ENGINEERING
TOMORROW

Data Sheet

Check and stop valve
Type **SCA-X** and **CHV-X**

With butt-weld connection F
Designed to open at very low differential pressures

SCA-X are check valves with a built-in stop valve function. CHV-X are check valves only. SCA-X/ CHV-X are available in angleway versions. The valves are designed to open at very low differential pressures, allow favourable flow conditions and are easy to disassemble for inspection and service.

The SCA-X is equipped with vented cap and has internal backseating enabling the spindle seal to be replaced whilst the valve still under pressure. Laser cut V-ports provide excellent opening characteristics (SCA-X/CHV-X 50-125).

The valve cone has a built-in flexibility to ensure a precise and tight closing towards the valve seat. A well balanced dampening effect between the piston and the cylinder gives an optimal protection during low loads and against pulsations.A well balanced dampening effect between the piston and the cylinder gives an optimal protection during low loads and against pulsations.

Features

- Modular Concept:
  - Each valve housing is available with buttweld F connection and in several different sizes.
  - Possible to convert SCA-X or CHV-X to any other product in the FlexlineTM SVL family (regulating valve, shut-off 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 open at a very low differential pressure of 0.04 bar (0.58 psig).
- Designed with a built-in damping chamber preventing valve flutter in case of low refrigerant velocity and/or low density.
- Each valve is clearly marked with type, size and performance range.
- Easy to disassemble for inspection and service.
- Internal backseating enables replacement of the spindle seal whilst the valve is active, i.e. under pressure.
- Optimal flow characteristics ensuring quick opening to the fully open position.
- Protection against pulsation by built-in damping facility.
- Housing and bonnet material is low temperature steel according to requirements of the Pressure Equipment Directive and other international classification authorities.
- Equipped with Stainless steel bolts.
- Classification: DNV, CRN, BV, EAC etc. To get an updated list of certification on the products please contact your local Danfoss Sales Company.

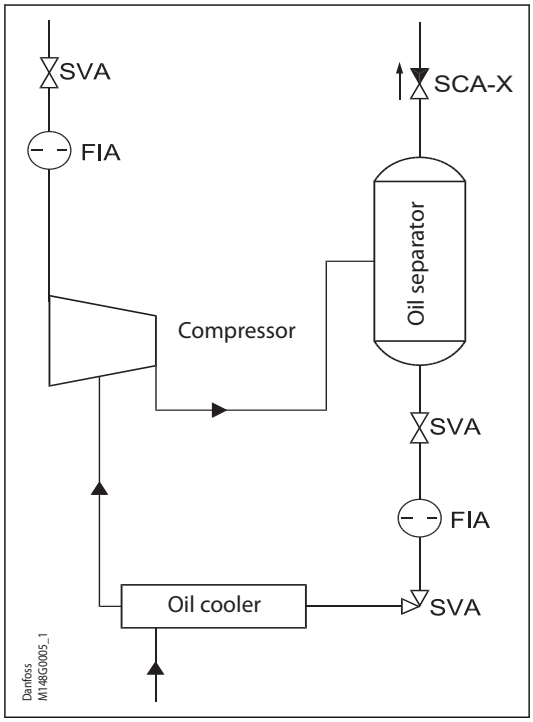
Applications

Application

Below diagram shows the check & stop valve SCA-X in the discharge line of a screw compressor unit. The SCA-X valve in the discharge line prevents “back condensation” in the oil separator as well as pressure equalising through the compressor.

Compared to an ordinary stop and check valve arrangement the combined stop/check valve solution, as shown, is easier to install and has lower flow resistance. Installation of the SCA-X/CHV-X in the economizer line is not recommended.

Figure 1: Flow diagram



Media

Refrigerants

Applicable to HCFC, HFC, R717 (Ammonia) and R744 (CO_2). For further information refer to the product instruction for SCA-X/CHV-X.

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.

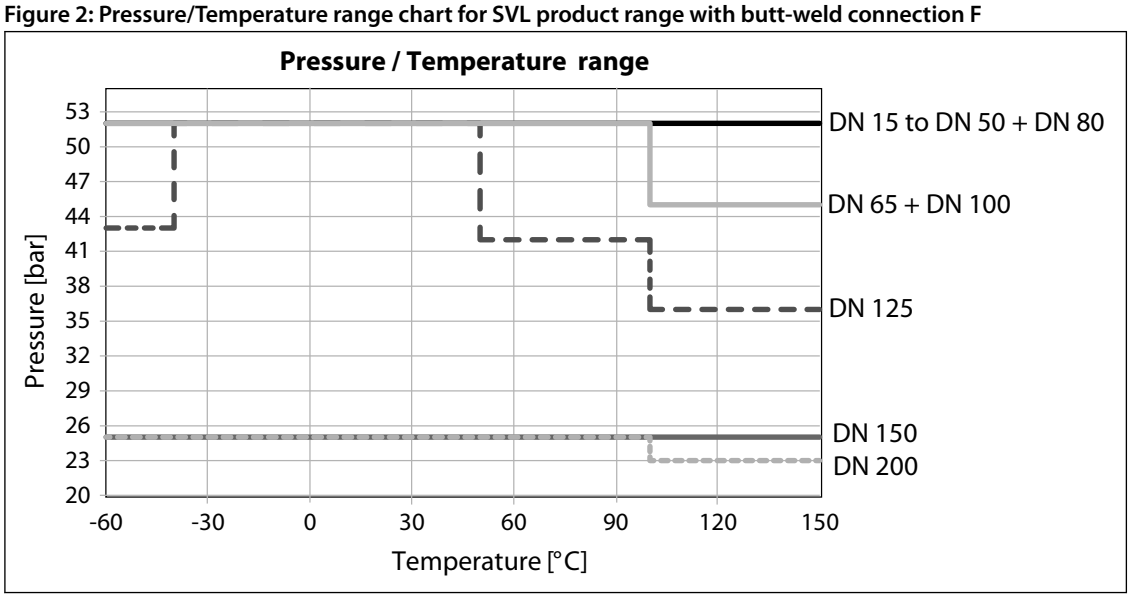
Product specification

Pressure and temperature data

Table 1: Pressure and temperature data

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

Figure 2: 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.

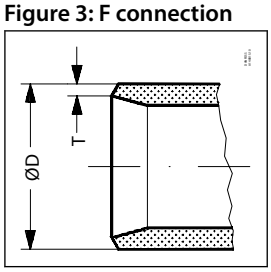
The reduced pressure in some of the SVL housings with connection type F is caused by the welding onto stainless steel pipes with reduced pipe size.

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		REG-SB	
	ANG		STR		ANG		STR		ANG	ANG	ANG	STR	ANG	STR	ANG	STR
	H-WHEEL	CAP	H-WHEEL	CAP	H-WHEEL	CAP	H-WHEEL	CAP	CAP	CAP	CAP	CAP	CAP	CAP	CAP	CAP
15	X	X	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	X	X
25	X	X	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	X	X
40	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
50	X	X	X	X					X	X	X	X			X	
65	X	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 3: F connection



Size	Size	øD	T	øD	T	k_v-angle m^3/h	C_v-angle $US_{gal/min}$
mm	in.	mm	mm	in.	in.		
15	½	21.3	2	0.839	0.079	8	9.3
20	¾	26.9	2	1.059	0.079	10	11.6
25	1	33.7	2	1.327	0.079	24	27.8
32	1¼	42.4	2	1.669	0.079	30	34.8
40	1½	48.3	2	1.902	0.079	30	34.8
50	2	60.3	2	2.37	0.079	45	53
65	2½	76.1	2	3	0.079	72	85
80	3	90.9	3	3.579	0.118	103	129
100	4	116.3	3	4.579	0.118	196	232
125	5	141.7	3	5.579	0.118	301	356

Connections

Available with the following connections:

- Butt-weld connection "F" :
  - DN 15 to 65 size: 2 mm thick
  - DN 80 -125 size: 3 mm thick

Design

Housing

The housing is made from special, cold resistant steel.

Valve cone

Valve cone with built in metallic stop - prevents damage to teflon ring in case of overtightening.

Damping chamber

The chamber is filled with refrigerants (gas or liquid), which provides a damping effect when the valve opens and closes.

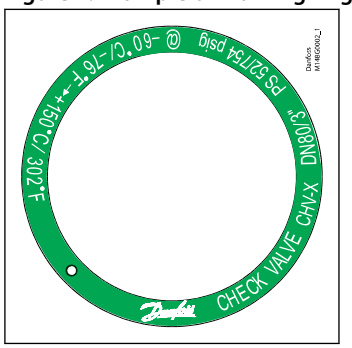
Spindle (SCA-X)
Made of polished stainless steel, which is ideal for O-ring sealing.

Packing Gland (SCA-X)
The “full temperature range” packing gland is the standard for the entire SVL platform.

This ensures perfect tightness throughout the whole temperature range: -60/+150 °C (-76/+302 °F).

Installation

Figure 4: Example of marking ring, CHV-X



The valve must be mounted vertically with the cone downwards. The valve is designed to resist very 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 instructions for SCA-X/CHV-X. If cold refrigeration oil having low viscosity enters and settles in the damping chamber, problems with the check valve may arise. Consequently, it may be necessary to modify the valve for more viscous liquids by enlarging the hole to the damping chamber.

Computation and selection

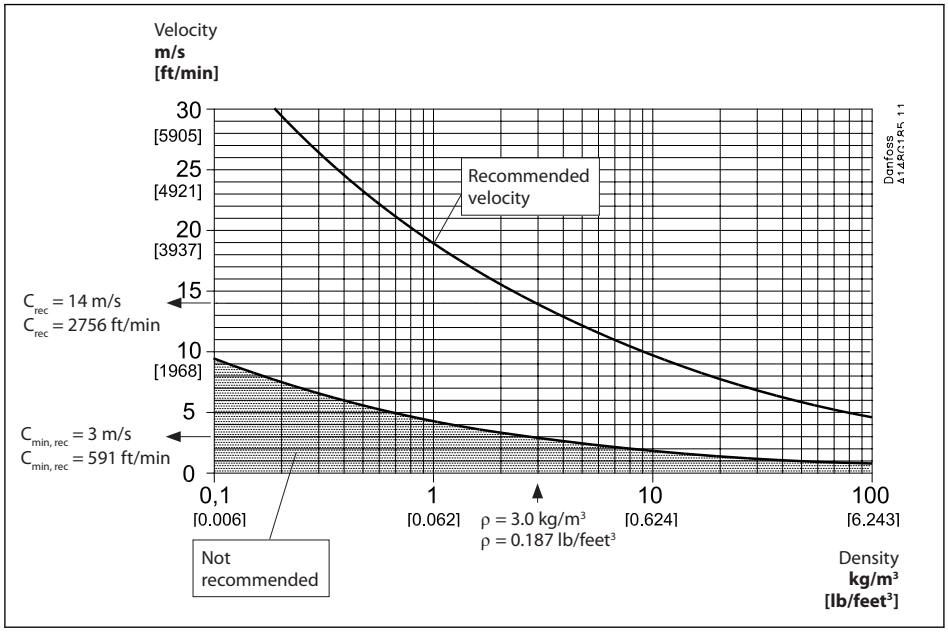
Introduction
When dimensioning SCA-X/CHV-X, it is important to select a valve that is best suited to all operating conditions. Therefore, it is necessary to consider both the nominal and part load working conditions.

The SCA-X/CHV-X valve can be calculated in two ways:
- Using the tables below.
- Using DIRcalc version 1.14 or higher.

Table 3: Example

SI-Units	US-Units
Assumed working conditions: Maximum flow V = 1000 m^3/h Density ρ = 3.0 kg/m^3 Minimum part load = 33%	Assumed working conditions: Maximum flow V = 1160 gpm Density ρ = 0.187 $lb/feet^3$ Minimum part load = 33%
Used expressions: Recommended velocity - C_{rec} [m/s] Minimum recommended velocity - $C_{min, rec}$ [m/s] Maximum velocity - C_{max} [m/s] Part load velocity - C_{part} [m/s]	Used expressions: Recommended velocity - C_{rec} [ft/min] Minimum recommended velocity - $C_{min, rec}$ [ft/min] Maximum velocity - C_{max} [ft/min] Part load velocity - C_{part} [ft/min]
We know the density ρ ≈ 3.0 kg/m^3, consequently C_{rec} as well as C_{min}, rec can be found in the figure below (standard valve).	We know the density ρ ≈ 0.187 $lb/feet^3$, consequently C_{rec} as well as $C_{min, rec}$ can be found in the figure (standard valve).
C_{rec} ≈14 m/s $C_{min', rec}$ ≈ 3 m/s	C_{rec} ≈ 2756 ft/min $C_{min, rec}$ ≈ 591 ft/min

Figure 5: Computation and selection



Knowing that V = 1000 m^3/h (1160 gpm) fig. 2 gives the following choices:
For SCA-X/CHV-X in size DN 100 the maximum velocity $C_{max} \approx 31$ m/s (6100 ft/min)
For SCA-X/CHV-X in size DN 125 the maximum velocity $C_{max} \approx 20$ m/s (3900 ft/min)

In conclusion SCA-X in size DN 125 is selected because $C_{max} \approx 20$ m/s (3900 ft/min) comes nearest to the recommended velocity $C_{rec} \approx 14$ m/s (2756 ft/min) and at the same time part load conditions fulfil the requirements, as described:

We know that $C_{max} \approx 20$ m/s (3900 ft/min) and that minimum part load is 33%. It follows that $C_{part} \approx 6.5$ m/s (1290 ft/min). Thus, C_{part} (6.5 m/s) > C_{min}, rec (3.0 m/s) and the selected SCA-X model DN125 is the perfect choice.

If the valve in question (for instance under part load conditions) provides a velocity less than $C_{min, rec}$ the valve might start hammering and become noisy. As a result the valve may wear prematurely.

Figure 6: DN 15 - 40

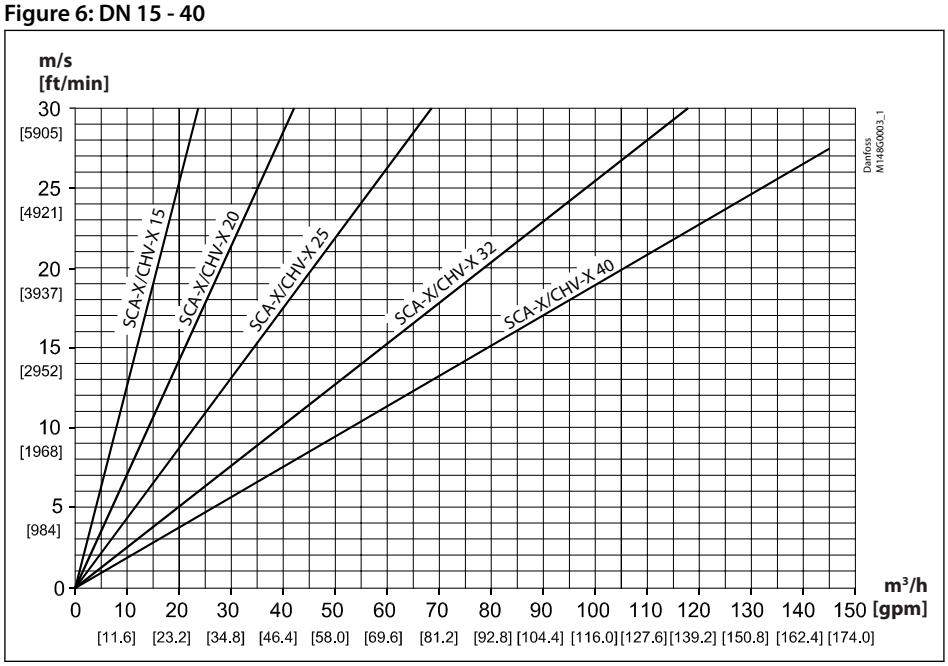
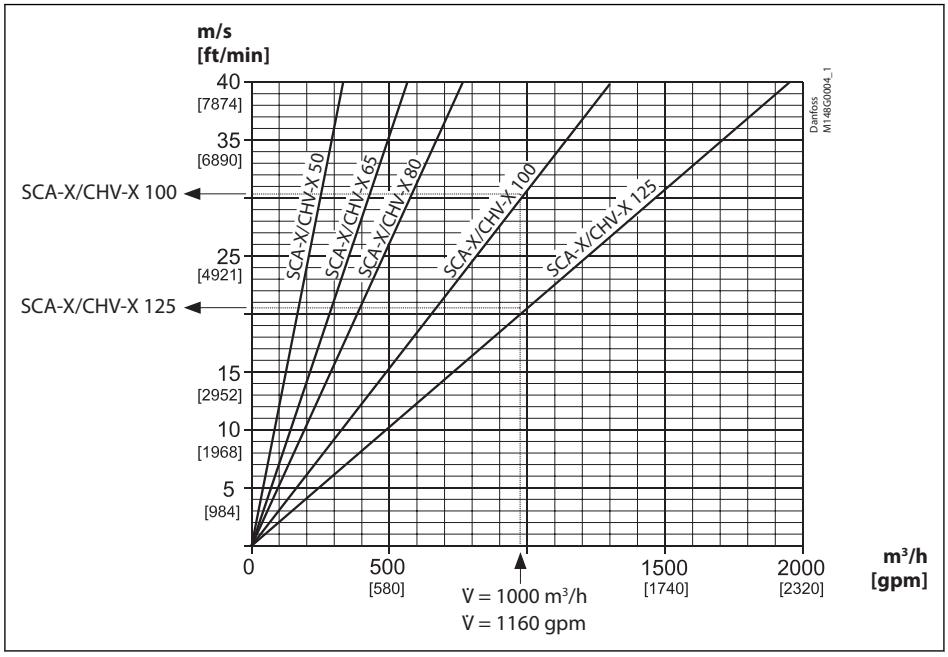


Figure 7: DN 50 - 125



Material specification

Table 4: SCA-X 15 - 40 and CHV-X 15 - 40

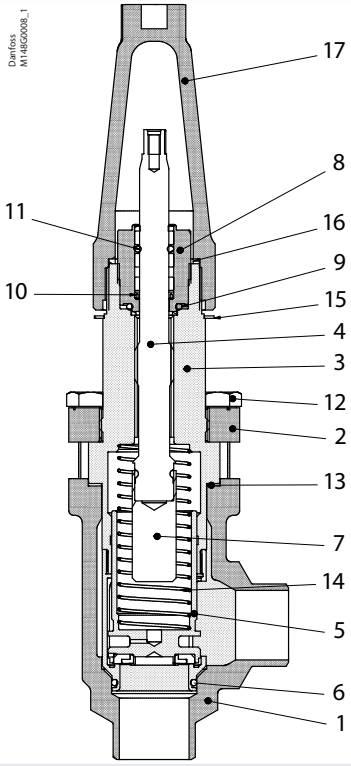
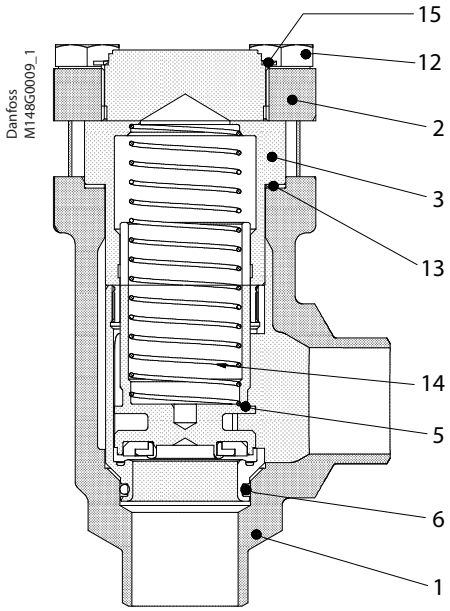
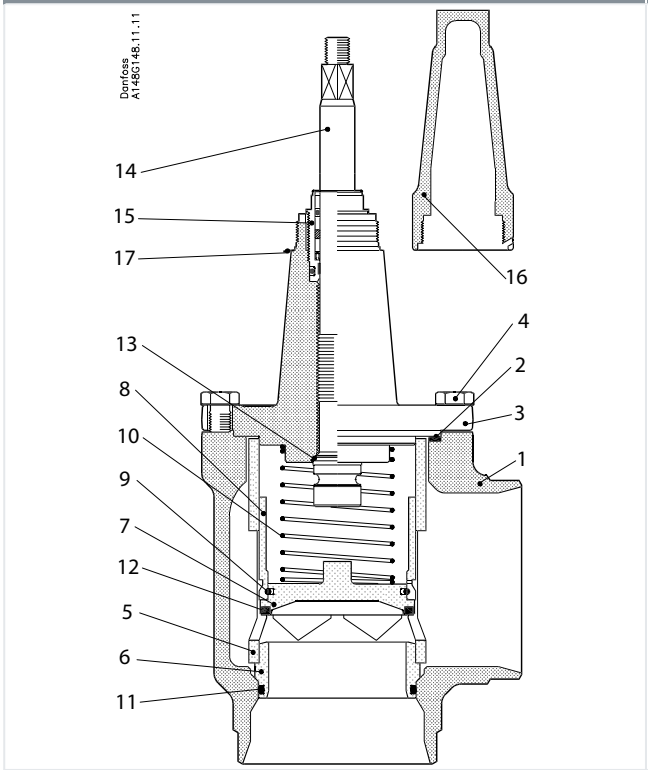
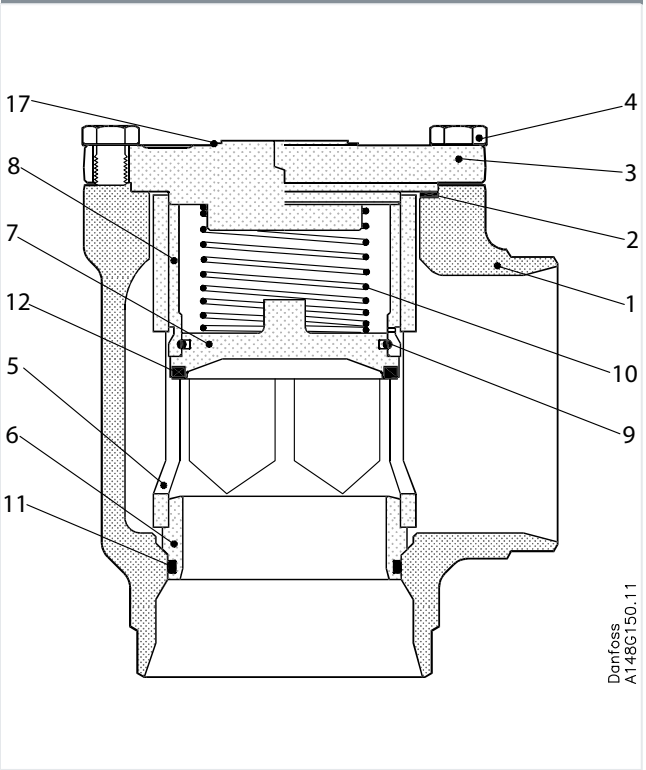
SCA-X 15 - 40	CHV-X 15 - 40
	

Table 5: Material specification

No.	Part	Material	DIN/EN	ISO	ASTM
1	Housing	Steel	G20Mn5QT, 10213-3		LCC, A352
			P285QH+QT, 10222-4		LF2, A350
2	Bonnet, Flange	Steel	P275NL1 EN10028-3		LF2, A350
3	Bonnet, Insert	Steel	11SMn30	Type 2 R 683/9	AISI 1213
			10087		
4	Spindle	Stainless steel	X8CrNiS18-9, EN 10088-3	Type 17 683/13	AISI 303

No.	Part	Material	DIN/EN	ISO	ASTM
5	Cone	Steel			
		Teflon (PTFE)			
6	O-ring	Chloroprene (Neoprene)			
7	Spindle extension	Steel			
8	Packing gland O-rings	Stainless steel Chloroprene (Neoprene)	X8CrNiS18-9 10088	Type 17 683/13	AISI 303
9	Packing washer	Aluminium			
10	Spring loaded seal	Teflon (PTFE)			
11	O-ring	Chloroprene (Neoprene)			
12	Bolts	Stainless steel	A2-70	A2-70	Type 308
13	Gasket	Fiber, non-asbestos			
14	Spring	Steel			
15	Identification ring	Stainless steel			
16	Seal cap gasket	Nylon			
17	Spindle seal cap	Aluminium			

Table 6: SCA-X 50 - 125 and CHV-X 50 - 125

SCA-X 50 - 125	CHV-X 50 - 125
	

No.	Part	Material	DIN/EN	ISO	ASTM
1	Housing DN 50-65	Steel	G20Mn5QT, 10213-3		LCC, A352
			P285QH+QT, 10222-4		LF2, A350
	Housing DN 80-125	Steel	G20Mn5 QT SEW 685		LCC, A352
2	Gasket	Fiber, Non-asbestos			
3	SCA-X: Valve bonnet CHV-X: End cover	Steel	P285 QH EN 10222-4		LF2, A350
			P275NL1 or 2 EN10028-3		A, A662
4	Bolts	Stainless steel	A2-70	A2-70	A-276
5	Tube	Steel			
6	Seat	Steel			
7	Valve plate	Steel			
8	Guide sleeve	Steel			
9	Spring ring	Steel			
10	Spring	Steel			
11	O-ring	Chloroprene (Neoprene)			

No.	Part	Material	DIN/EN	ISO	ASTM
12	Teflon ring	Teflon (PTFE)			
13	Soft back seal	Teflon (PTFE)			
14	Spindle DN 50-65	Stainless steel	X8CrNiS18-9 17440	Type 17 R 683/13	AISI 303
	Spindle DN 80-125	Stainless steel	X5CrNi1810 17440	Type 11 683/13	AISI 304 A-276
15	Packing gland	Stainless steel	X8CrNiS18-9, EN 10088-3,	Type 17 R 683/13	AISI 303
16	Spindle seal cap and gasket	Aluminium			
17	Marking label	Stainless steel			

Dimensions and weights

Table 7: SCA-X/CHV-X 15 - 40 (½- 1½ in.)

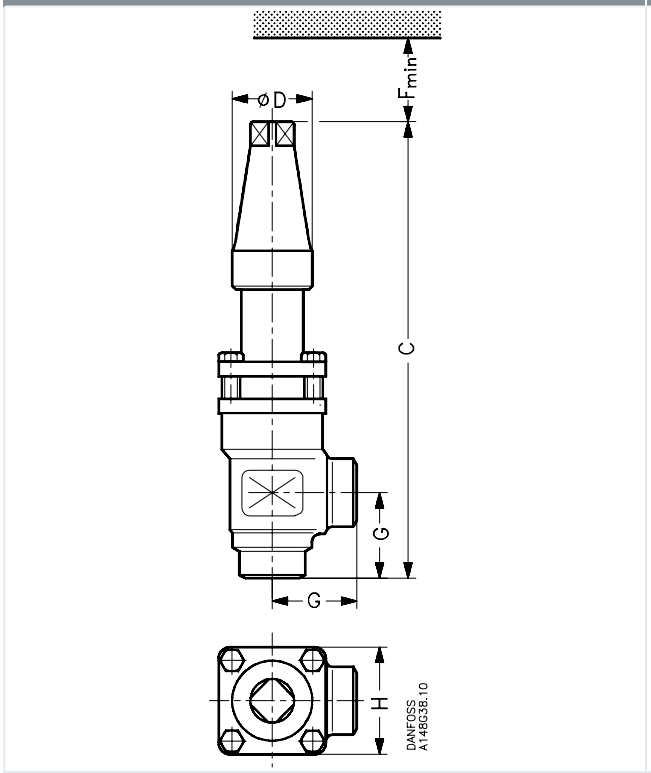
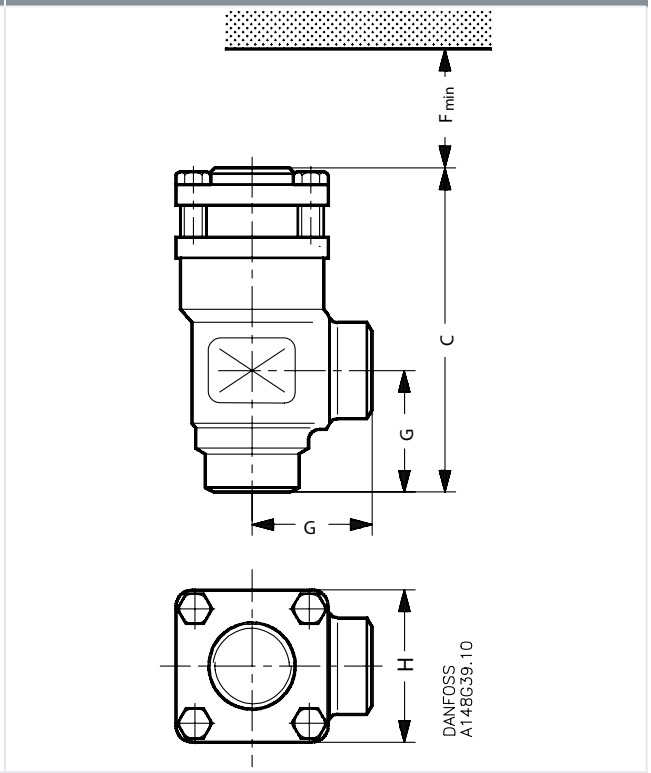
SCA-X 15- 40	CHV-X 15 -40
	

Table 8: SCA-X 15 - 40

Valve size		C	G	ØD	F_{min}	H	Weight
SCA-X 15 (½ in.)	mm	212	45	38	60	60	1.6 kg
	in.	8.35	1.77	1.5	2.36	2.36	3.53 lb
SCA-X 20 (¾ in.)	mm	212	45	38	60	60	1.6 kg
	in.	8.35	1.77	1.5	2.36	2.36	3.53 lb
SCA-X 25 (1 in.)	mm	295	55	50	85	70	3.2 kg
	in.	11.61	2.17	1.97	3.35	2.76	7.05 lb
SCA-X 32 (1¼ in.)	mm	295	55	50	85	70	3.2 kg
	in.	11.61	2.17	1.97	3.35	2.76	7.05 lb
SCA-X 40 (1½ in.)	mm	295	55	50	85	70	3.2 kg
	in.	11.61	2.17	1.97	3.35	2.76	7.05 lb

Table 9: CHV-X 15 - 40

Valve size		C	G	F_{min}	H	Weight
CHV-X 15 (½ in.)	mm	103	45	60	60	1.2 kg
	in.	4.06	1.77	2.36	2.36	2.65 lb
CHV-X 20 (¾ in.)	mm	103	45	60	60	1.2 kg
	in.	4.06	1.77	2.36	2.36	2.65 lb
CHV-X 25 (1 in.)	mm	143	55	85	70	2.3 kg
	in.	5.63	2.17	3.35	2.76	5.07 lb

Valve size		C	G	F_{min}	H	Weight
CHV-X 32 (1¼ in.)	mm	143	55	85	70	2.3 kg
	in.	5.63	2.17	3.35	2.76	5.07 lb
CHV-X 40 (1½ in.)	mm	143	55	85	70	2.3 kg
	in.	5.63	2.17	3.35	2.76	5.07 lb

Specified weights are approximate values only.

Table 10: SCA-X/CHV-X 50 - 65 (2 - 2½ in.)

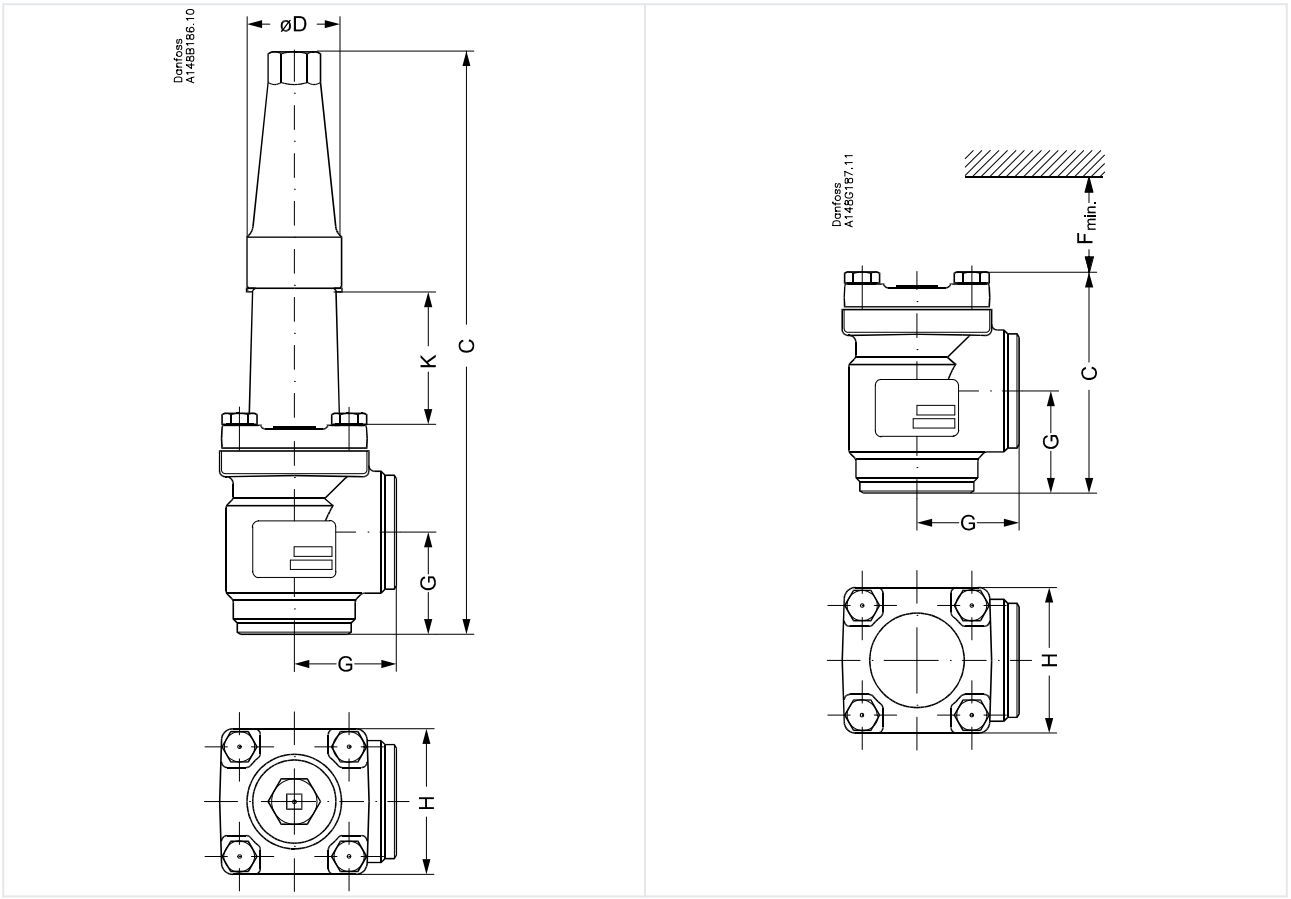


Table 11: SCA-X

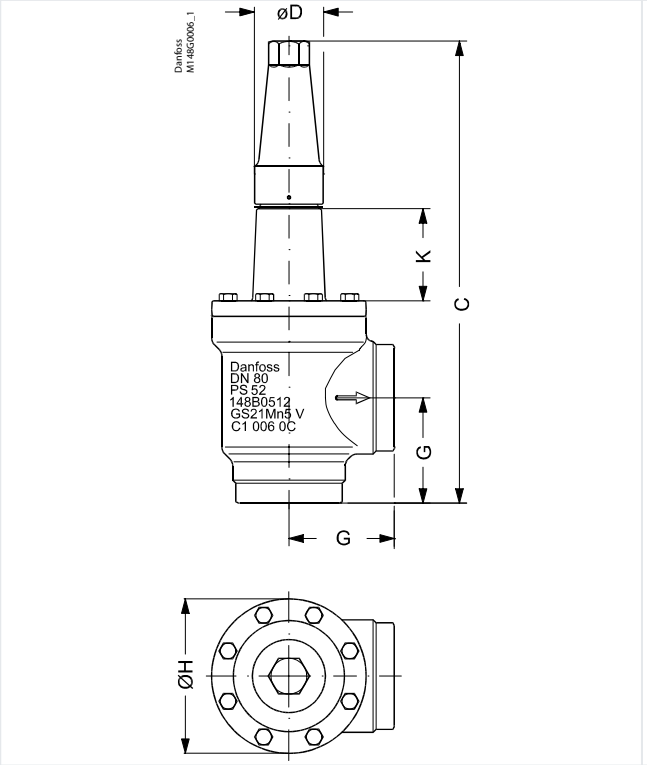
Valve size		K	C	G	ØD	H	Weight
SCA-X 50SCA-X (2)	mm	70	315	60	50	77	3.8 kg
	in.	2.76	12.4	2.36	1.97	3.03	8.40 lb
SCA-X 65SCA-X (2½)	mm	70	335	70	50	90	5.5 kg
	in.	2.76	13.19	2.76	1.97	3.54	12.16 lb

Table 12: CHV-X

Valve size		C	G	$F_{min.}$	H	Weight
SCA-X 50	mm	132	60	92	77	3.2 kg
SCA-X (2)	in.	5.2	2.36	3.62	3.03	7.10 lb
SCA-X 65	mm	152	70	107	90	4.5 kg
SCA-X (2½)	in.	5.98	2.76	4.21	3.54	9.95 lb

Specified weights are approximate values only.

Table 13: SCA-X/CHV-X 80 - 125 (3 - 5 in.)



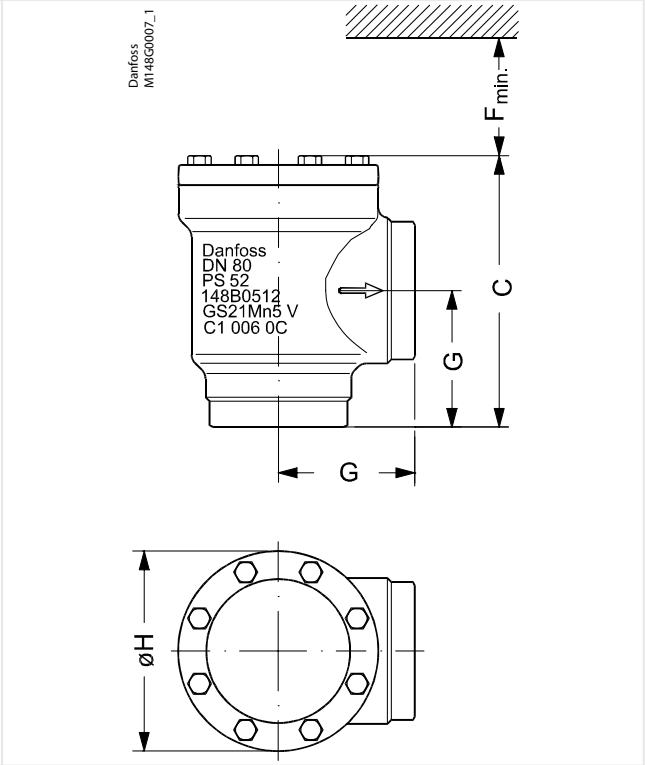


Table 14: SCA-X

Valve size		K	C	G	ØD	ØH	Weight
SCA-X 80	mm	76	388	90	58	129	9.7 kg
SCA-X (3)	in.	3	15.28	3.54	2.28	5.08	21.4 lb
SCA-X 100	mm	90	437	106	58	156	15.3 kg
SCA-X (4)	in.	3.54	17.2	4.17	2.28	6.14	33.7 lb
SCA-X 125	mm	90	533	128	74	193	28.1 kg
SCA-X (5)	in.	3.54	20.98	5.04	2.91	7.6	61.9 lb

Table 15: CHV-X

Valve size		C	G	$F_{min.}$	ØH	Weight
CHV-X 80	mm	189	90	133	129	8.7 kg
CHV-X (3)	in.	7.44	3.54	5.24	5.08	19.23 lb
CHV-X 100	mm	223	106	163	156	14.3 kg
CHV-X (4)	in.	8.78	4.17	6.43	6.14	31.60 lb
CHV-X 125	mm	268	128	190	193	25.6 kg
CHV-X (5)	in.	10.55	5.04	7.48	7.6	56.58 lb

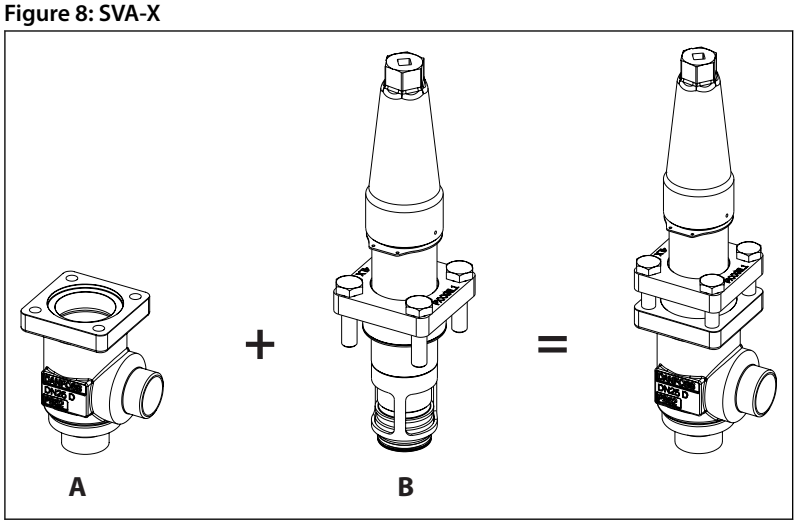
Specified weights are approximate values only.

Ordering

Ordering SVA-X from the parts programme

Example (select from table 1 and 2)

Figure 8: SVA-X



A	Valve housing, size 25 (1 in.), butt weld F, angleway, **148B6416** Table 21: SVL valve housings w/different connections
B	Top part, SCA-X size 25 (1 in.) **148B5482** Table 23: SCA-X

Table 16: SVL valve housings w/different connections

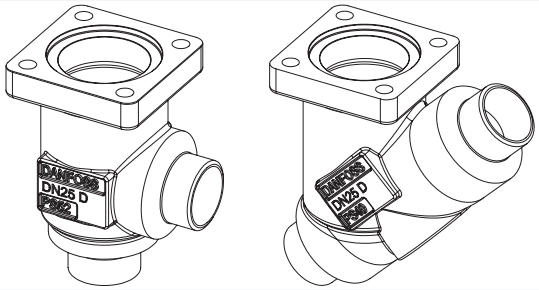
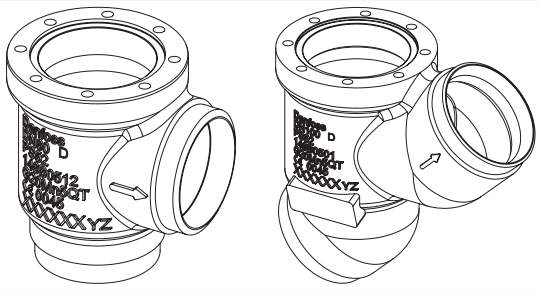
DN 15-65 mm (½ - 2½ in.)	DN 80-125 mm (3 - 5 in.)
	

Table 17: SVL valve housings w/different connections

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
80	3	148B6421	148B6431
100	4	148B6422	148B6432
125	5	148B6423	148B6433

Table 18: SCA-X complete top part including gaskets and bolts

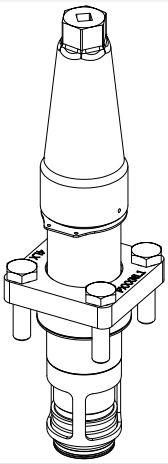
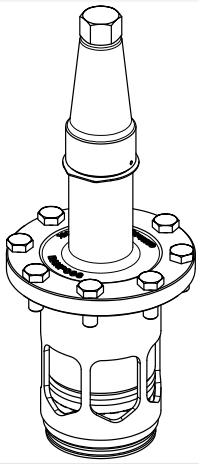
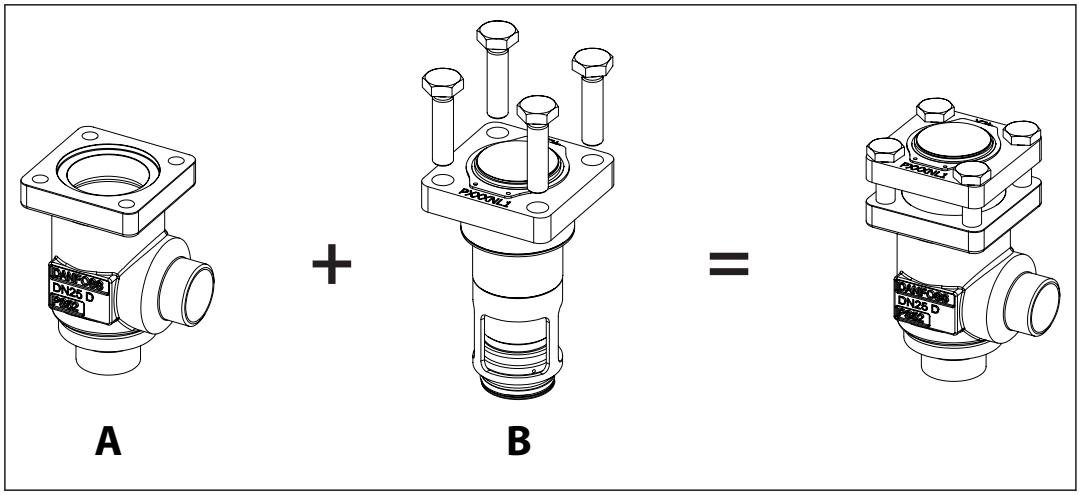
SCA-X 15-50	SCA-X 80-125
	

Table 19: SCA-X

Sizes [DN]		SCA-X 15-50	SCA-X 80-125
		Complete top part	
mm	in.	SCA-X	
15	½	148B5282	
20	¾		
25	1	148B5482	
32	1¼		
40	1½		
50	2	148B5735	
65	2½	148B5825	
80	3	148B5918	
100	4	148B6019	
125	5	148B6118	

Ordering CHV-X from the parts programme

Example (select from table 1 and 2)



A	Valve housing, size 25 (1 in.), butt weld F, angleway, **148B6416** Table 21: SVL valve housings w/different connections
B	Top part, CHV-X size 25 (1 in.) **148B5483** Table 23: SCA-X

Table 20: CHV-X valve housings w/different connections

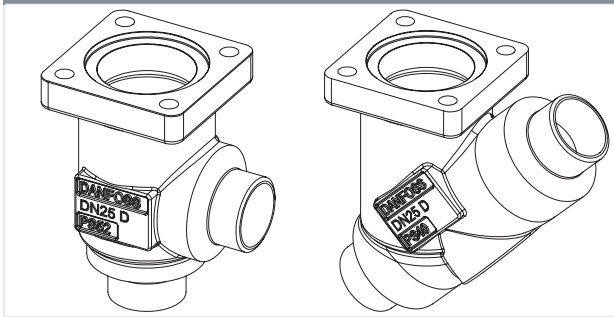
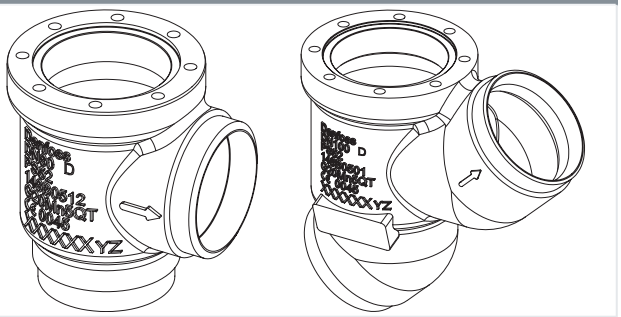
DN 15-65 mm (½ - 2½ in.)	DN 80-125 mm (3 - 5 in.)
	

Table 21: CHV-X valve housings w/different connections

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
80	3	148B6421	148B6431
100	4	148B6422	148B6432
125	5	148B6423	148B6433

Table 22: CHV-X complete top part including gaskets and bolts

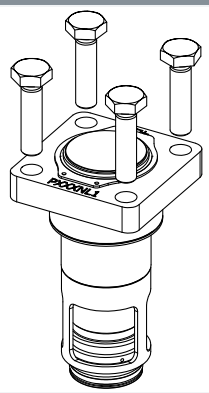
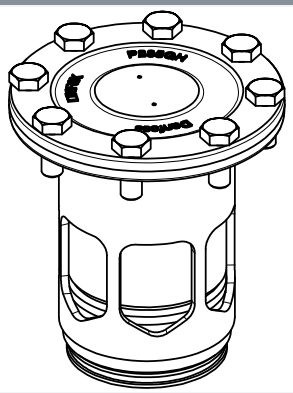
CHV-X 15-50	CHV-X 80-125
	

Table 23: CHV-X

Sizes [DN]		SCA-X 15-50	SCA-X 80-125
		Complete top part	
mm	in.	SCA-X	
15	½	148B5283	
20	¾		
25	1	148B5483	
32	1¼		
40	1½		
50	2	148B5747	
65	2½	148B5827	
80	3	148B5919	
100	4	148B6022	
125	5	148B6119	

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.

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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 24: 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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