ENGINEERING TOMORROW

Data Sheet

Function module
Type **REG-SA** and **REG-SB**

With butt-weld connection F
Designed for regulation purposes in liquid and expansion lines

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 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 enabling replacement of the spindle seal whilst the valve is active, i.e. under pressure.

Features

- Modular Concept:
  - Each valve housing is available with buttweld F connection and in several different sizes.
  - Possible to convert REG-SA or REG-SB to any other product in the FlexlineTM 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.
- 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.
- Long neck versions (DN 15 to DN 40) for insulated systems available from parts programme.
- ure 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 "DIRcalc ™" (Danfoss Industrial Refrigeration calculation programme).
- 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

Applicable to HCFC, HFC, R717 (Ammonia) and R744 (CO_2). For further information refer to the product instruction for REG-SA and REG-SB.

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.

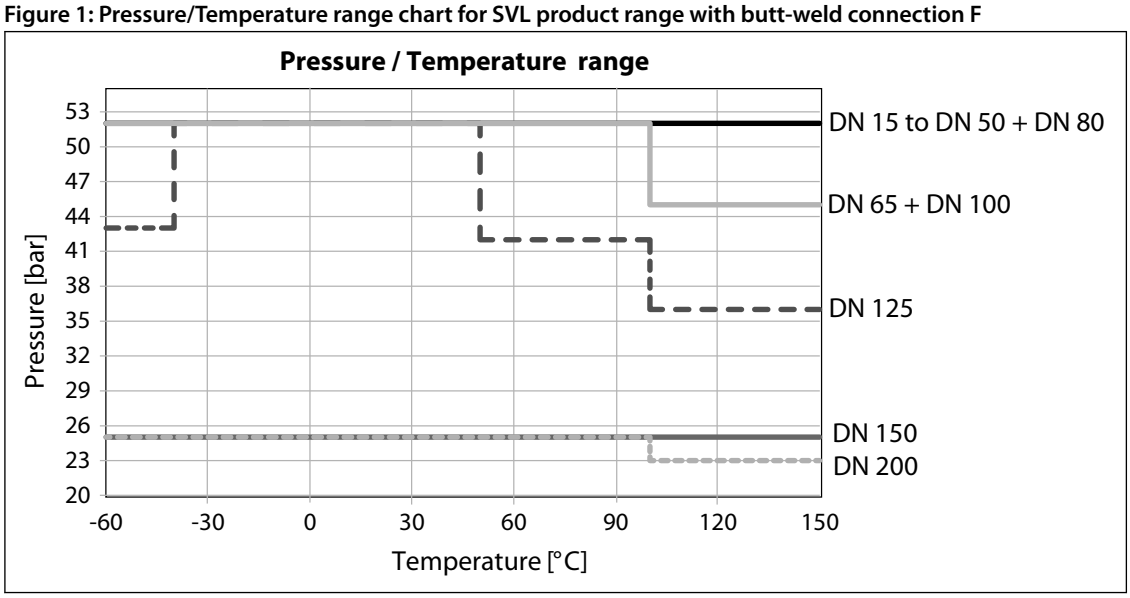
Product specification

Pressure and temperature data

Table 1: Technical data

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

Figure 1: Pressure/Temperature range chart for SVL product range with butt-weld connection F



For valve sizes DN 15 to DN 50 and DN 80:
52 bar (754 psig) at -60 °C to +150 °C (-76 °F to +302 °F).

For valve sizes DN 65 and DN100:
52 bar (754 psig) at -60 °C to +100 °C (-76 °FF to +212 °F),
45 bar (652 psig) at +100 °C to +150 °C (+212 °F to +302 °F).

For valve size DN 125:
52 bar (754 psig) at -40 °C to +50 °C (-40 °F to +122 °F)
43 bar (623 psig) at -60 °C to -40 °C (- 76 °F to -40 °F),
42 bar (609 psig) at +50 °C to +100 °C (+122 °F to +212 °F),
36 bar (522 psig) at +100 °C to+150 °C (+212 °F to +302 °F).

For valve size DN 150:
25 bar (362 psig) at -60 °C to +150 °C (-76 °F to +302 °F).

For valve size DN 200:
25 bar (362 psig) at -60 °C to +100 °C (-76 °F to +212 °F),
23 bar (333 psig) at +100 °C to +150 °C (+212 °F to +302 °F).

SVL housings with other connection types (DIN, ANSI, SOC and thread) are approved for a maximum working pressure of 52 bar (754 psig) at –60 °C to +150 °C (–76 °F to +302 °F) for all sizes.

The reduced pressure in some of the SVL housings with connection type F is caused by the welding onto stainless steel pipes with reduced pipe size.

Table 2: Pressure/Temperature range chart for SVL product range with butt-weld connection F

Size [DN]	SVA-S				SVA-L				SCA-X	CHV-X	FIA		REG-SA	
	ANG		STR		ANG		STR		ANG	ANG	ANG	STR	ANG	STR
	H-WHEEL	CAP	H-WHEEL	CAP	H-WHEEL	CAP	H-WHEEL	CAP	CAP	CAP	CAP	CAP	CAP	CAP
15	X	X	X	X	X	X	X	X	X	X	X	X	X	X
20	X	X	X	X	X	X	X	X	X	X	X	X	X	X
25	X	X	X	X	X	X	X	X	X	X	X	X	X	X
32	X	X	X	X	X	X	X	X	X	X	X	X	X	X
40	X	X	X	X	X	X	X	X	X	X	X	X	X	X
50	X	X	X	X					X	X	X	X		
65	X	X	X	X					X	X	X	X		
80	X	X	X	X					X	X	X	X		
100	X	X	X	X					X	X	X	X		
125	X	X	X	X					X	X	X	X		
150	X	X	X	X							X	X		
200	X	X	X	X							X	X		

Connections

Figure 2: "F" Connection

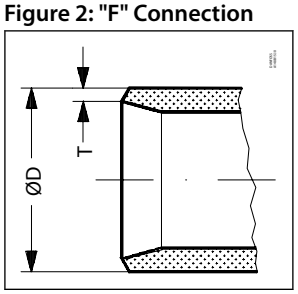


Table 3: Butt-weld connection type F

Size	Size	ØD	T	ØD	T	Cone
mm	in.	mm	mm	in.	in.	
15	½	21.3	2	0.839	0.079	A and B
20	¾	26.9	2	1.059	0.079	
25	1	33.7	2	1.327	0.079	A and B
32	1¼	42.4	2	1.669	0.079	
40	1½	48.3	2	1.902	0.079	
50	2	60.3	2	2.37	0.079	B
65	2½	76.1	2	3	0.079	B

Available with the following connections:

- Butt-weld connection "F"
  - DN 15 to 65 size: 2mm thick

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

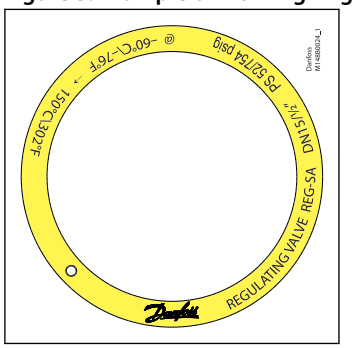
The spindle is made of polished stainless steel, which is ideal for O-ring sealing.

Packing gland - REG-SA and REG-SB
The “full temperature range” packing gland ensures perfect tightness in the whole range: -60/+150 °C (-76/+302 °F). The packing glands are equipped with a scraper ring to prevent penetration of dirt and ice.

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 3: Example of marking ring, REG-SA



Computation and selection

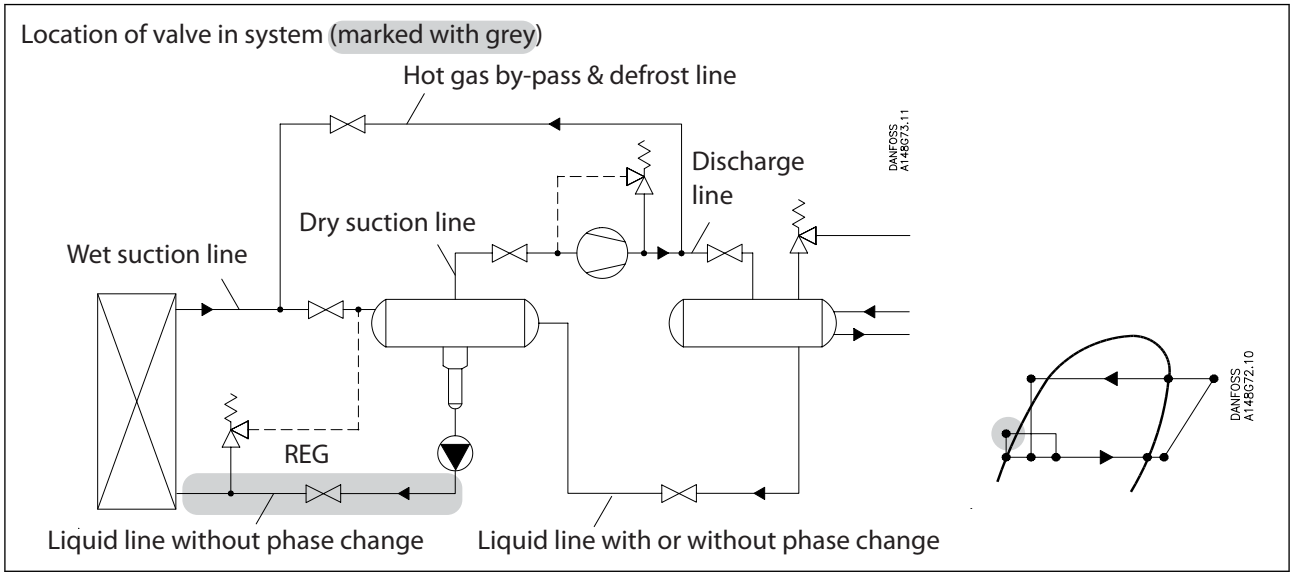
Introduction
In refrigeration plants, regulating valves are primarily used in liquid lines in order to regulate the flow of refrigerant. The valves can, however, also be used as expansion valves. From a calculation point of view the two fields of application are very different.

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).

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).
Location of valve in system (marked with grey)

Figure 4: Computation and selection



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 - 5).

Table 4: Units

SI-units	Imperial units
Mass flow: $K_V = \frac{G}{\sqrt{\rho \times 1000 \times \Delta p}} = G \times C_A \left[m^3/h\right]$	Mass flow: $C_V = \frac{0.95 \times G}{\sqrt{\rho \times \Delta p}} = 31.6 \times G \times C_A \left[US_{gal/min}\right]$
Volume flow: $K_V = \frac{V}{\sqrt{\frac{1000 \times \Delta p}{\rho}}} \left[m^3/h\right]$	Volume flow: $C_V = \frac{0.127 \times V}{\sqrt{\frac{\Delta p}{\rho}}} \left[US_{gal/min}\right]$

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 (fig. 11).
C_v [US $_{gal/min}$]	owing 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/ft_3]	Density of the refrigerant before the valve
C_A	Calculation factor (fig. 11).

Figure 5: REG-SA 15-20 and REG-SB 15-20

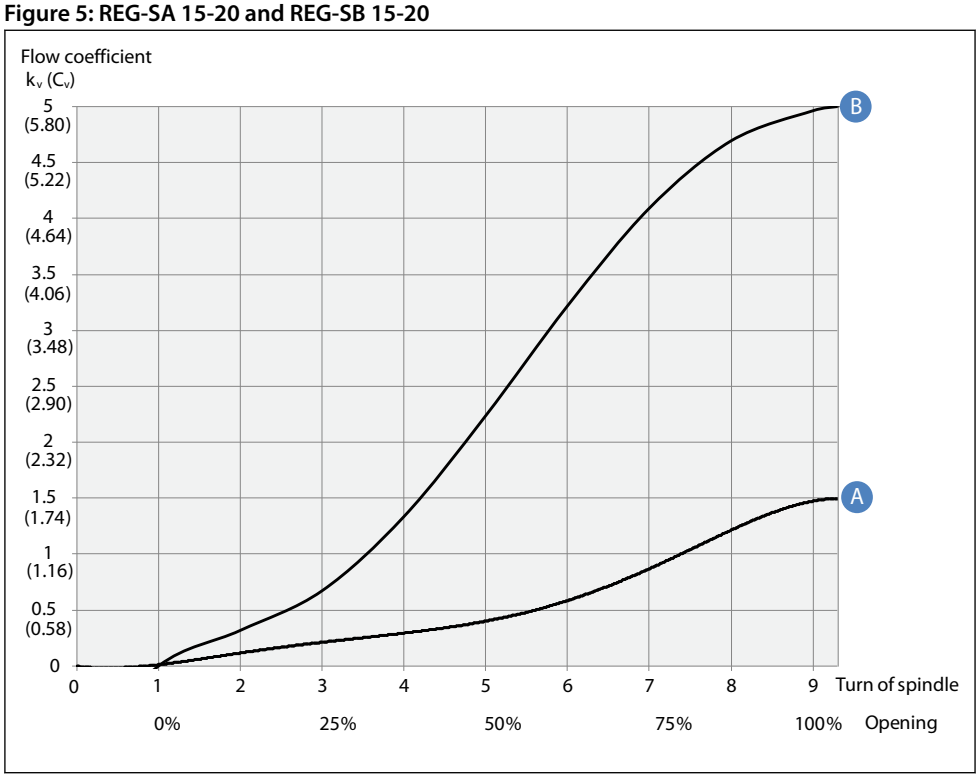


Figure 6: REG-SA 25-40 and REG-SB 25-40

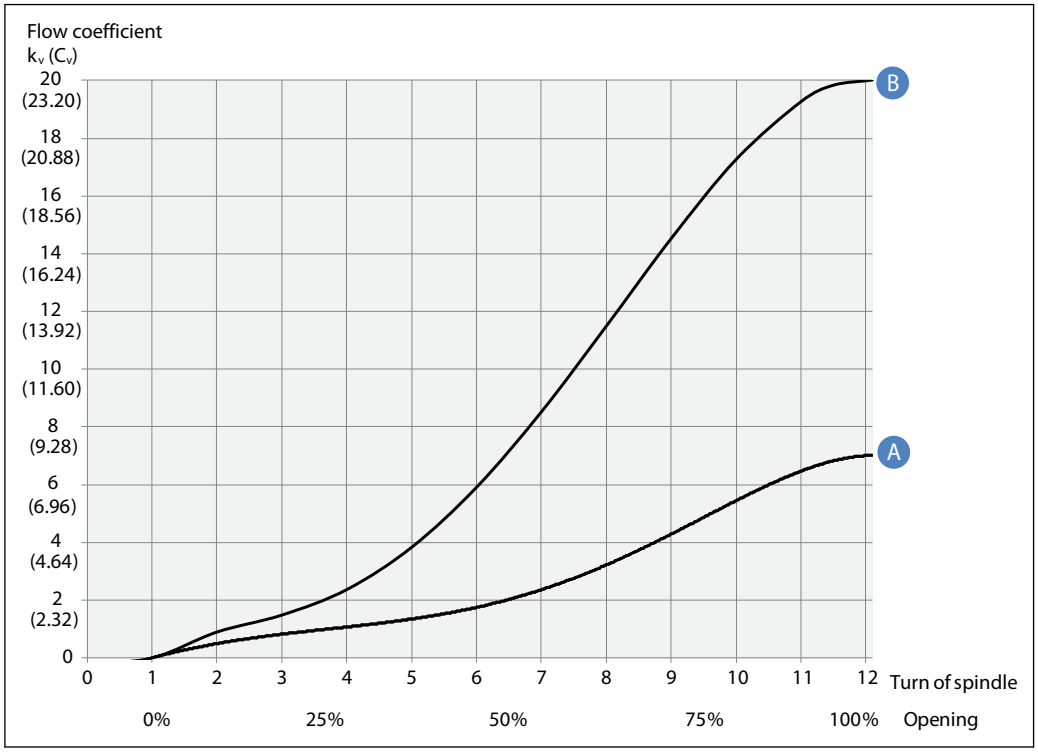


Figure 7: REG-SB 50

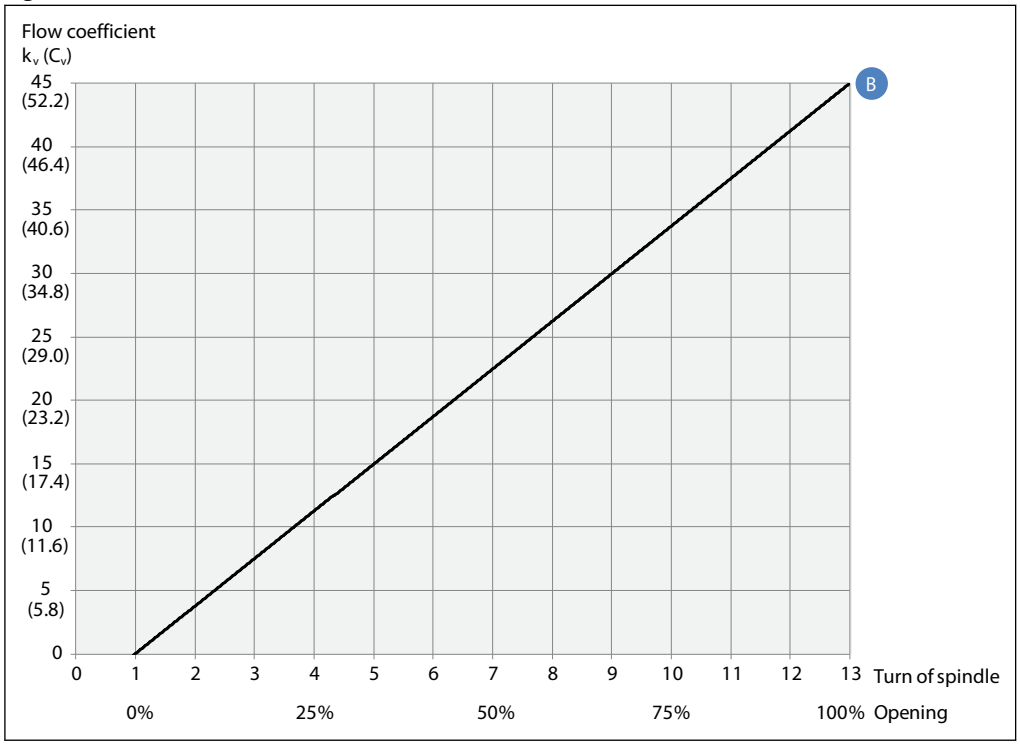
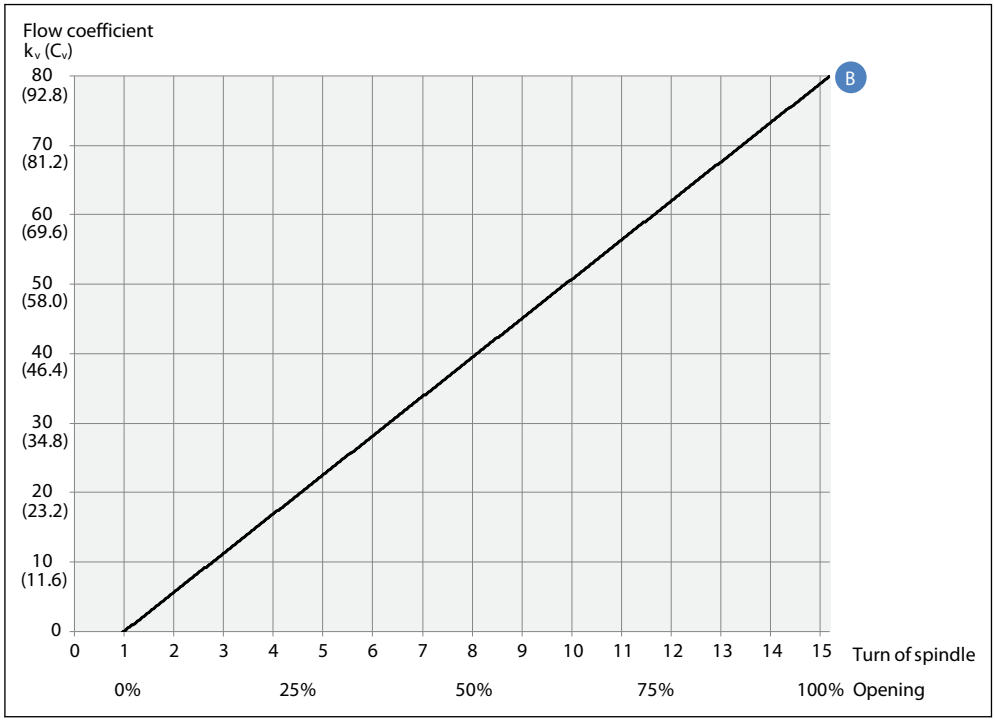


Figure 8: REG-SB 65



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

Figure 9: REG-SA 15-20 and REG-SB 15-20

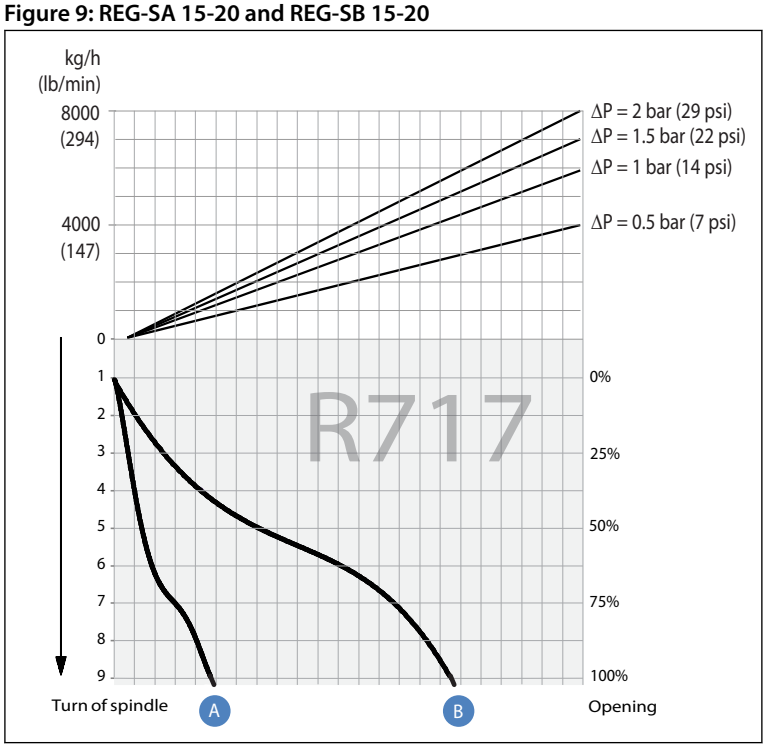
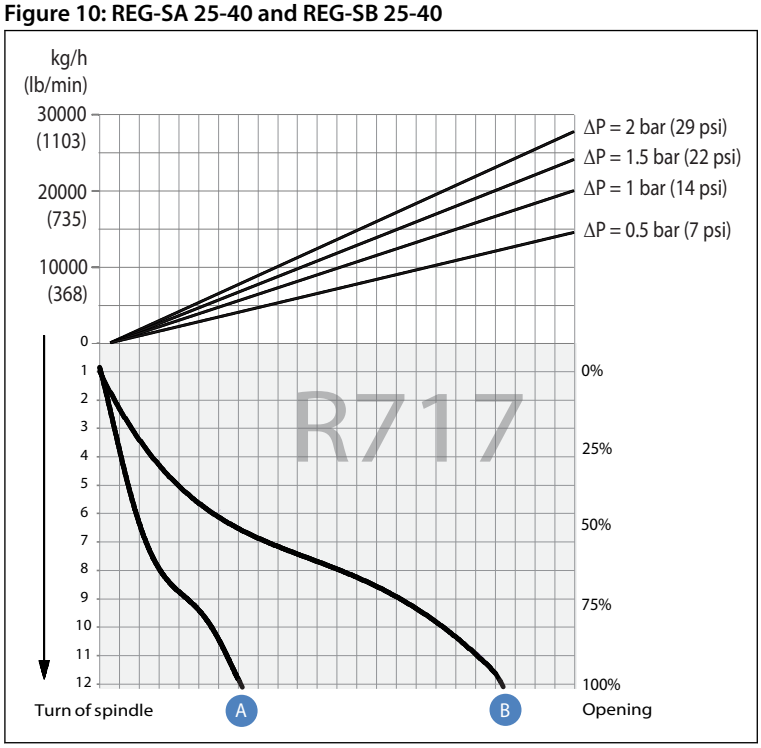


Figure 10: REG-SA 25-40 and REG-SB 25-40



For choice of valve size and connection see "Connections".
Liquid R 717, density: 670 kg/m^3 [42 lb/ft^3]

Figure 11: REG-SB 50

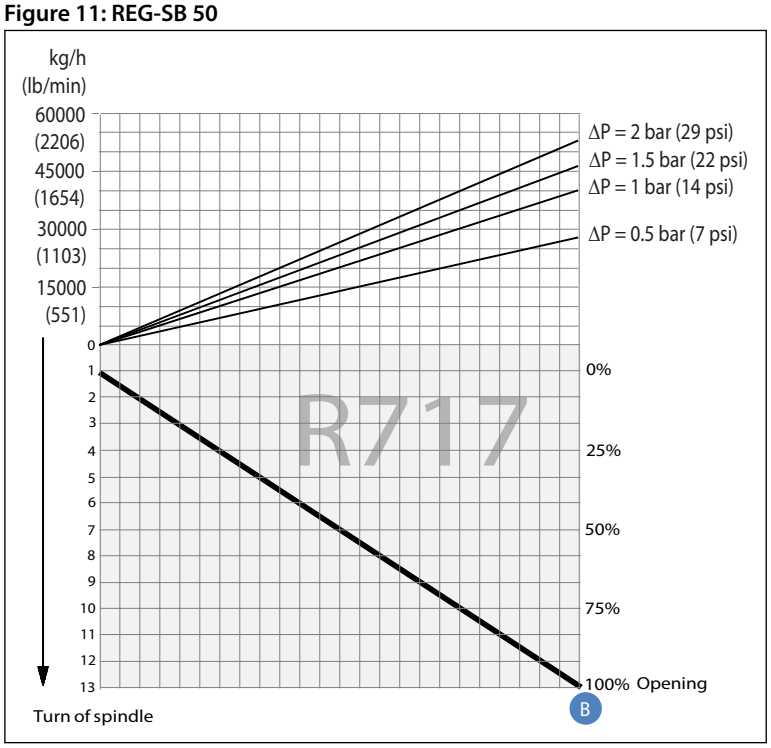
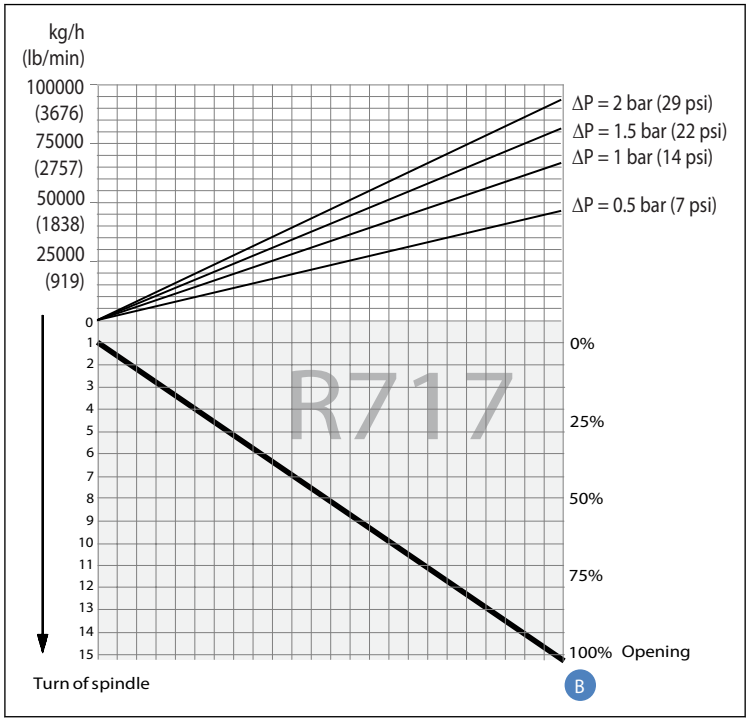
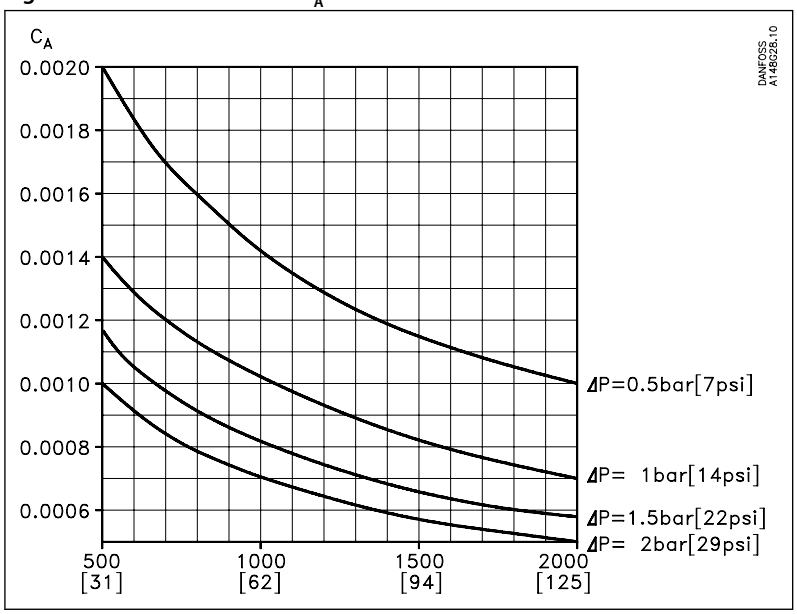


Figure 12: REG-SB 65



For choice of valve size and connection see "Connections".
Liquid R 717, density: 670 kg/m^3 [42 lb/ft^3]

Figure 13: Calculation factor C_A



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

Table 5: Example 1

Features	Description
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/m^3), and there must be no build-up of flash gas in the valve.

Figure 14: Flow rate diagram - REG-SA 15-20 and REG-SB 15-20

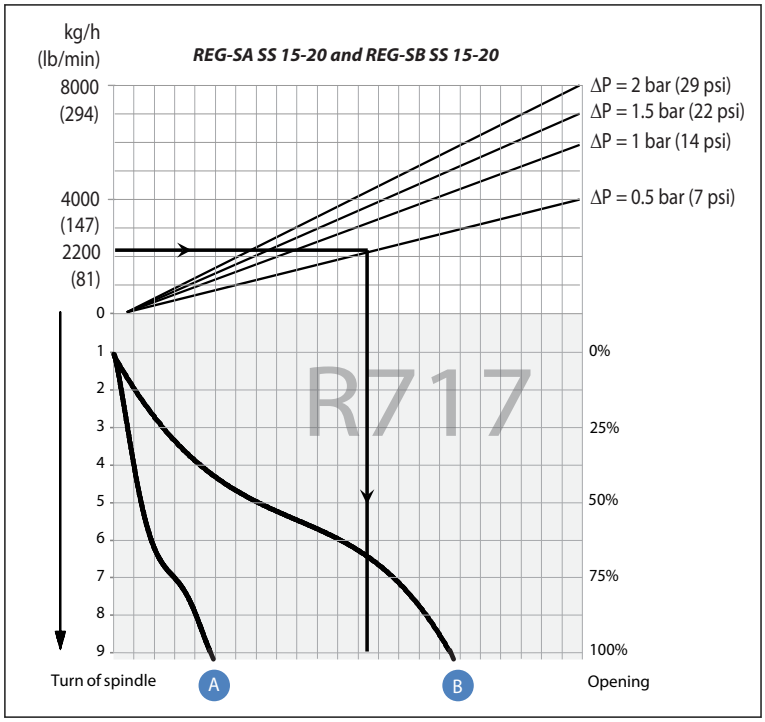


Table 6: Example 2

Features	Description
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. 5 - 8) as the refrigerant in question is not included.

Use the curves of the kv-values instead (fig. 1 - 4) and calculate the required kv by means of the formulas in the "Introduction" passage at the beginning of this chapter. Alternatively calculate the kv-values by means of the calculation factor C_A (fig. 11) and the flow rate diagram (in this example: fig. 12) 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]
$k_v = 3.56$ [m3/h]

Figure 15: Calculation factor C_A

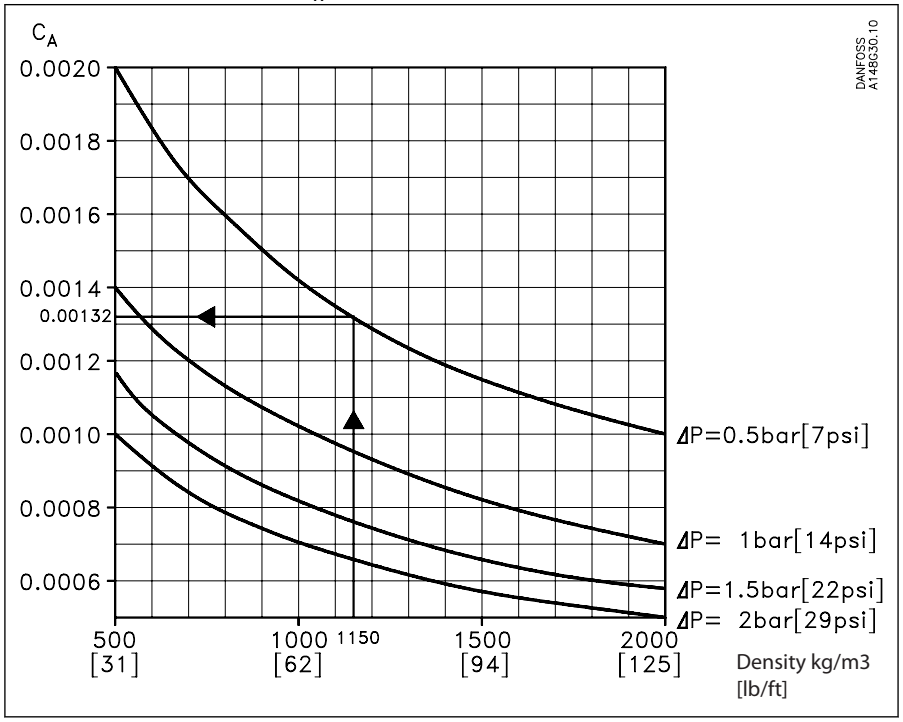
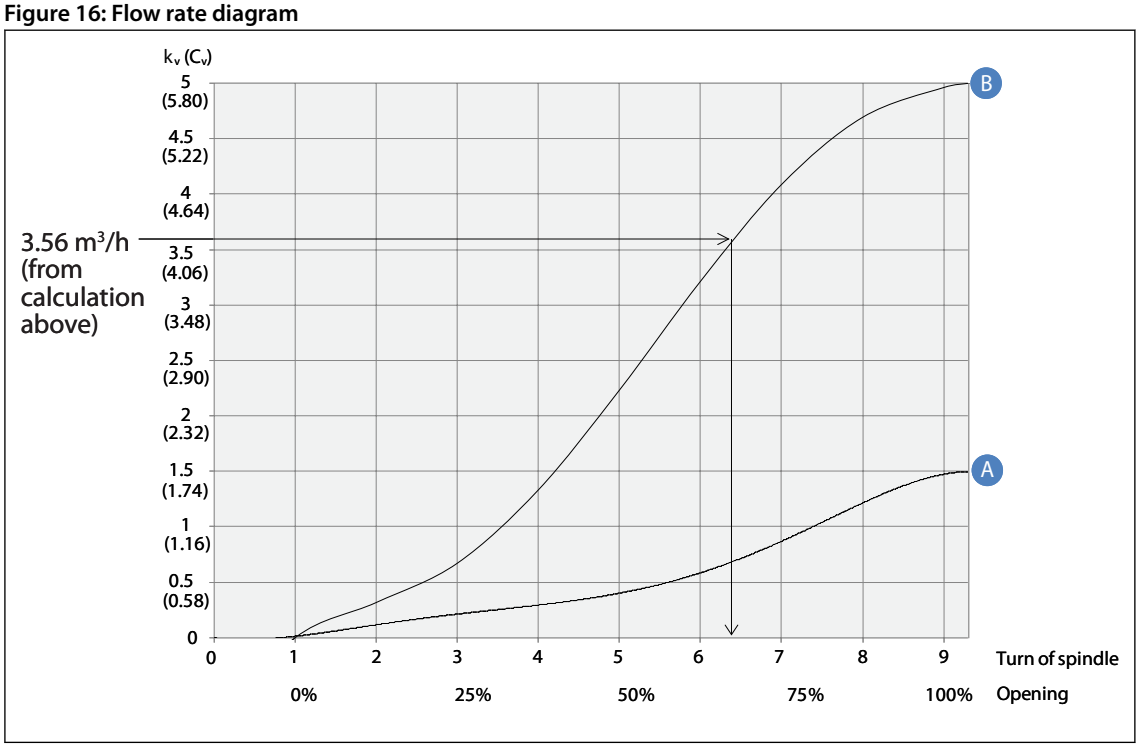


Figure 16: Flow rate diagram



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

Material specification

Table 7: Specifications

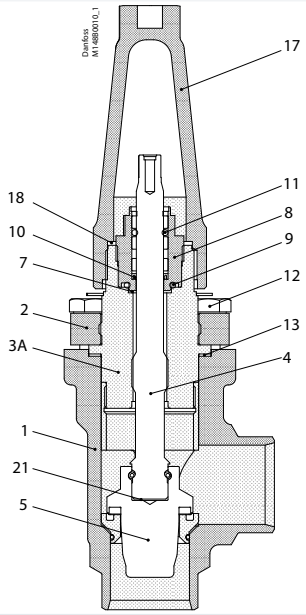
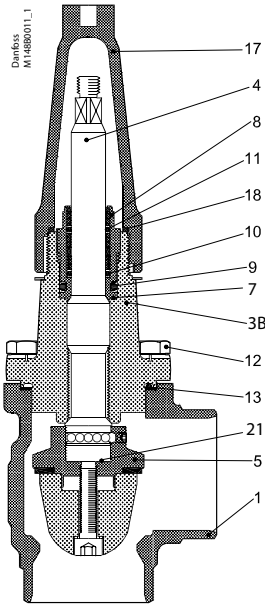
REG-SA and REG-SB 15 - 40	REG-SA and REG-SB 50 - 65
	

Table 8: Material specification

No.	Part	Material	EN	ISO	ASTM
1	Housing	Steel	G20Mn5QT, 10213-3		LCC, A352
			P285QH+QT, 10222-4		LF2, A350
2	DN 15 - 40 (½ - 1½ in.)– Bonnet, Flange	Steel	P275NL1 or 2 EN10028-3		A, A662
3A	DN 15 - 40 (3/8 - 1½ in.)– Bonnet, Insert	Steel	11SMn3010087	Type 2, R 683-9	1213
					SAE J403
3B	DN 50 - 65 (2 - 2½ in.)– Bonnet, Flange	Steel	P285QH+QT 10222-4		LF2 A350
4	Spindle DN 15 - 65 (¼ - 2½ in.)	Stainless steel	X8CrNiS 18-9, 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

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

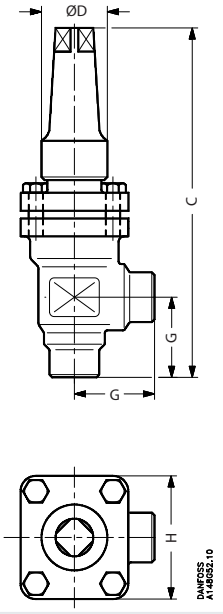
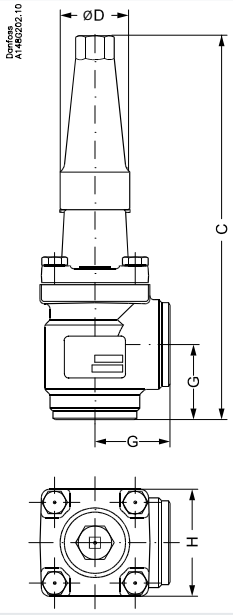
REG-SA and REG-SB 15 - 40	REG-SB 50 - 65
	

Table 10: Dimensions and weights

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	1.5	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
REG-SA/SB 32 SOC	mm	275	62	50	70	2.9 kg
REG-SA/SB (1¼ in.) SOC	in.	10.83	2.44	1.97	2.76	6.4 lb
REG-SA/SB 40 SOC	mm	275	62	50	70	2.9 kg
REG-SA/SB (1½ in.)	in.	10.83	2.44	1.97	2.76	6.4 lb
SOC REG-SB 50 SOC	mm	320	65	50	77	4.1 kg
REG-SB (2 in.) SOC	in.	12.6	2.56	1.97	3.03	9.0 lb

Specified weights are approximate values only.

Table 11: REG-SA and REG-SB 15 - 65 in straightway version

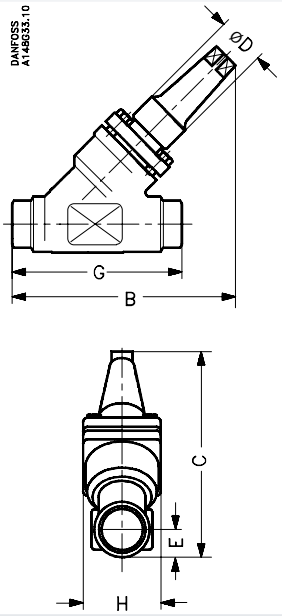
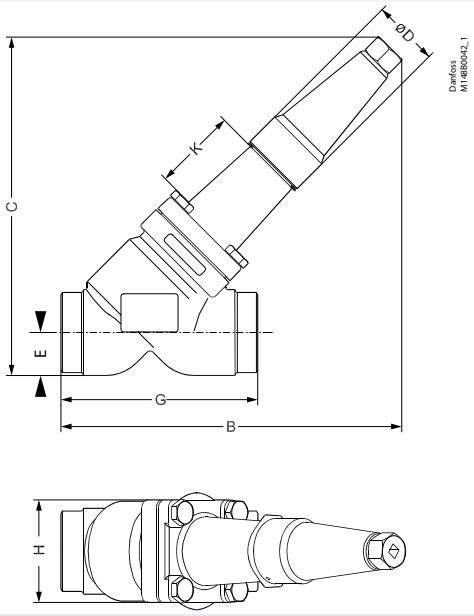
REG-SA and REG-SB 15 - 40	REG-SB 50-65
	

Table 12: Dimensions and weights

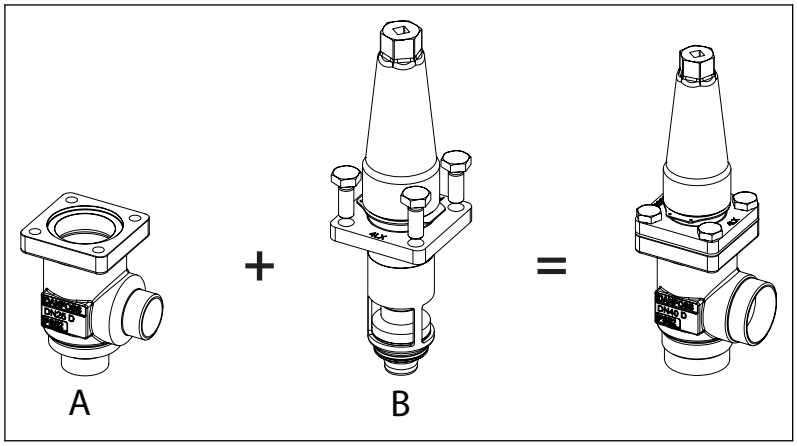
Valve size		C	B	E	G	∅D	H	Weight
REG-SA/SB 15-20	mm	145	155	20	120	38	60	2.0 kg
REG-SA/SB (½ - ¾)	in.	5.71	6.1	0.79	4.72	1.5	2.36	4.4 lb
REG-SA/SB 25-40	mm	200	215	26	155	50	70	3.0 kg
REG-SA/SB (1-1½)	in.	7.87	8.46	1.02	6.1	1.97	2.76	6.6 lb
REG-SB 50	mm	257	250	32	148	50	77	4.2 kg
REG-SB (2 in.)	in.	10.12	10.2	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
REG 32 SOC	mm	209	222	27.4	155	50	70	3.0 kg
REG (1¼) SOC	in.	8.23	8.74	1.08	6.1	1.97	2.76	6.6 lb
REG 40 SOC	mm	213	222	31	155	50	70	3.0 kg
REG (1½) SOC	in.	8.39	8.74	1.22	6.1	1.97	2.76	6.6 lb
REG-SB 50 SOC	mm	261	266	37	162	50	77	5.1 kg
REG-SB (2 in.) SOC	in.	10.28	10.47	1.26	6.38	6.38	3.03	11.2 lb

Specified weights are approximate values only.

Ordering

Ordering REG-SA/SB from the parts programme

Figure 17: Example (select from table 1 and 2)



A	Valve housing, size 25 (1 in.), butt weld F, angleway, **148B6416**, Table 1
B111	Top part, REG-SA, size 25 (1 in.) **148B5480**, Table 2

Table 13: SVL valve housings w/different connections (Table 1)

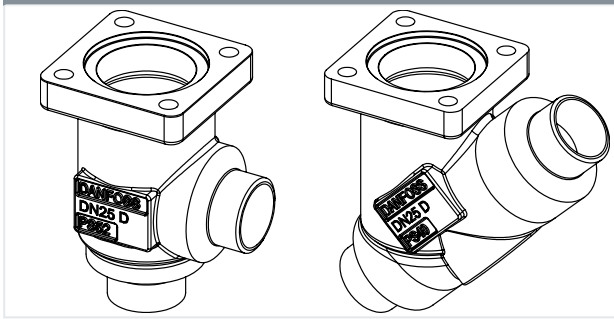
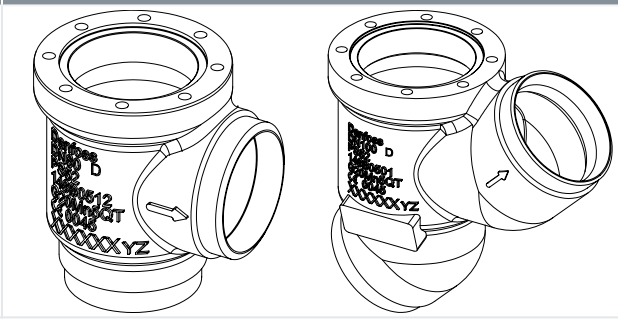
DN 15-65 mm (½ - 2½ in.)	DN 80-125 mm (3 - 5 in.)
	

Table 14: SVL valve housings w/different connections (Table 1)

Sizes [DN]		DN 15-65 mm (½ - 2½ in.)	DN 80-125 mm (3 - 5 in.)
		Valve Housing SVL	
		Butt weld F	
mm	in.	ANG	STR
15	½	148B6414	148B6424
20	¾	148B6415	148B6425
25	1	148B6416	148B6426
32	1¼	148B6417	148B6427
40	1½	148B6418	148B6428
50	2	148B6419	148B6429
65	2½	148B6420	148B6430

Table 15: SVA complete top part including gaskets and bolts (Table 2)

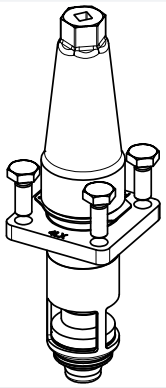
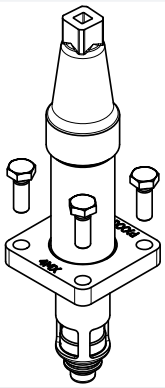
REG-SA/SB 15-65	REG-LA/LB 15-40
	

Table 16: SVA complete top part including gaskets and bolts (Table 2)

Sizes [DN]		Complete top part			
mm	in.	REG-SA	REG-SB	REG-LA	REG-LB
15	½	148B5280	148B5281	148B6401	148B6402
20	¾				
25	1	148B5480	148B5481	148B6403	148B6404
32	1¼				
40	1½				
50	2		148B5734		
65	2½		148B5824		

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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.

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Pressure Equipment Directive (PED)

FIA strainers are approved in accordance with the European standard specified in the Pressure Equipment Directive and are CE marked. For further details / restrictions - see Installation Instruction.

Table 17: Pressure Equipment Directive (PED)

SCA-X/CHV-X valves			
Nominal bore	DN = < 25 mm (1 in.)	DN32-80 mm (1¼ - 3 in.)	DN100 - 125 mm (4 - 5 in.)
Classified for		Fluid group I	
Category	Article 3, paragraph 3	II	III

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