ENGINEERING TOMORROW

Data Sheet

Hand operated regulating valve Type **REG-SA SS** and **REG-SB SS**

Assures favorable flow characteristics in harsh operating surroundings

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 (CO_2), Propane, Butane, Iso-Butane and Ethane.
- R717 Heat Pump and Propylene applications with replaced O-ring.
- 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 (754 psig)
- Temperature range: -60 °C / +150 °C (-76 °F / +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.

Media

Refrigerants

Refrigerants
Applicable to HCFC, HFC, R717 (Ammonia), R744 (CO2), Propane, Butane, Iso-Butane and Ethane. R717 Heat Pump and Propylene applications with replaced O-ring.

For further information please contact your local Danfoss Sales Company.

New refrigerants

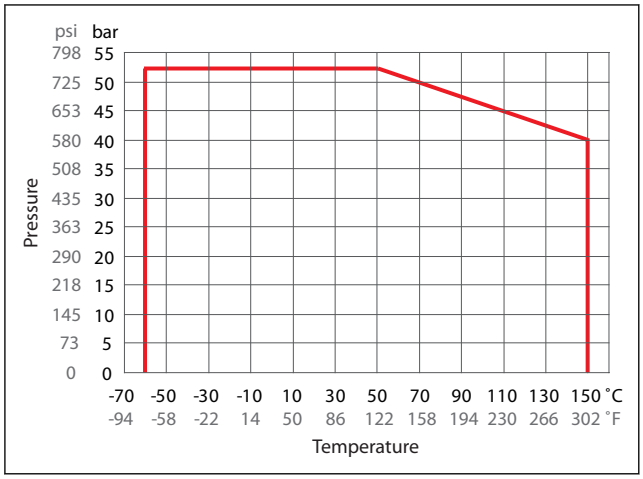
Danfoss products are continually evaluated for use with new refrigerants depending on market requirements.

When a refrigerant is approved for use by Danfoss, it is added to the relevant portfolio, and the R number of the refrigerant (e.g. R513A) will be added to the technical data of the code number. Therefore, products for specific refrigerants are best checked at store.danfoss.com/en/, or by contacting your local Danfoss representative.

Product specification

Pressure and temperature range

Figure 1: Pressure and temperature range graph



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

Design

Housing
Made of stainless steel approved for low temperature operations.

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 °C / +150 °C (-76 °F / +302 °F).

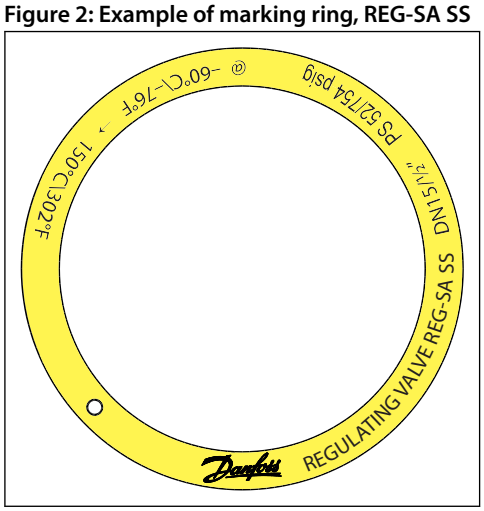
The packing glands are equipped with a scraper ring to prevent penetration of dirt and ice into the packing gland.

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 installation guide for REG-SA SS and REG-SB SS.

Figure 2: Example of marking ring, REG-SA SS



Pressure and temperature data

Table 1: Pressure and temperature

Description	Values
Temperature range	-60 °C - +150 °C (-76 °F -+302°F)
Max working pressure	52 bar (754 psig)

Flow coefficients

Flow coefficients for fully opened valves from k_v = 0.15 to 80 m^3/h (C_v = 0.17 to 92.5 USgal/min).

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.)

Figure 3: DIN

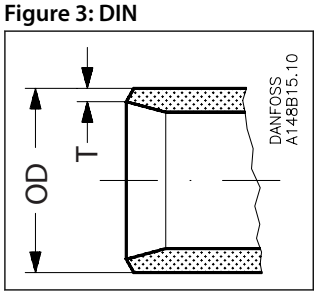


Table 2: Butt-weld DIN (EN 10220)

Size		OD	T
15	mm	21.3	2.3
½	in.	0.839	0.091
20	mm	26.9	2.3
¾	in.	1.059	0.091
25	mm	33.7	2.6
1	in.	1.327	0.103
32	mm	42.4	2.6
1¼	in.	1.669	0.102
40	mm	48.3	2.6
1½	in.	1.902	0.103

Figure 4: ANSI

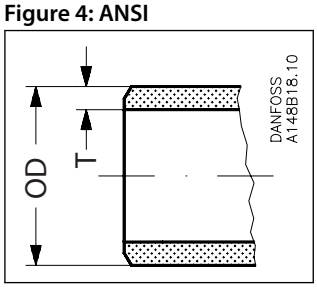


Table 3: Butt-weld ANSI (B 36.19M, SCHEDULE 40)

Size		OD	T
15	mm	21.3	2.8
½	in.	0.839	0.11
20	mm	26.9	2.9
¾	in.	1.06	0.11
25	mm	33.7	3.5
1	in.	1.33	0.14
32	mm	42.4	3.6
1¼	in.	1.67	0.14
40	mm	48.3	3.7
1½	in.	1.9	0.15

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 (Bernouillis equation).

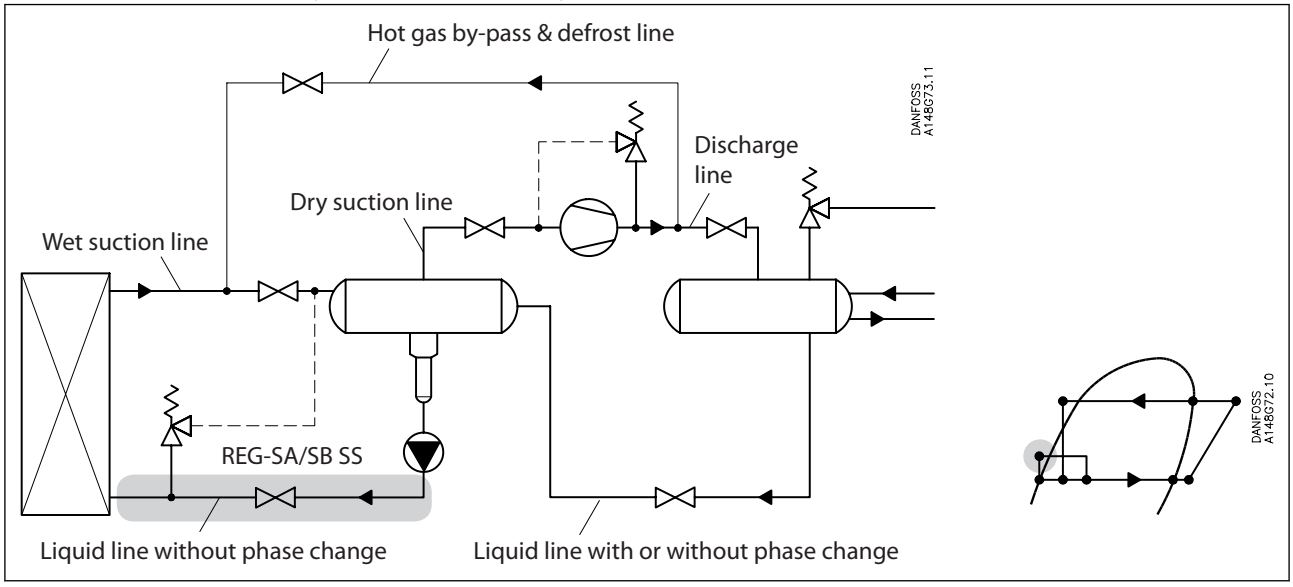
Sizing regulating valve for liquid flow Liquid refrigerants: Use the liquid tables, Figure 12: Flow rate diagramCalculation factor C_A, Figure 12: Flow rate diagramCalculation factor C_A, Figure 13: Flow rate diagram. For other refrigerants and brines, "Normal flow" (Turbulent flow); see below and use the flow coefficient tables (Figure 6: REG-SA SS 15-20 and REG-SB SS 15-20 and Figure 7: REG-SA SS 25-40 and REG-SB SS 25-40).

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).

Figure 5: Location of valve in system (marked with grey)



SI-units

Mass flow:

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

Volume flow:

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

k_v	[m³/h]	Quantity [m³/h] of water flowing through a valve at a pressure loss of 1 bar (according to VDE/VDI Norm 2173).
P_1	[bar]	Pressure before the valve (upstream).
P_2	[bar]	Pressure after the valve (downstream).
Δp	[bar]	Actual pressure loss across the valve (P1–P2).
G	[kg/h]	Mass flow through the valve.
V	[m³/h]	Volume flow through the valve.
ρ	[kg/m³]	Density of the refrigerant before the valve.
C_A		Calculation factor (See Figure 10: Calculation factor C_A).

Imperial units

Mass flow:

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

Volume flow:

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

C_v	[US gal/min]	Quantity [US gal/min] of water flowing through a valve at a pressure loss of 1 psi.
P_1	[psi]	Pressure before the valve (upstream).
P_2	[psi]	Pressure after the valve (downstream).
Δp	[psi]	Actual pressure loss across the valve (P1–P2).
G	[lb/min]	Mass flow through the valve.
V	[US gal/min]	Volume flow through the valve.
ρ	[lb/ft³]	Density of the refrigerant before the valve.
C_A		Calculation factor (See Figure 10: Calculation factor C_A).

Figure 6: REG-SA SS 15-20 and REG-SB SS 15-20

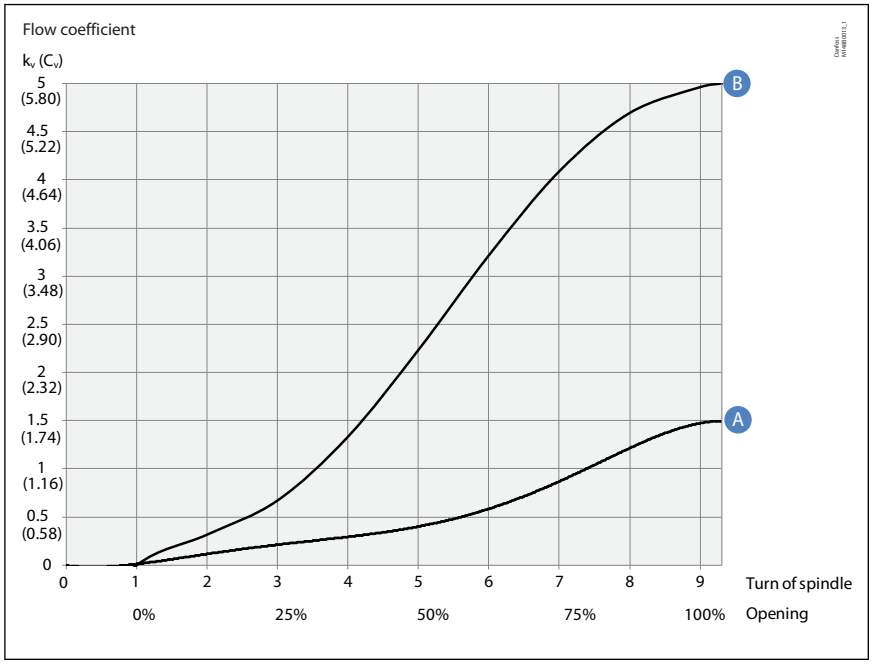
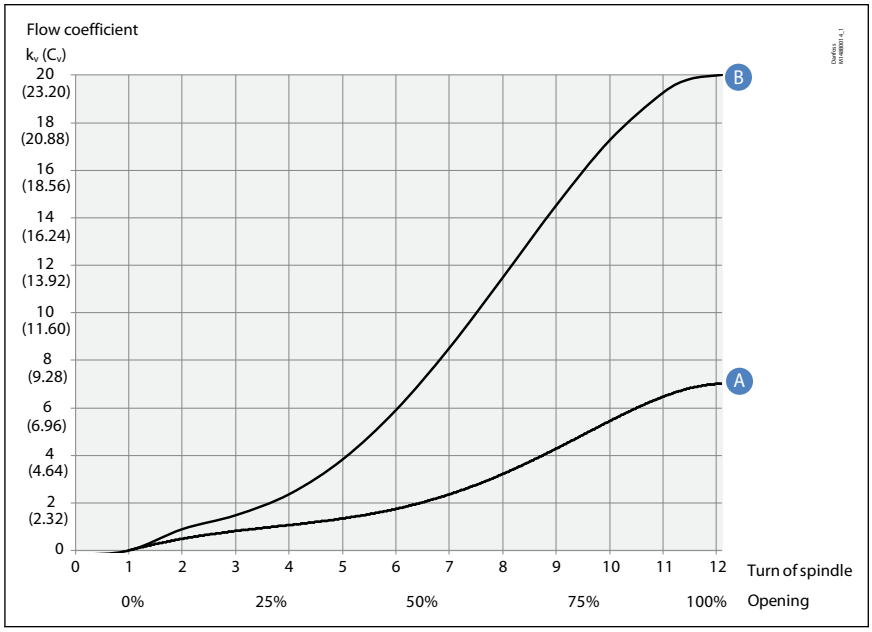


Figure 7: REG-SA SS 25-40 and REG-SB SS 25-40



Liquid R 717, density: 670 kg/m^3 [42 lb/ft^3]

Figure 8: REG-SA SS 15-20 and REG-SB SS 15-20

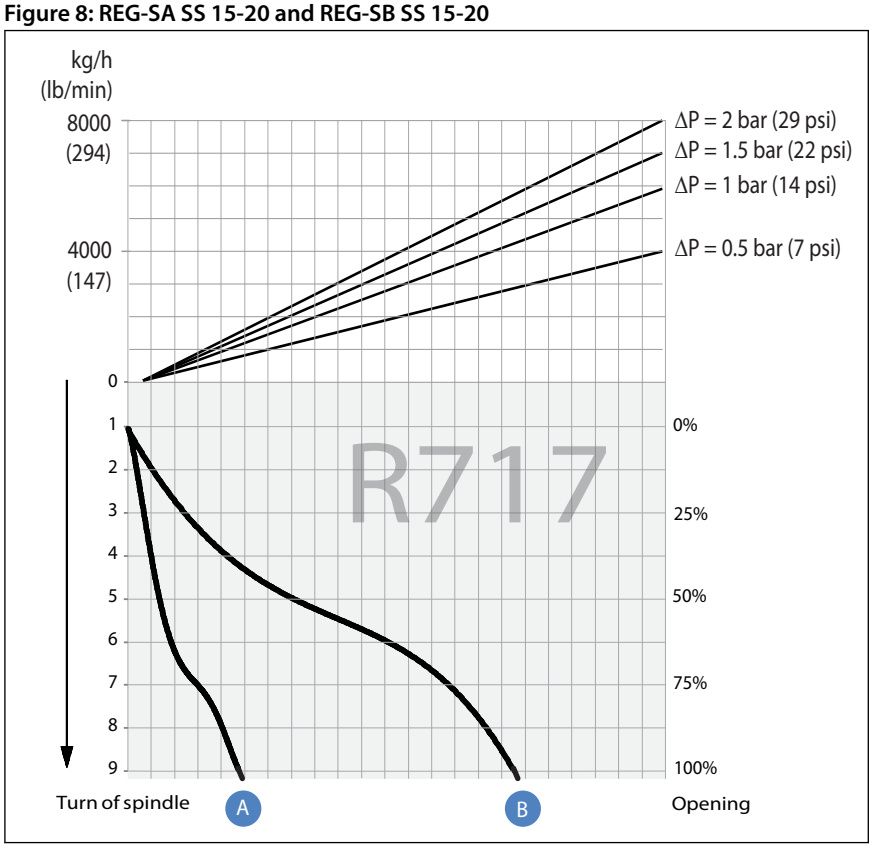


Figure 9: REG-SA SS 25-40 and REG-SB SS 25-40

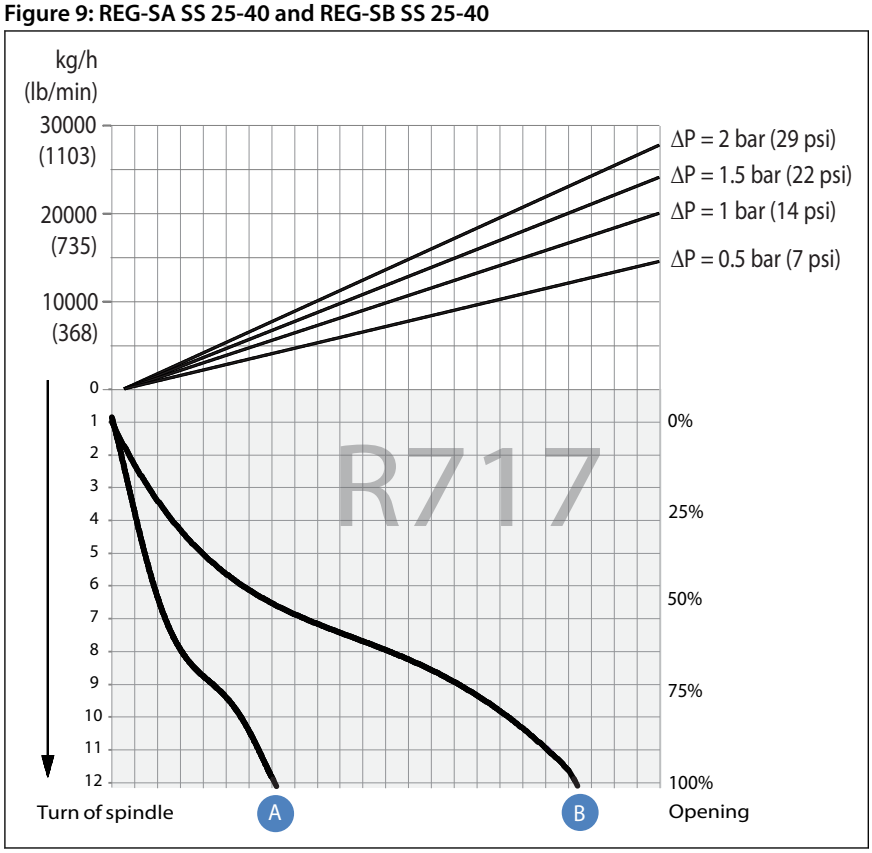
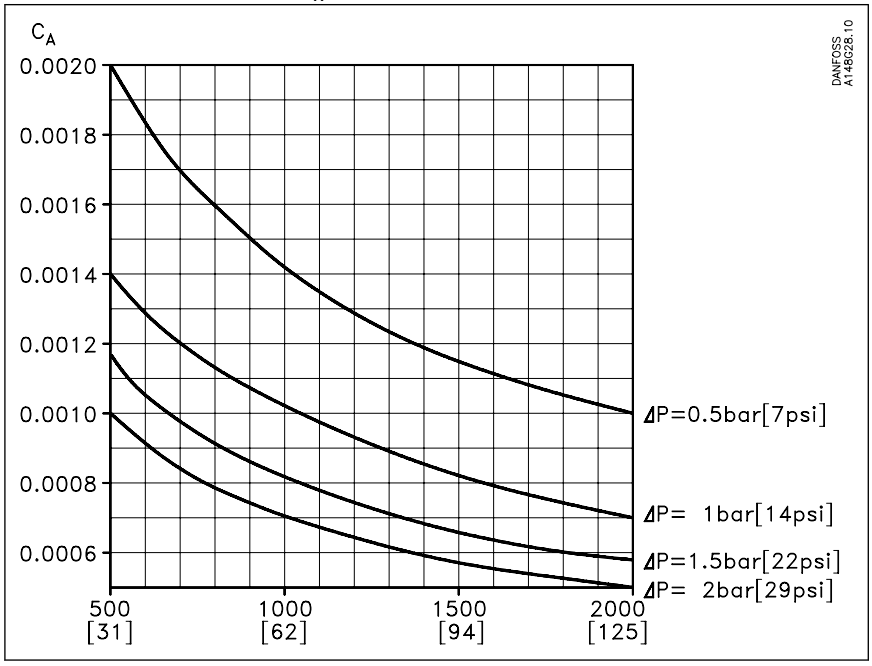


Figure 10: Calculation factor C_A



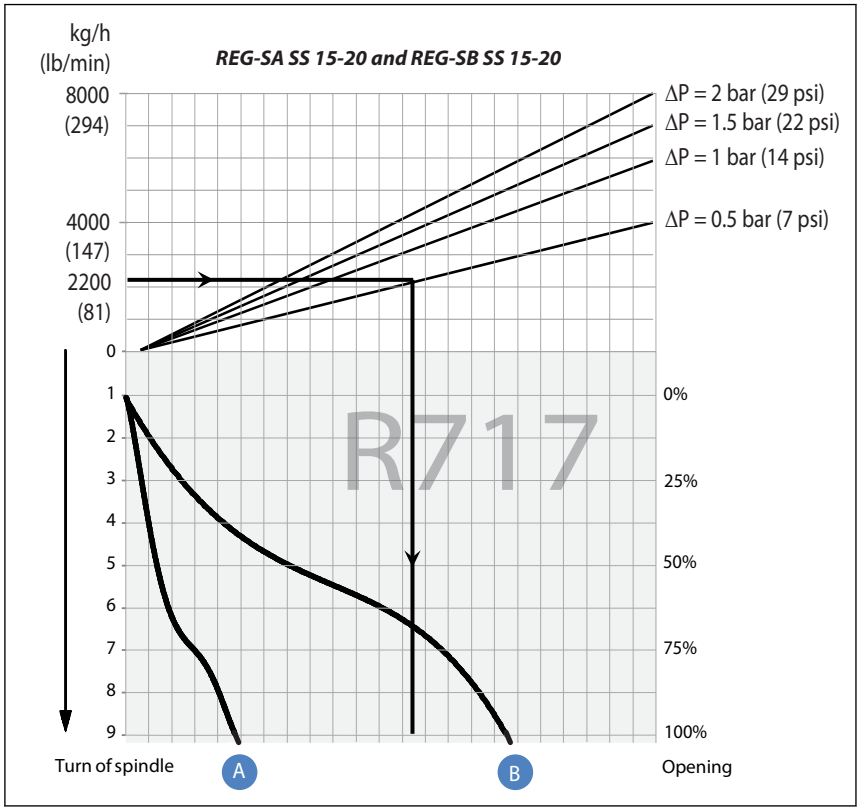
NOTE:
For choice of valve size and connection see "Connections".

Computation and selection Example 1.

Refrigerant: R 717
Refrigerant flow: 2200 kg/h
Pressure drop: Δp = 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/m^3), and there must be no build-up of flash gas in the valve.

Figure 11: Flow rate diagram



Computation and selection Example 2.

Brine, density ρ: 1150 [kg/m^3]
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 (Figure 8: REG-SA SS 15-20 and REG-SB SS 15-20 and Figure 9: REG-SA SS 25-40 and REG-SB SS 25-40) as the refrigerant in question is not included.

Use the curves of the k_v-values instead (Figure 6: REG-SA SS 15-20 and REG-SB SS 15-20 and Figure 7: REG-SA SS 25-40 and REG-SB SS 25-40) 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 (Figure 12: Flow rate diagramCalculation factor C_A) and the flow rate diagram (in this example: Figure 13: Flow rate diagram) as per the following calculation example.

Calculation example:
Required k_v-value
$C_A = 0.00132$ (from Figure 13: Flow rate diagram)
$k_v = C_A \times G$
$k_v = 0.00132 \times 2{,}700$ [kg/h]
$= 3.56$ [m^3/h]

Figure 12: Calculation factor C_A

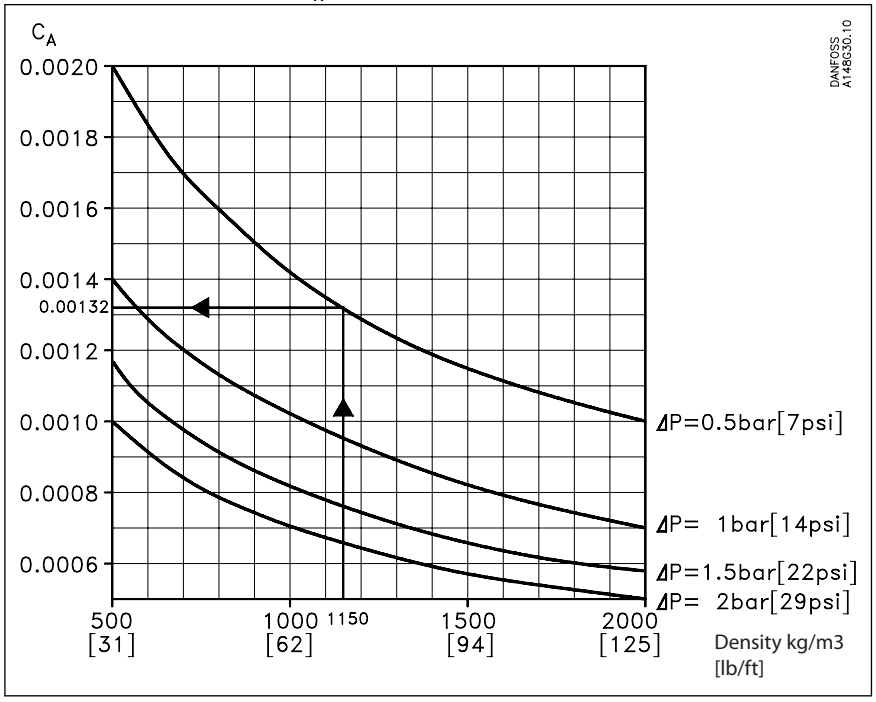
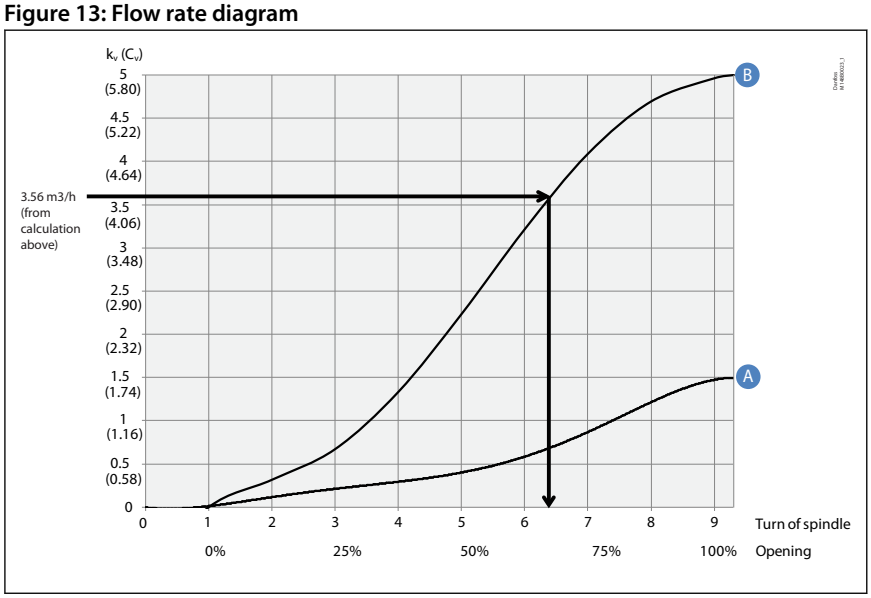


Figure 13: Flow rate diagram



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

Material specification

Figure 14: REG-SA SS and REG-SB SS 15 - 40

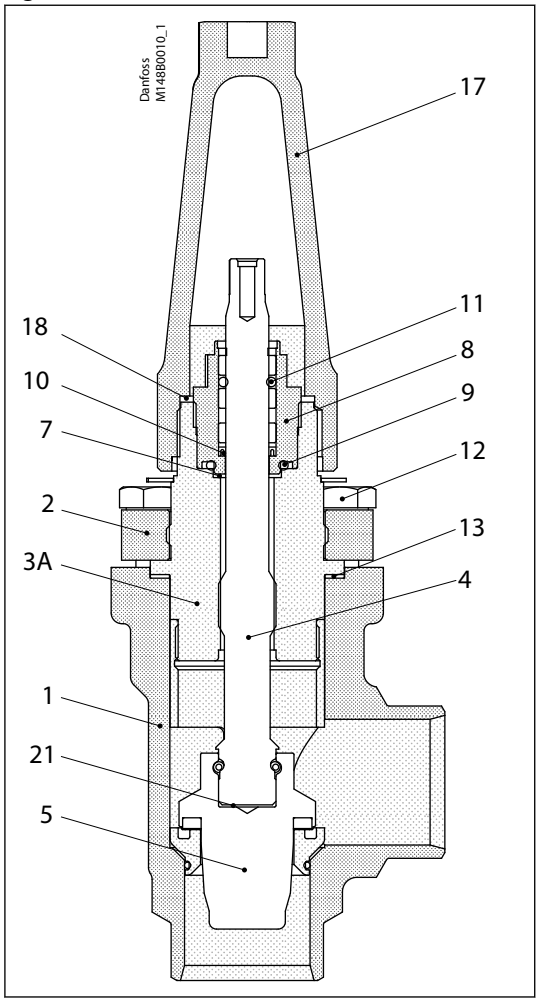


Table 4: Material and parts

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	Chloroprene (Neoprene)			
10	Spring loaded Teflon ring	PTFE			
11	O-ring	Chloroprene (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

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

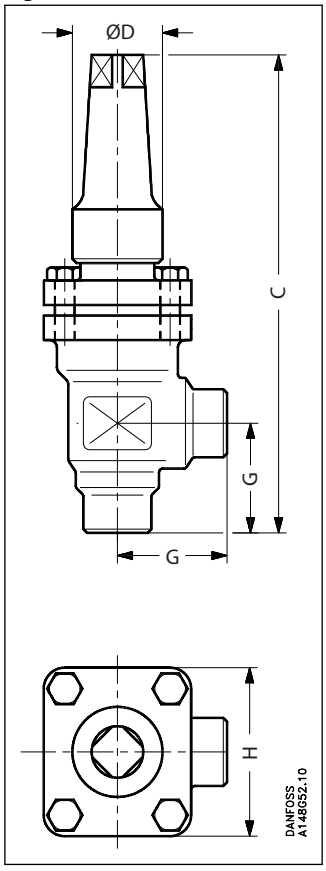


Table 5: Valve size and weight

Valve size		C	G	ØD	H	Weight
REG-SA SS/SB SS 15-20	**mm**	182	45	38	60	1.4 kg
REG-SA SS/SB SS (½-3/4)	**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 (1-1½)	**in.**	9.33	2.17	1.97	2.76	5.3 lb

NOTE:
Specified weights are approximate values only.

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

Figure 16: REG-SA SS and REG-SB SS 15 - 40

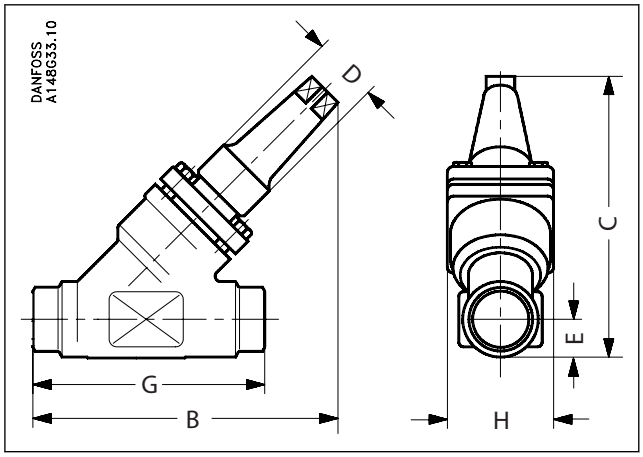


Table 6: Valve size and weight

Valve size		C	B	E	G	∅D	H	Weight
REG-SA SS/SB SS 15-20	**mm**	145	155	20	120	38	60	2.0 kg
REG-SA SS/SB SS (½-3/4)	**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 (1-1½)	**in.**	7.87	8.46	1.02	6.10	1.97	2.76	6.6 lb

NOTE:
Specified weights are approximate values only.

Ordering

How to order

The table below is used to indentify 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.

Table 7: Type codes

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

Complete REG-SA SS (Cone type A)

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

Table 8: 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	1 ¼	REG-SA SS 32 D ANG	148B5589
40	1 ½	REG-SA SS 40 D ANG	148B5674

Table 9: 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	1 ¼	REG-SA SS 32 D STR	148B5590
40	1 ½	REG-SA SS 40 D STR	148B5675

Table 10: 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	1 ¼	REG-SA SS 32 A40 ANG	148B6484

Table 11: 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	1 ¼	REG-SA SS 32 A40 STR	148B6486

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

Complete REG-SB SS (Cone type B)

Table 12: 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	1 ¼	REG-SB SS 32 D ANG	148B5591
40	1 ½	REG-SB SS 40 D ANG	148B5676

Table 13: 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	1 ¼	REG-SB SS 32 D STR	148B5592
40	1 ½	REG-SB SS 40 D STR	148B5677

Table 14: 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	1 ½	REG-SB SS 40 A40 ANG	148B5686

Table 15: Butt-weld ANSI (B 36.19M SCHEDULE 40)

Size		Type	Code no.
mm	in.		
Straightway - REG-SA SS with cone type A			
20	¾	REG-SB SS 20 A40 STR	148B6488
25	1	REG-SB SS 25 A40 STR	148B6479
40	1 ½	REG-SB SS 40 A40 STR	148B5685

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

Replacement kit

Replacement kit (O-ring replacement) for R717 Ammonia Heat Pump[1] and Propylene applications (including ID tag)

Table 16: O-ring kit

Size		O-ring kit for	
mm	in.	R717 Heat pump	R1270 Propylene
10	⅜	148B6084	148B6085
15	½	148B6070	148B6077
20	¾		
25	1	148B6071	148B6078
32	1¼		
40	1½		

1 Replacement kits for R717 Ammonia Heat Pump is applicable for continuous operating temperature between +100 °C - 150 °C (212 °F - 302 °F)

Certificates, declarations, and approvals

The list contains all certificates, declarations, and approvals for this product type. Individual code number may have some or all of these approvals, and certain local approvals may not appear on the list.

Some approvals may change over time. You can check the most current status at danfoss.com or contact your local Danfoss representative if you have any questions.

Table 17: Pressure Equipment Directive (PED)

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

Table 18: Valves specifications

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	
Catagory	Article 3, paragraph 3	II

Table 19: Certificates and declarations

File name	Document type	Document topic	Approval authority
03709-F0 BV	Marine - Safety Certificate	-	BV
033F0685.AK	EU Declaration	EMCD/PED	Danfoss
033F0691.AE	Manufacturers Declaration	RoHS	Danfoss

ENGINEERING
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Online support

Danfoss offers a wide range of support along with our products, including digital product information, software, mobile apps, and expert guidance. See the possibilities below.

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The Danfoss Product Store is your one-stop shop for everything product related—no matter where you are in the world or what area of the cooling industry you work in. Get quick access to essential information like product specs, code numbers, technical documentation, certifications, accessories, and more.
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