

Data Sheet

Hand operated regulating valve Type **REG-SA** and **REG-SB 65**

Designed for regulation purposes in liquid and expansion lines, suitable for MWP up to 65 bar



REG-SA and REG-SB are angleway and straightway hand regulating valves, which act as normal stop valves in closed position.

The valves are available in two different versions – REG-SA and REG-SB designed for regulation purposes in liquid and expansion lines.

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

REG-SA and REG-SB are equipped with vented cap and internal backseating enables replacement of the spindle seal whilst the valve is active, i.e. under pressure.

Features

- Modular Concept:
 - Each valve housing is available with DIN and ANSI butt weld connection and in several different sizes.
 - Possible to convert REG-SA or REG-SB to any other product in the Flexline™ SVL family (shut-off valve, check & stop valve, check valve or strainer) just by replacing the complete top part.
- Fast and easy valve overhaul service. It is easy to replace the top part and no welding is needed.
- Designed to ensure perfect regulation
- Internal backseating enables replacement of the spindle seal whilst the valve is active, i.e. under pressure.
- Easy to disassemble for inspection and possible repair.
- Acts as a normal stop valve in closed position.
- Housing and bonnet material is low temperature steel according to requirements of the Pressure Equipment Directive and other international classification authorities.
- Exact capacity and setting of the valve can be calculated for all refrigerants by means of Coolselector™.
- Classification: DNV, CRN, BV, EAC etc. To get an updated list of certification on the products please contact your local Danfoss Sales Company.
- Equipped with 42CrMo4 bolts to withstand high pressure.
- Service kits with replacement O-rings for R717 Heat Pump and R1270 Propylene include separate ID-ring for ID of application

Media

Refrigerants

Applicable to HCFC, HFC, R717 (Ammonia), R744 (CO₂), R290 (Propane), R600 (Butane), R600a (Iso-Butane), R170 (Ethane) and R1270 (Propylene).

R717 Heat Pump and R1270 Propylene applications with replaced O-ring from replacement kit for DN 10-40.

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

Design

Housing

Housing is Standard SVA angleway or straightway housing allowing other inserts from the SVL platform to be installed. Material is special, cold resistant steel

The cone

The valves are available in two different versions – REG-SA with an A cone and REG-SB 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.

Spindle

The spindle is made of polished stainless steel, which is ideal for O-ring sealing.

Packing gland - REG-SA and REG-SB

The "full temperature range" packing gland ensures perfect tightness in the whole 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.

For special and/or high demanding applications/conditions which run with high constant temperatures, it is recommended to replace the packing gland with "HL Packing Gland" as spare part. For more information, please, contact your local Danfoss sales representative

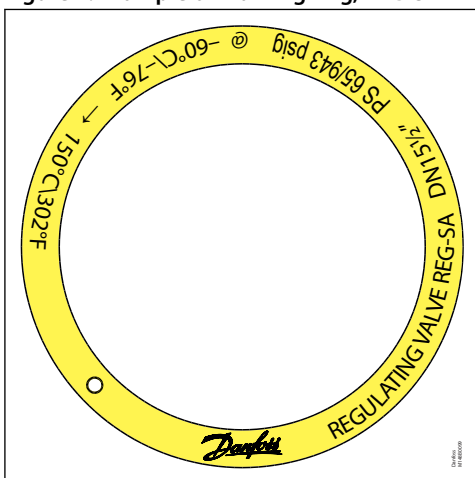
Installation

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 and REG-SB.

Figure 1: Example of marking ring, REG-SA



ID ring for special application

After converting a REG-SA/SB (DN 10-40) valve for Heat Pump/Propylene applications (replacing O-ring) the color marked ID tag included in the service kit must be fixed to the valve as shown in figure to the right.

The ID tag indicates the special application and identifies the installed O-ring.

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Figure 2: Valve with ID tag

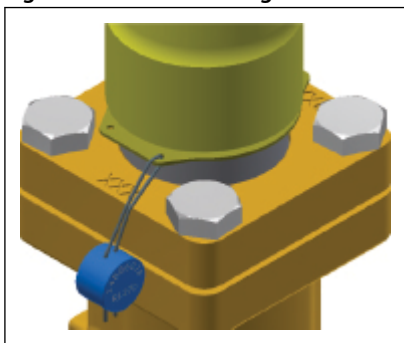


Figure 3: ID tag R1270



Figure 4: ID tag R717



Pressure and temperature data

Table 1: Temperature and pressure

Description	Values
Temperature range	-60 °C / +150 °C (-76 °F / +302 °F).
Max. working pressure	65 bar (943 psig).

With O-ring replaced for valves up to DN40 (Service kit):

- Heat pump configuration: R717 - 65 bar (943 psi) @ +100 °C to +150 °C (+212 °F to +302 °F) continuous.
- Propylene configuration: R1270 - 65 bar (943 psi) @ -60 °C to 150 °C (-76 °F to 302 °F).

Connections

Figure 5: DIN

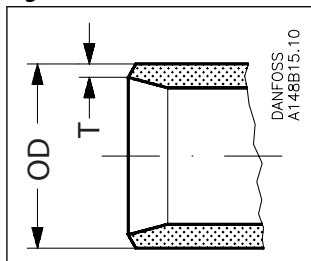
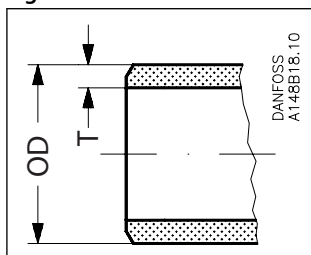


Table 2: Butt-weld DIN (EN 10220)

Size		OD	T	OD	T
mm	in.	mm	mm	in.	in.
10	3/8	17.2	2.3	0.677	0.091
15	1/2	21.3	2.3	0.839	0.091
20	3/4	26.9	2.3	1.059	0.091
25	1	33.7	2.6	1.327	0.103
32	1 1/4	42.4	2.6	1.669	0.102
40	1 1/2	48.3	2.6	1.902	0.103
50	2	60.3	2.9	2.37	0.11
65	2 1/2	76.1	2.9	3	0.11

Figure 6: ANSI



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Table 3: Butt-weld ANSI (B 36.10 Schedule 80)

Size		OD	T	OD	T
mm	in.	mm	mm	in.	in.
10	3/8	17.2	3.2	0.677	0.126
15	1/2	21.3	3.7	0.839	0.146
20	3/4	26.9	4.0	1.059	0.158
25	1	33.7	4.6	1.327	0.181
32	1 1/4	42.4	4.9	1.669	0.193
40	1 1/2	48.3	5.1	1.902	0.201

Table 4: Butt-weld ANSI (B 36.10 Schedule 40)

Size		OD	T	OD	T
mm	in.	mm	mm	in.	in.
50	2	60.3	3.9	2.37	0.15
65	2 1/2	73.0	5.2	2.87	0.20

Figure 7: SD (DIN)

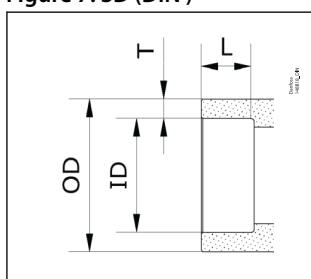


Table 5: Socket-Brazing DIN (EN 1254-5)

Size		ID	L	OD	T
mm	in.	mm	mm	mm	mm
10	3/8	10	8	15.88	2.94
15	1/2	16	8	21.3	2.65
20	3/4	22	11	26.9	2.45
25	1	28	11	33.7	2.85
32	1 1/4	35	15	42.4	3.7
40	1 1/2	42	15	48.3	3.15
50	2	54	13.5	60.3	3.15
65	2 1/2	64	13.5	73	4.5

Figure 8: SA (ASME)

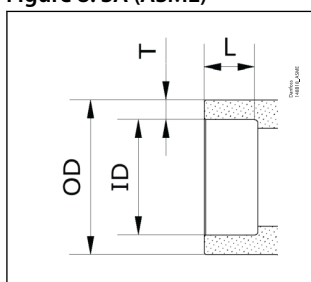


Table 6: Socket-Brazing ASME (ASME B16.50)

Size	ID	L	OD	T
in.	mm	mm	mm	mm
3/8	9.53	8	15.88	3.18
1/2	15.88	8	21.3	2.71
3/4	22.23	11	26.9	2.34
1	28.58	11	33.7	2.56
1 1/4	34.93	15	42.4	3.74
1 1/2	41.28	15	48.3	3.51
2	54	13.5	60.3	3.15
2 1/2	66.7	13.5	76.1	4.70

The design fits with all copper pipes having following tolerance to the nominal diameter.

Table 7: Tolerance for nominal diameter

Copper pipe diameter	Tolerance
≥3mm up to ≤18 mm	±0,04 mm
Over 18 mm up to ≤28 mm	±0,05 mm
Over 28 mm up to ≤54 mm	±0,06 mm
Over 54 mm up to ≤76,1 mm	±0,07 mm
Over 76,1 mm up to ≤88,9 mm	±0,07 mm
Over 88,9 mm up to ≤108 mm	±0,07 mm

Computation and selection

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.

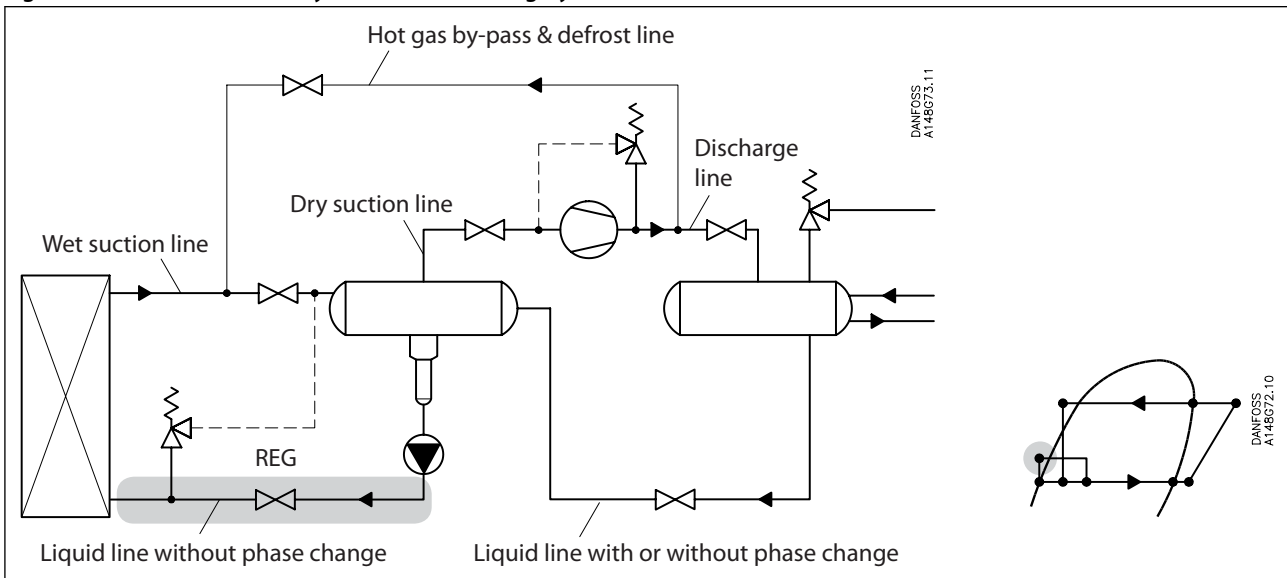
Normal flow is the term used to describe the general case where the flow through the valve is proportional to the square root of the pressure drop across it and inversely proportional to the density of the refrigerant (Bernouillis equation).

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 Coolselector®2.

Figure 9: Location of valve in system (marked with grey)



Sizing regulating valve for liquid flow

Liquid refrigerants: Use the liquid tables, [Figure 15](#), [Figure 16](#), [Figure 17](#), [Figure 18](#), [Figure 19](#). For other refrigerants and brines, "Normal flow" (Turbulent flow); see below and use the flow coefficient tables ([Figure 10](#), [Figure 11](#), [Figure 12](#), [Figure 13](#), [Figure 14](#)).

SI-units

Mass flow:

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

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Volume flow:

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

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).
P_1	[bar]	Pressure before the valve (upstream).
P_2	[bar]	Pressure after the valve (downstream).
Δp	[bar]	Actual pressure loss across the valve ($P_1 - P_2$).
G	[kg/h]	Mass flow through the valve.
V	[m ³ /h]	Volume flow through the valve.
ρ	[kg/m ³]	Density of the refrigerant before the valve.
C_A		Calculation factor (See Figure 20).

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:

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

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 ($P_1 - P_2$).
G	[lb/min]	Mass flow through the valve.
V	[US gal/min]	Volume flow through the valve.
ρ	[lb/ft ³]	Density of the refrigerant before the valve.
C_A		Calculation factor (See Figure 20: Calculation factor C_A).

Figure 10: REG-SA 15-20 and REG-SB 15-20

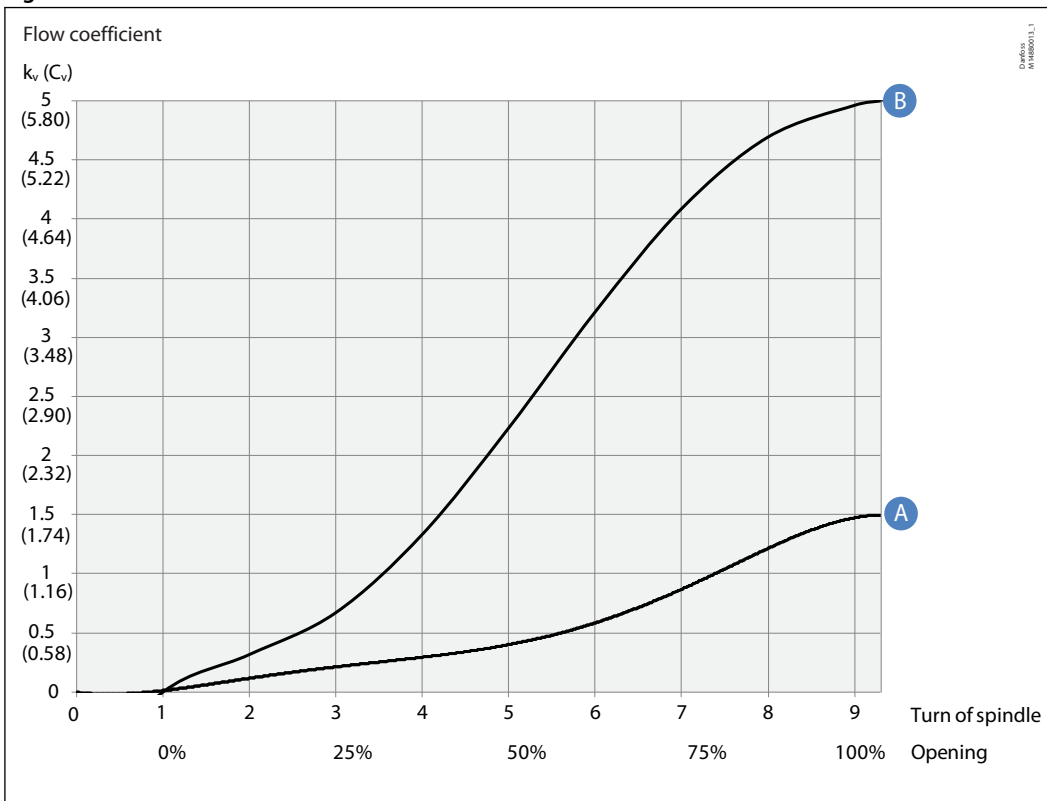


Figure 11: REG-SA 25-40 and REG-SB 25-40

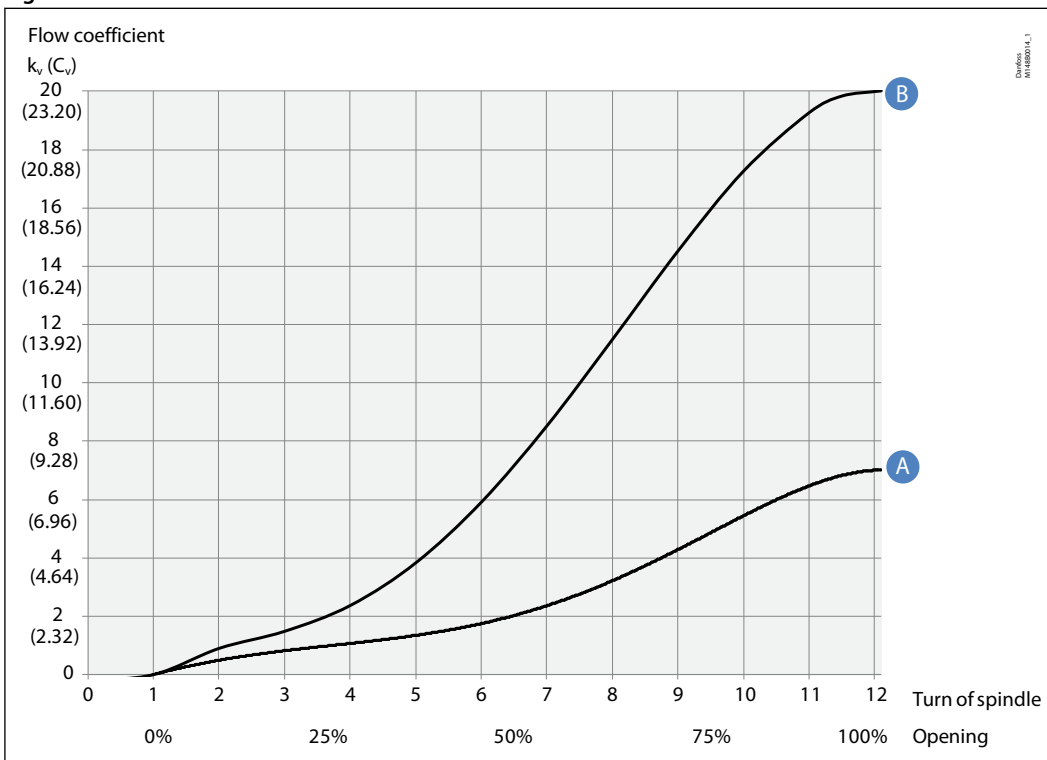


Figure 12: REG-SB 50

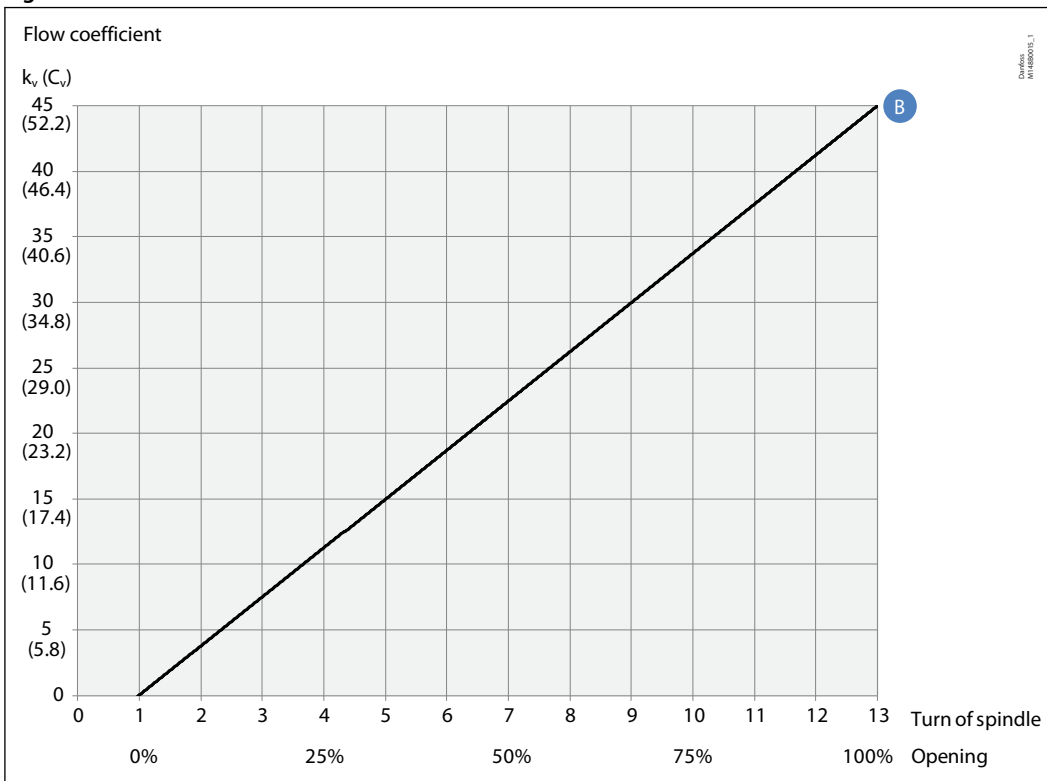
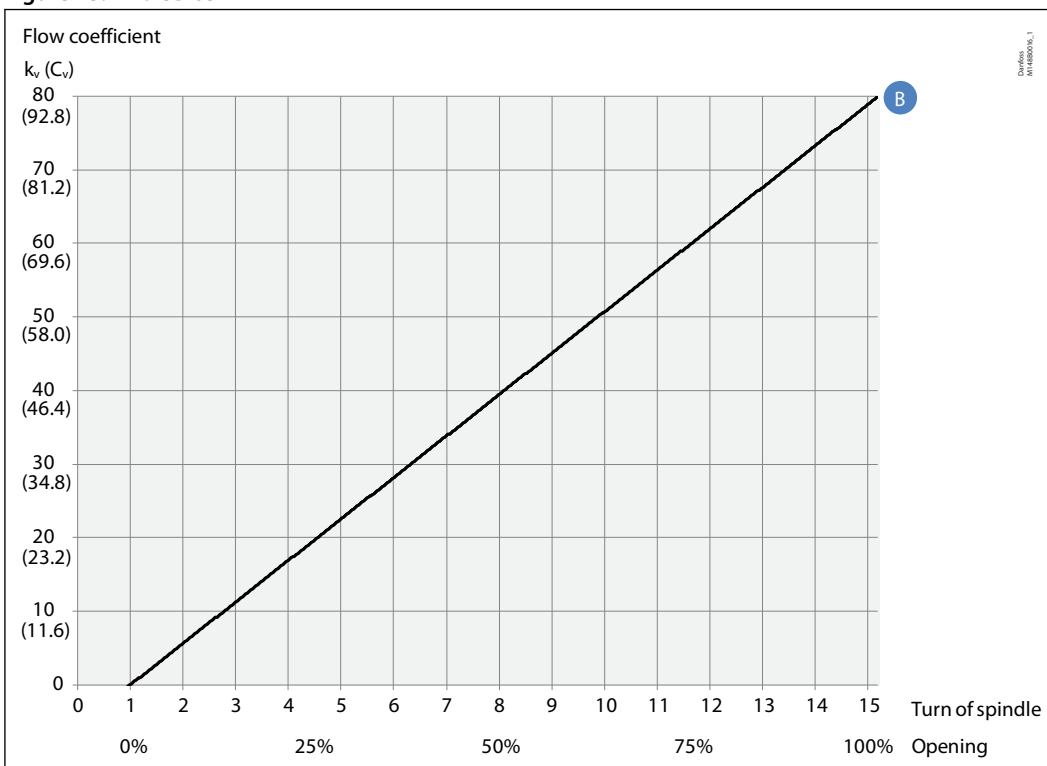


Figure 13: REG-SB 65



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

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Figure 14: REG-SA 15-20 and REG-SB 15-20

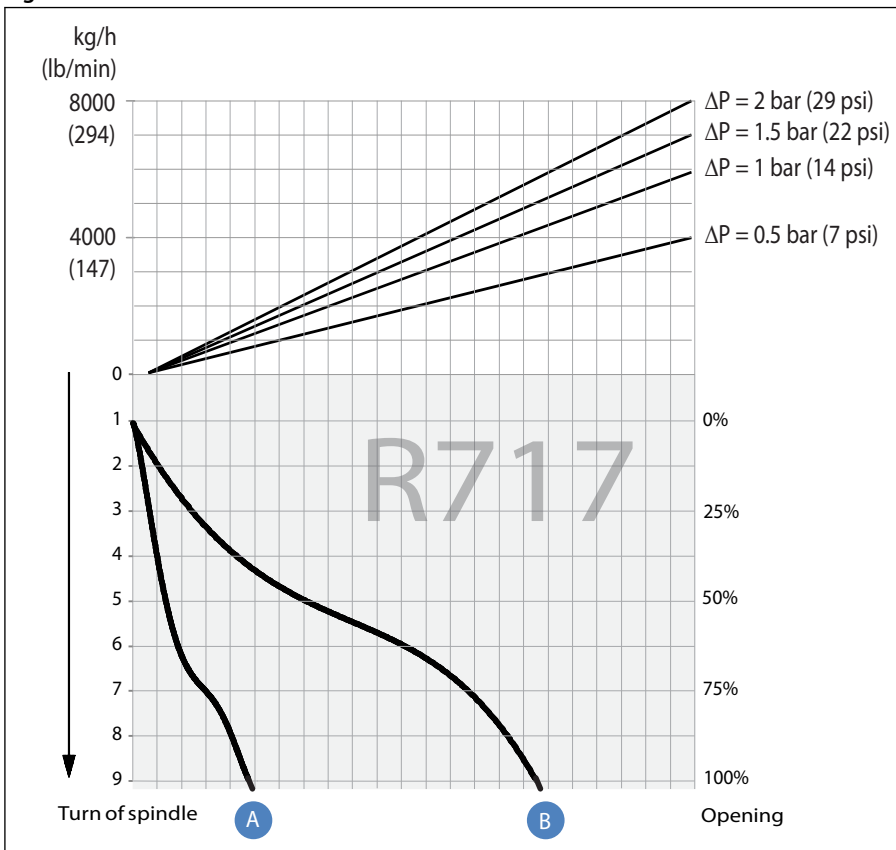
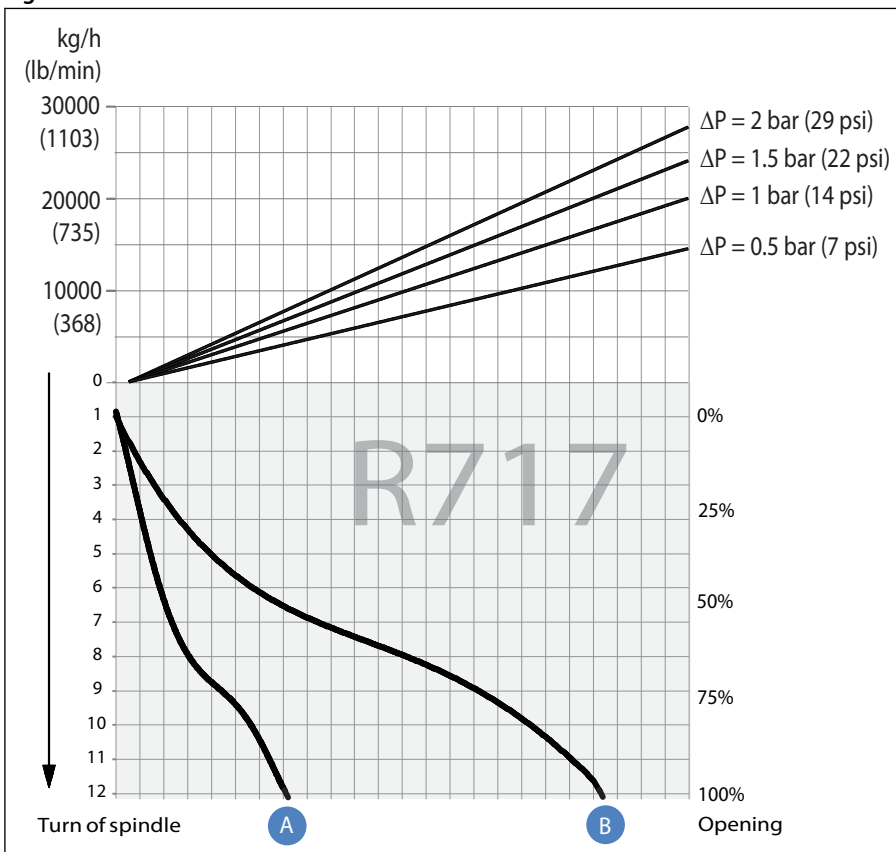


Figure 15: REG-SA 25-40 and REG-SB 25-40



Hand operated regulating valve, type REG-SA and REG-SB 65

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

Figure 16: REG-SB 50

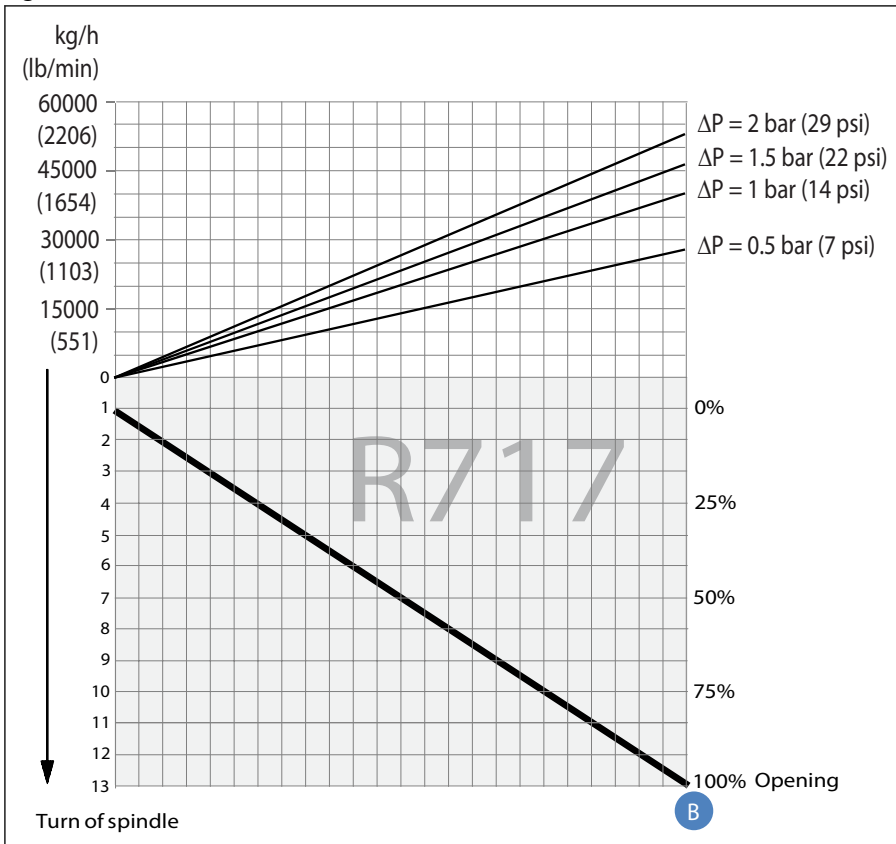
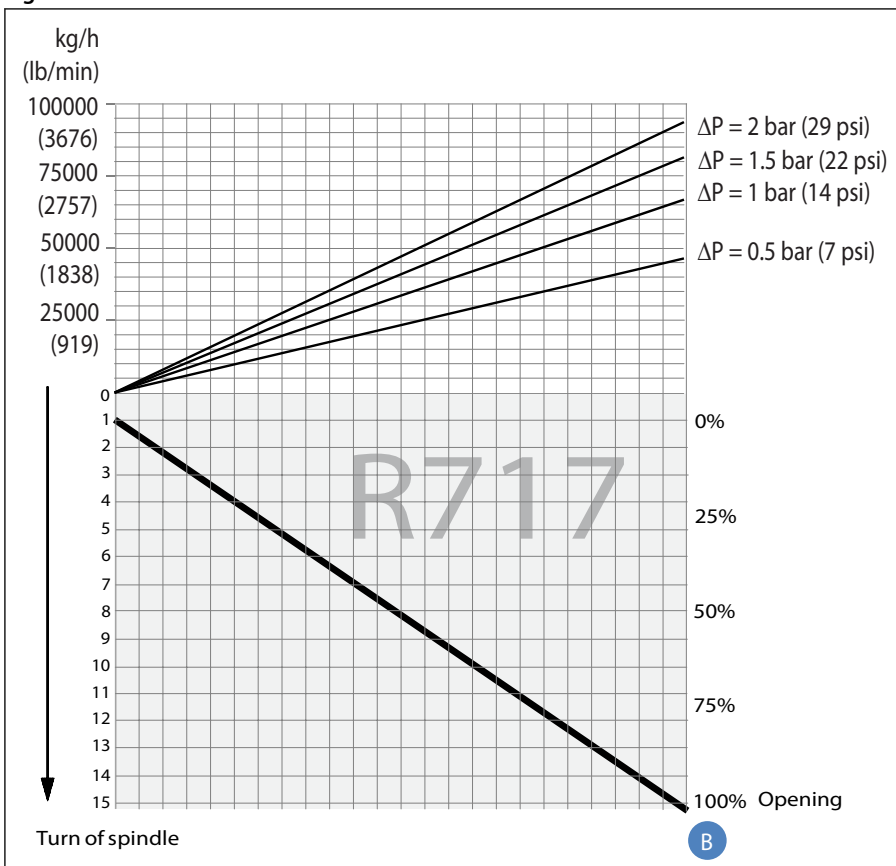
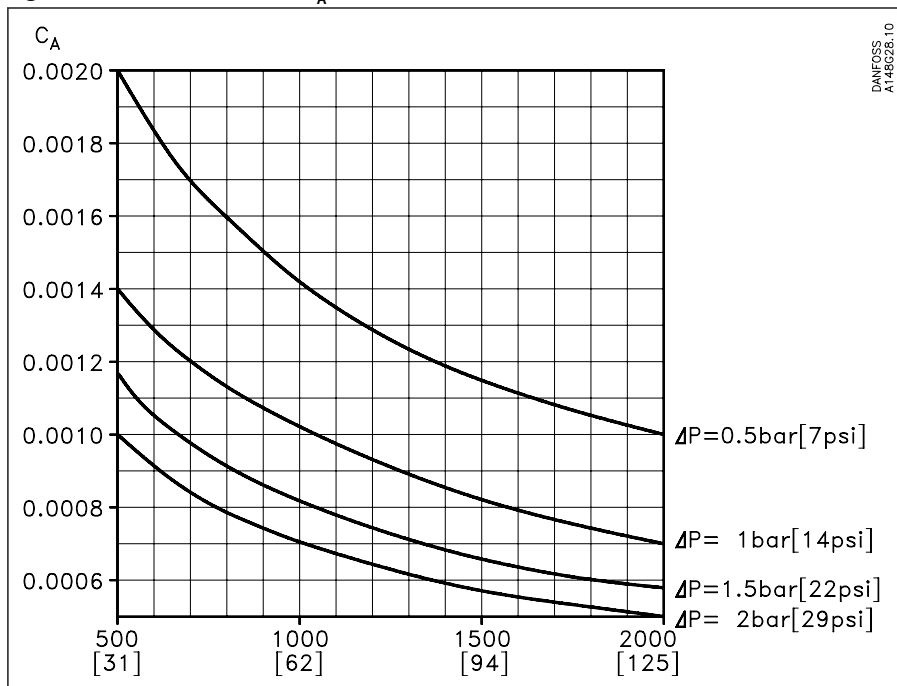


Figure 17: REG-SB 65



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

Figure 18: Calculation factor C_A



NOTE:

For choice of valve size and connection see "".

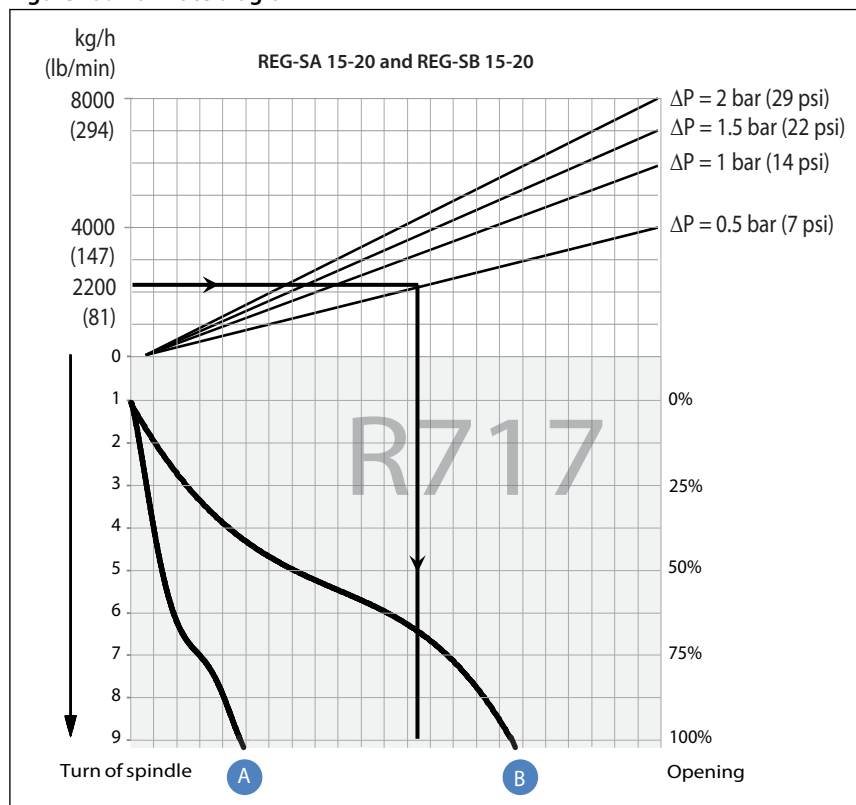
Computation and selection Example 1

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 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.

Figure 19: 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 (Figure 14, Figure 15, Figure 16, Figure 17) as the refrigerant in question is not included.

Use the curves of the k_v -values instead (Figure 10, Figure 11, Figure 12, Figure 13) 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 20) and the flow rate diagram (in this example: Figure 21) as per the following calculation example.

Required k_v -value

$C_A = 0.00132$ (from Figure 20)

$k_v = C_A \times G$

$k_v = 0.00132 \times 2,700$ [kg/h]

= 3.56 [m³/h]

Calculation example:

Figure 20: Calculation factor C_A

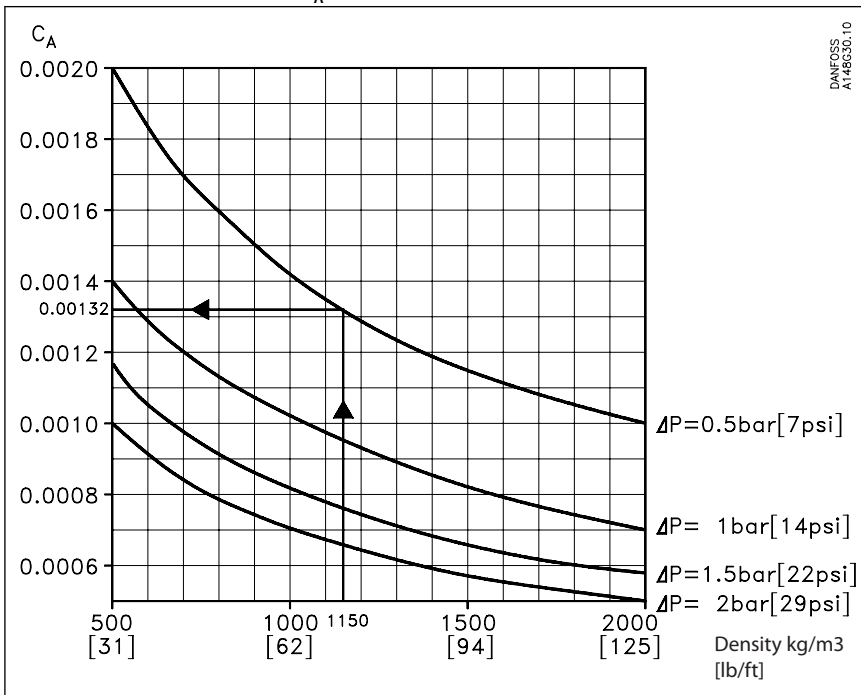
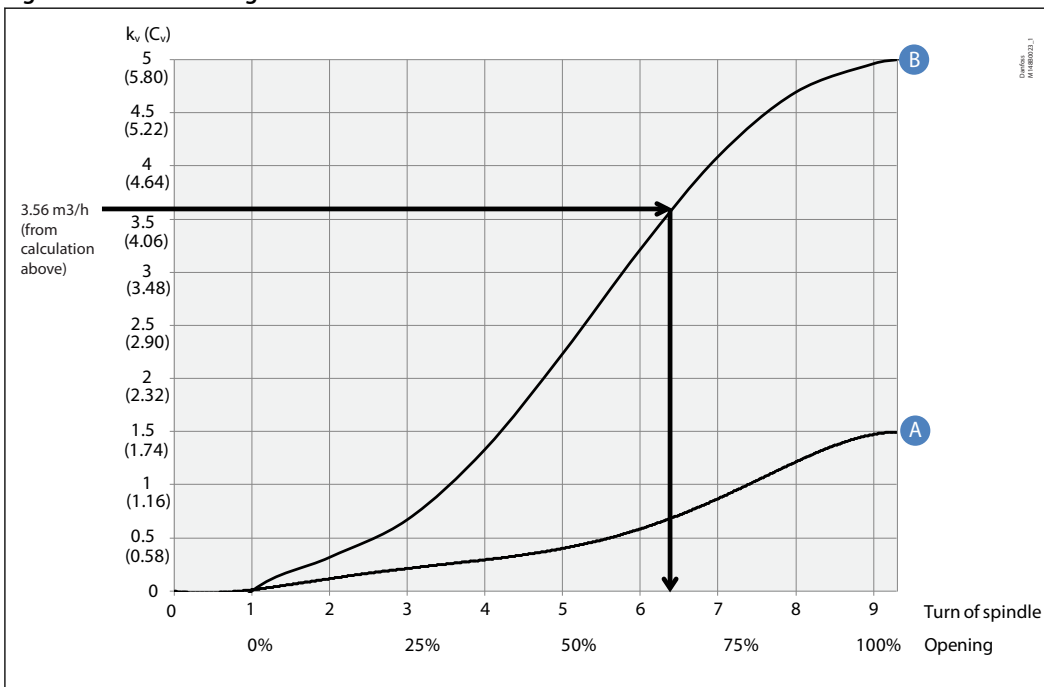


Figure 21: Flow rate diagram



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

Material specification

Figure 22: REG-SA and REG-SB 10 - 65

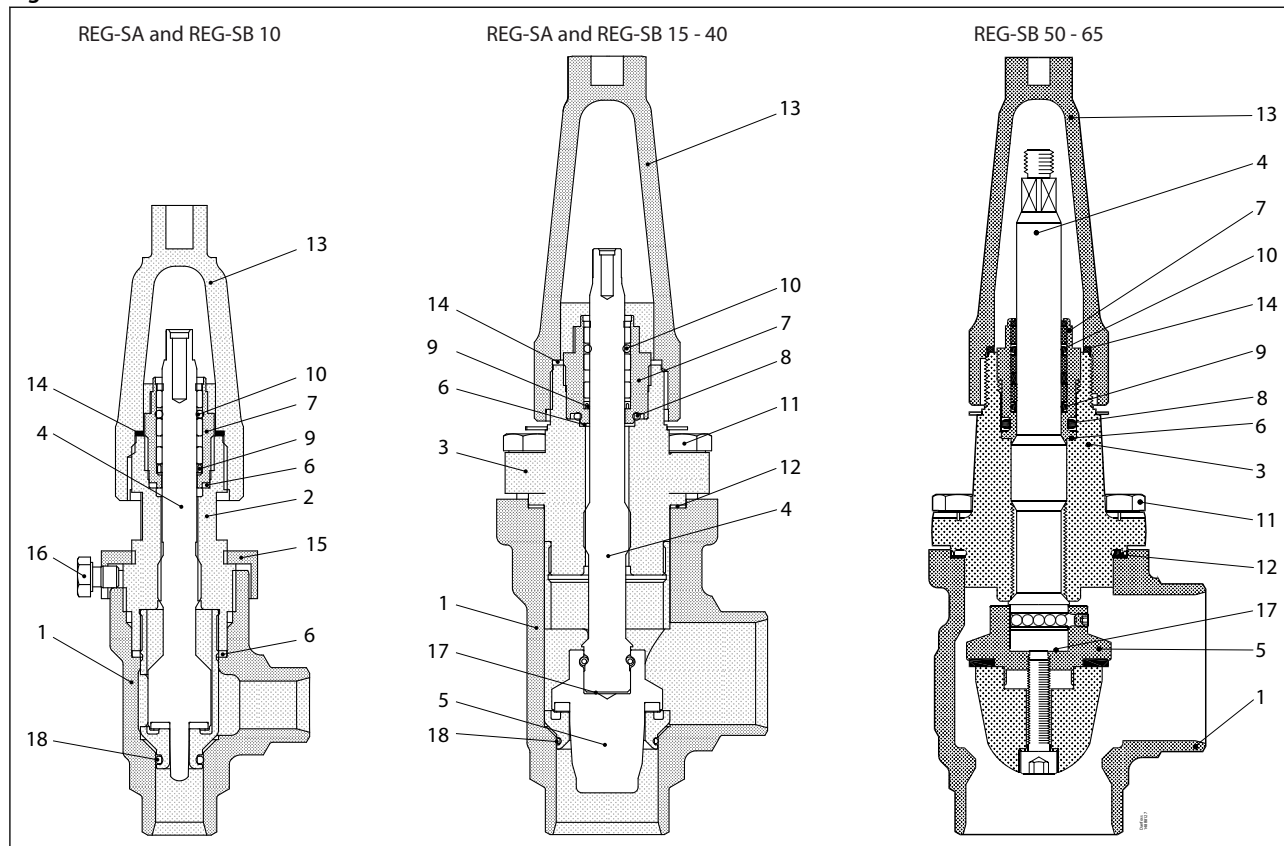


Table 8: Material and part list

No.	Part	Material	EN	ISO	ASTM
1	Housing	Steel	G20Mn5QT, 10213-3 P285QH+QT, 10222-4		LCC, A352 LF2, A350
2	Bonnet DN 10 (3/8 in.)	Steel	11SMn30 10087	Type 2, R 683-9	1213 SAE J403
3	Bonnet DN 15 - 65 (1/2 - 2 1/2 in.)	Steel	P285QH+QT 10222-4		LF2 A350
4	Spindle DN 10 - 65 (1/4 - 2 1/2 in.)	Stainless steel	X8CrNiS 18-9, 17440	Type 17, 683/13	AISI 303
5	Cone	Steel			
6	Packing washer	Aluminium			
7	Packing gland	Stainless Steel	X8CrNiS 18-9, 10088	Type 17, 683/13	AISI 303
8	O-ring	Chloroprene (Neoprene)			
9	Spring loaded Teflon ring	PTFE			
10	O-ring	Chloroprene (Neoprene)			
11	Bolts	High temperature steel	42CrMo4, 10269		A193
12	Gasket	Fiber, non asbestos			
13	Seal cap	Aluminium			
14	Gasket for seal cap	Nylon			
15	Locking nut	Steel			
16	Screw	Steel			
17	Disk spring	Steel			
18	O-ring	Chloroprene (Neoprene) ⁽¹⁾			

⁽¹⁾ Replace the O-ring with the replacement kit for R717 Heat Pump and R1270 Propylene applications.

Dimensions and weights

Figure 23: REG-SA and REG-SB 15 - 65 in angleway version

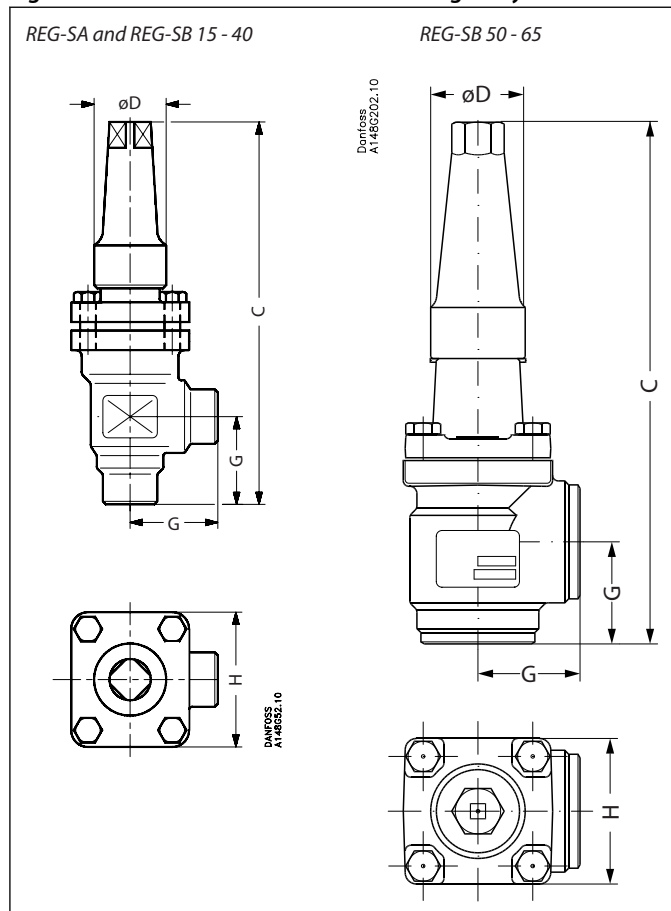


Table 9: REG-SA and REG-SB 15 - 65 in angleway version

Valve size		C	G	ØD	H	Weight
REG-SA/SB 15-20	mm	182	45	38	60	1.4 kg
REG-SA/SB (½-¾)	in.	7.17	1.77	1.50	2.36	3.1 lb
REG-SA/SB 25-40	mm	237	55	50	70	2.4 kg
REG-SA/SB (1-1½)	in.	9.33	2.17	1.97	2.76	5.3 lb
REG-SB 50	mm	315	60	50	77	3.2 kg
REG-SB (2 in.)	in.	12.4	2.36	1.97	3.03	7.1 lb
REG-SB 65	mm	335	70	50	90	4.8 kg
REG-SB (2½ in.)	in.	13.19	2.76	1.97	3.54	10.6 lb

NOTE:

Specified weights are approximate values only.

Figure 24: REG-SA and REG-SB 15 - 40 in straightway version

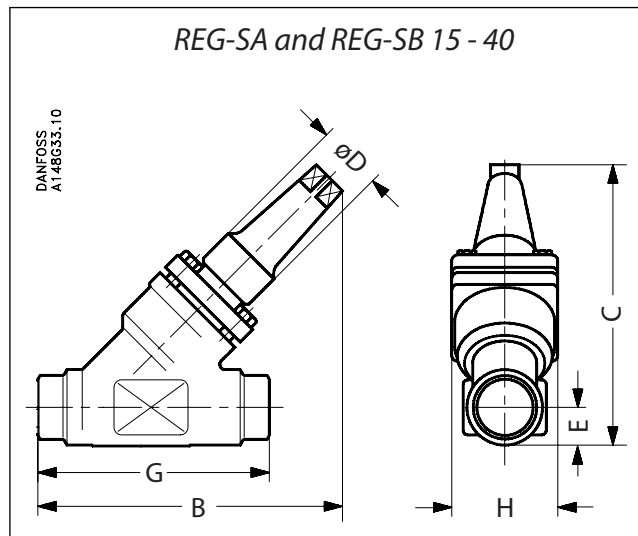


Figure 25: REG-SB 50-65 in straightway version

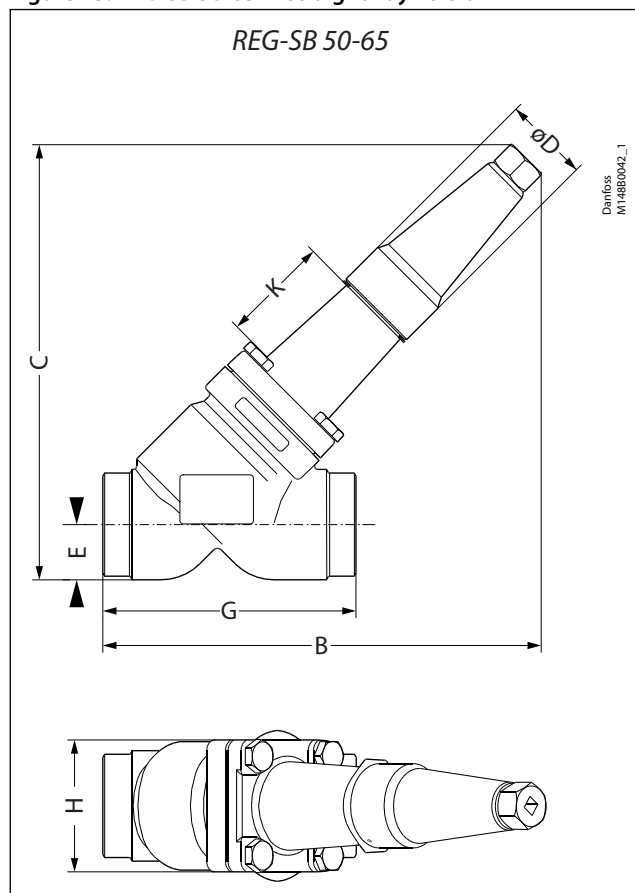


Table 10: REG-SA and REG-SB 15 - 65 in straightway version

Valve size		C	B	E	G	ØD	H	Weight
REG-SA/SB 15-20	mm	145	155	20	120	38	60	2.0 kg
REG-SA/SB (½-¾)	in.	5.71	6.10	0.79	4.72	1.50	2.36	4.4 lb
REG-SA/SB 25-40	mm	200	215	26	155	50	70	3.0 kg
REG-SA/SB (1-1½)	in.	7.87	8.46	1.02	6.10	1.97	2.76	6.6 lb
REG-SB 50	mm	257	250	32	148	50	77	4.2 kg
REG-SB (2 in.)	in.	10.12	10.20	1.26	5.83	1.97	3.03	9.3 lb
REG-SB 65	mm	280	284	40	176	50	90	6.3 kg
REG-SB (2½ in.)	in.	11.02	11.18	1.57	6.93	1.97	3.54	13.9 lb

NOTE:

Specified weights are approximate values only.

Ordering

Table 11: Ordering for REG-SA and REG-SB 65 bar (943 psi) series

Size [DN]	Parts Program										Replacement kit	
	Housing								Top complete		O-ring kit for	
	ANG				STR				REG-SA	REG-SB	R717 Heat Pump ⁽¹⁾	R1270 Propylene
	DIN	ANSI	SD	SA	DIN	ANSI	SD	SA				
10	148B6690	148B6688	148B6723	148B6712	148B6694	148B6692	148B6744	148B6733	148B5761	148B5764	148B6084	148B6085
15	148B6622	148B6612	148B6724	148B6713	148B6642	148B6632	148B6745	148B6734	148B5762	148B5765	148B6070	148B6077
20	148B6623	148B6613	148B6725	148B6714	148B6643	148B6633	148B6746	148B6735	148B5762	148B5765		
25	148B6624	148B6614	148B6726	148B6715	148B6644	148B6634	148B6747	148B6736	148B5763	148B5766		
32	148B6625	148B6615	148B6727	148B6716	148B6645	148B6635	148B6748	148B6737	148B5763	148B5766	148B6096	148B6097
40	148B6626	148B6616	148B6728	148B6717	148B6646	148B6636	148B6749	148B6738	148B5763	148B5766		
50	148B6627	148B6617	148B6718		148B6647	148B6637	148B6739			148B5767		
65	148B6628	148B6618	148B6729	148B6719	148B6648	148B6638	148B6750	148B6740		148B5768		


⁽¹⁾ Replacement kits for R717 Ammonia Heat Pump is applicable for continuous operating temperature between 100 °C to 150 °C (212 °F to 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 12: Pressure Equipment Directive (PED)

	SVL valves are approved according to the European standard specified in the Pressure Equipment Directive and are CE marked.
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For further details / restrictions - see Installation guide.

Table 13: REG-SA and REG-SB

REG-SA and REG-SB		
Nominal bore	DN ≤ 25 mm (1 in.)	DN32-65 mm (1¼ - 2½ in.)
Classified for	Fluid group I	
Category	Article 3, paragraph 3	II

Table 14: Certificates and declarations

File name	Document type	Approval authority
03709-F0 BV	Marine - Safety Certificate	BV
TAP0000002 Rev. 2	Marine - Safety Certificate	DNV GL
EU 033F0685.AK	EU Declaration	Danfoss
MD 033F0691.AE	Manufacturers Declaration	Danfoss
19.10048.266	Marine - Safety Certificate	RMRS

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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