Pressure drop Δp : 0.5 [bar]

In this example it is not possible to use the selection diagrams (fig. 3 and 4) as the refrigerant in question is not included.

Use the curves of the k_v -values instead (fig. 1 - 2) and calculate the required k_v by means of the formulas in the "Introduction" passage at the beginning of this chapter. Alternatively calculate the k_v -values by means of the calculation factor C_A (fig. 7) and the flow rate diagram (in this example: fig. 8) as per the following calculation example.

Calculation example:

Required k_v -value
 $C_A = 0.00132$ (from fig. 18)
 $k_v = C_A \times G$
 $k_v = 0.00132 \times 2,700$ [kg/h]
 $= 3.56$ [m³/h]

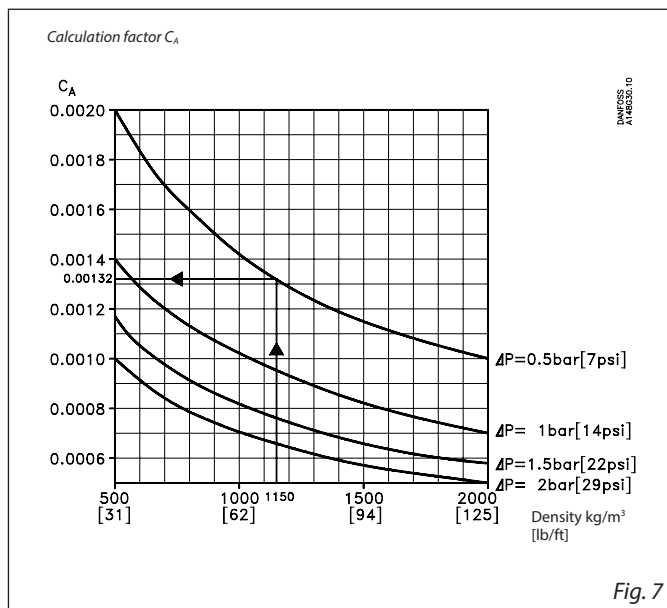


Fig. 7

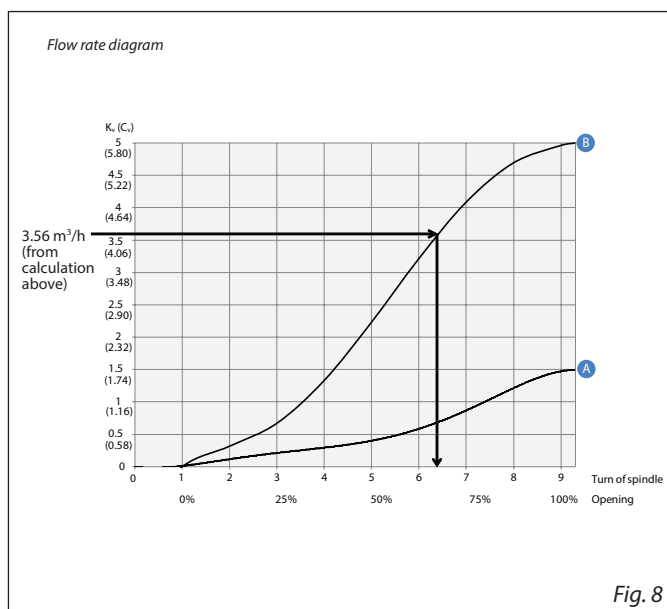
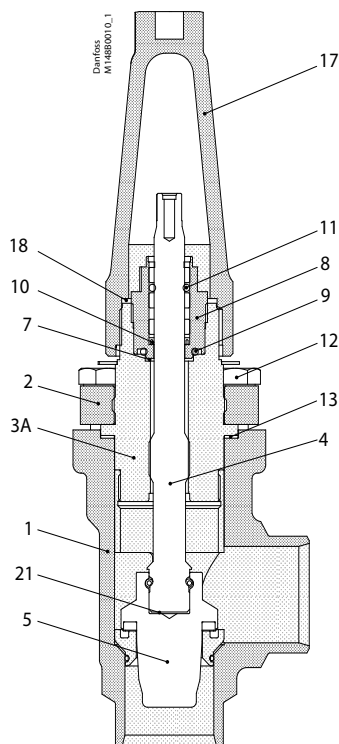


Fig. 8

REG-SB SS 15 and REG-SB SS 20 with cone B can be used.

Material specification

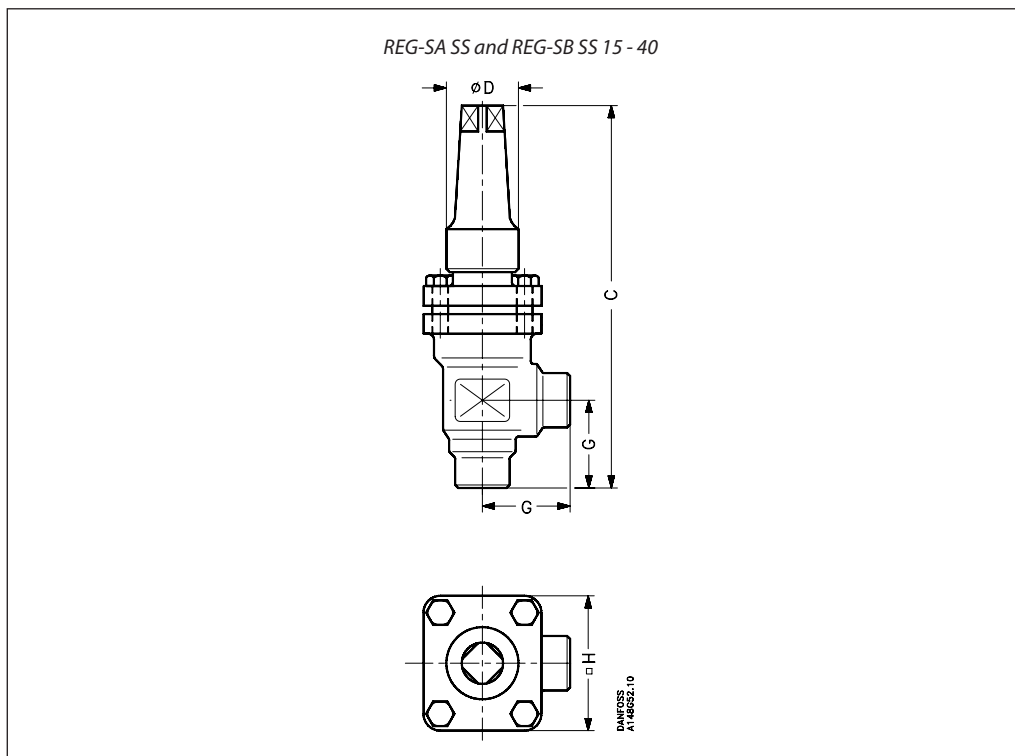
REG-SA SS and REG-SB SS 15 - 40



No.	Part	Material	EN	ISO	ASTM
1	Housing	Stainless steel	GX5CrNi19-10 EN10213-4		AISI 304
2	Bonnet, Flange	Stainless steel	X5CrNi18-10 EN10088		AISI 304
3A	Bonnet, Insert	Stainless steel	X8CrNiS18-9 DIN 17440		AISI 303
4	Spindle	Stainless steel	X8CrNiS 18-9, DIN 17440	Type 17, 683/13	AISI 303
5	Cone	Steel			
7	Packing washer	Aluminium			
8	Packing gland	Stainless Steel	X8CrNiS 18-9, 10088	Type 17, 683/13	AISI 303
9	O-ring	Cloroprene (Neoprene)			
10	Spring loaded Teflon ring	PTFE			
11	O-ring	Cloroprene (Neoprene)			
12	Bolts	Stainless steel	A2-70	A2-70	Type 308
13	Gasket	Fiber, non asbestos			
14	Bottom insert	Steel			
17	Seal cap	Aluminium			
18	Gasket f. seal cap	Nylon			
19	Locking nut	Steel			
20	Screw	Steel			
21	Disk spring	Steel			

Dimensions and weights

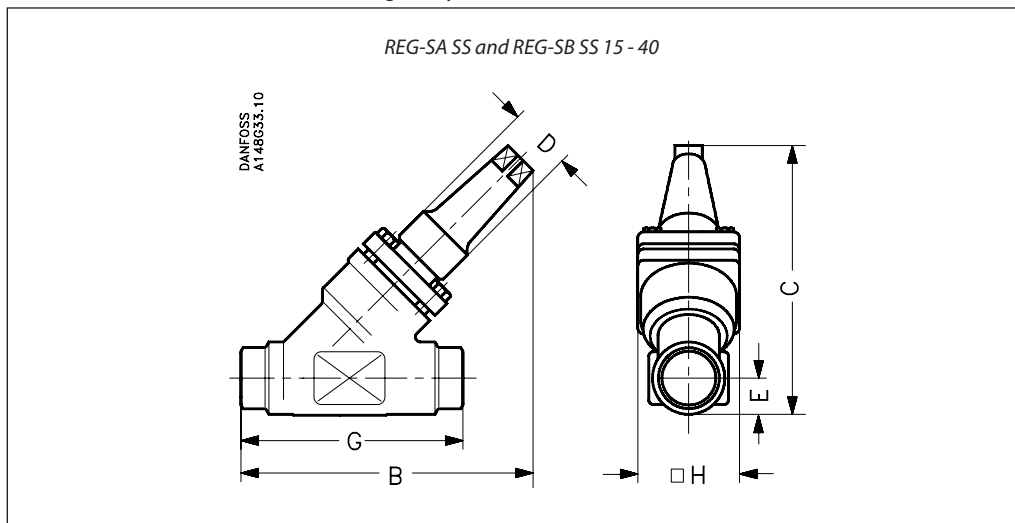
REG-SA SS and REG-SB SS 15 - 40 in angleway version



Valve size		C	G	$\varnothing D$	$\square H$	Weight
REG-SA SS/SB SS 15-20	mm	182	45	38	60	1.4 kg
REG-SA SS/SB SS (1/2-3/4)	in.	7.17	1.77	1.50	2.36	3.1 lb
REG-SA SS/SB SS 25-40	mm	237	55	50	70	2.4 kg
REG-SA SS/SB SS (1-1 1/2)	in.	9.33	2.17	1.97	2.76	5.3 lb

Specified weights are approximate values only.

REG-SA SS and REG-SB SS 10 - 65 in straightway version



Valve size		C	B	E	G	$\varnothing D$	$\square H$	Weight
REG-SA SS/SB SS 15-20	mm	145	155	20	120	38	60	2.0 kg
REG-SA SS/SB SS (1/2-3/4)	in.	5.71	6.10	0.79	4.72	1.50	2.36	4.4 lb
REG-SA SS/SB SS 25-40	mm	200	215	26	155	50	70	3.0 kg
REG-SA SS/SB SS (1-1 1/2)	in.	7.87	8.46	1.02	6.10	1.97	2.76	6.6 lb

Specified weights are approximate values only.

Ordering
How to order

The table below is used to identify the valve required.

Please note that the type codes only serve to identify the valves, some of which may not form part of the standard product range. For further information please contact your local Danfoss Sales Company.

Type codes

Valve type	REG SA SS REG-SB SS	Regulating Valves		
Nominal size in mm (Valve size measured on the connection diameter)	15 20 25 32 40	Available connection types		
			D	A
		DN 15	x	x
		DN 20	x	x
		DN 25	x	x
		DN 32 DN 40	x x	x x
Connections	D A	Butt-weld connection: DIN EN 10220 Butt-weld connection: ANSI B 36.19M		
Valve housing	ANG	Angle flow		
	STR	Straight flow		
Cone A	Size: DN 15 DN 20 DN 25 DN 32 DN 40	Flow area [mm ²] 36.5 36.5 178 178 178		
Cone B	Size: DN 15 DN 20 DN 25 DN 32 DN 40	Flow area [mm ²] 115 115 531 531 531		

Complete REG-SA SS (Cone type A)
Example:

REG-SA SS (Cone B) 15 DIN angleway = **148B5387**

Important!

Where products need to be certified according to specific certification societies or where higher pressures are required, the relevant information should be included at the time of order.

Butt-weld DIN (EN 10220)

Size		Type	Code no.
mm	in.		

Angleway - REG-SA SS with cone type A

15	½	REG-SA SS 15 D ANG	148B5297
20	¾	REG-SA SS 20 D ANG	148B5385
25	1	REG-SA SS 25 D ANG	148B5494
32	1¼	REG-SA SS 32 D ANG	148B5589
40	1½	REG-SA SS 40 D ANG	148B5674

Butt-weld DIN (EN 10220)

Size		Type	Code no.
mm	in.		

Straightway - REG-SA SS with cone type A

15	½	REG-SA SS 15 D STR	148B5298
20	¾	REG-SA SS 20 D STR	148B5386
25	1	REG-SA SS 25 D STR	148B5495
32	1¼	REG-SA SS 32 D STR	148B5590
40	1½	REG-SA SS 40 D STR	148B5675

Butt-weld ANSI (B 36.19M SCHEDULE 40)

Size		Type	Code no.
mm	in.		

Angleway - REG-SA SS with cone type A

15	½	REG-SA SS 15 A40 ANG	148B6482
25	1	REG-SA SS 25 A40 ANG	148B6483
32	1¼	REG-SA SS 32 A40 ANG	148B6484

Butt-weld ANSI (B 36.19M SCHEDULE 40)

Size		Type	Code no.
mm	in.		

Straightway - REG-SA SS with cone type A

15	½	REG-SA SS 15 A40 STR	148B5299
25	1	REG-SA SS 25 A40 STR	148B6485
32	1¼	REG-SA SS 32 A40 STR	148B6486

D = Butt-weld DIN
A = Butt-weld ANSI
ANG = Angleway
STR = Straightway

Ordering

Complete REG-SB SS (Cone type B)

Butt-weld DIN (EN 10220)

Size		Type	Code no.
mm	in.		

Angleway - REG-SB SS with cone type B

15	½	REG-SB SS 15 D ANG	148B5387
20	¾	REG-SB SS 20 D ANG	148B5389
25	1	REG-SB SS 25 D ANG	148B5496
32	1¼	REG-SB SS 32 D ANG	148B5591
40	1½	REG-SB SS 40 D ANG	148B5676

Butt-weld DIN (EN 10220)

Size		Type	Code no.
mm	in.		

Straightway - REG-SB SS with cone type B

15	½	REG-SB SS 15 D STR	148B5388
20	¾	REG-SB SS 20 D STR	148B5390
25	1	REG-SB SS 25 D STR	148B5497
32	1¼	REG-SB SS 32 D STR	148B5592
40	1½	REG-SB SS 40 D STR	148B5677

Butt-weld ANSI (B 36.19M SCHEDULE 40)

Size		Type	Code no.
mm	in.		

Angleway - REG-SB SS with cone type B

20	¾	REG-SB SS 20 A40 ANG	148B6487
40	1½	REG-SB SS 40 A40 ANG	148B5686

Butt-weld ANSI (B 36.19M SCHEDULE 40)

Size		Type	Code no.
mm	in.		

Straightway - REG-SB SS with cone type B

20	¾	REG-SB SS 20 A40 STR	148B6488
25	1	REG-SB SS 25 A40 STR	148B6479
40	1½	REG-SB SS 40 A40 STR	148B5685

- D = Butt-weld DIN
- A = Butt-weld ANSI
- ANG = Angleway
- STR = Straightway