

## Data Sheet

Check and stop valves  
**SCA-X** and **CHV-X**

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 and straightway 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).

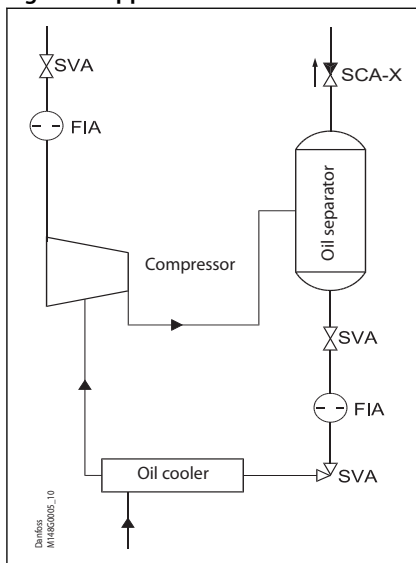
The valve cone has a built-in flexibility to ensure a precise and tight closing towards the valve seat. A well balanced dampening effect between the piston and the cylinder gives an optimal protection during low loads and against pulsations.

### Features

- Modular Concept:
  - Each valve housing is available with DIN and ANSI butt weld connection and in several different sizes.
  - Possible to convert SCA-X or CHV-X to any other product in the Flexline™ 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. At replacement of the O-ring for special application, an additional ID ring is fixed to the valve.
- 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 42CrMo4 bolts to withstand high pressure.
- Classification: DNV, CRN, BV, EAC etc. To get an updated list of certification on the products please contact your local Danfoss Sales Company.
- Service kits with replacement O-rings for R717 Heat Pump and R1270 Propylene include separate ID-ring for ID of application.

**Application**

Figure 1: Application



The above 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.**

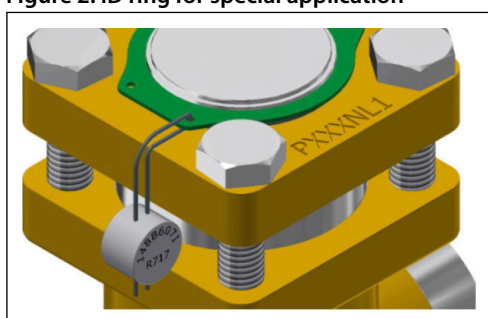
For horizontal installation of the function module, please contact Danfoss.

**ID ring for special application**

After converting a SCA or CHV 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.

Figure 2: ID ring for special application



## Media

### **Refrigerants**

Applicable to HCFC, HFC, R717 (Ammonia), R744 (CO<sub>2</sub>) and flammable refrigerants. For further information please see the installation guide 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/](https://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	65 bar (943 psig)
With O-ring replaced (Service kit)	Heat pump configuration: R717 - 65 bar(g) (943 psig) @ +100 °C to +150 °C (+212 °F to +302 °F) continuous.
Propylene configuration:	R1270 - 65 bar(g) (943 psig) @ -60 °C to 150 °C (-76 °F to 302 °F)

**Connections**

Figure 3: DIN

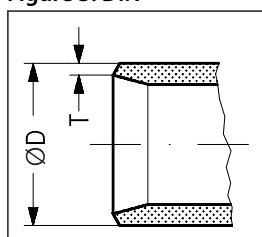


Table 2: Butt-weld DIN (EN 10220)

Size		ØD	T	ØD	T	k <sub>v</sub> Angleway	C <sub>v</sub> Angleway	k <sub>v</sub> Straightway	C <sub>v</sub> Straightway
mm	in.	mm	mm	in.	in.	m <sup>3</sup> /h	US <sub>gal</sub> /min	m <sup>3</sup> /h	US <sub>gal</sub> /min
15	½	21.3	2.3	0.839	0.091	8	9.3	4	4.6
20	¾	26.9	2.3	1.059	0.091	10	11.6	7	8.1
25	1	33.7	2.6	1.327	0.102	24	27.8	16	18.6
32	1¼	42.4	2.6	1.669	0.102	30	34.8	21	24.4
40	1½	48.3	2.6	1.902	0.102	30	34.8	21	24.4
50	2	60.3	2.9	2.37	0.11	45	53	28	34
65	2½	76.1	2.9	3.00	0.11	72	85	41	48
80	3	88.9	3.2	3.50	0.13	103	129	81	94
100	4	114.3	3.6	4.50	0.14	196	232	157	182
125	5	139.7	4.0	5.50	0.16	301	356	250	290

Figure 4: ANSI

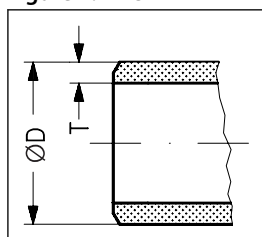


Table 3: Butt-weld ANSI (B 36.10 Schedule 80)

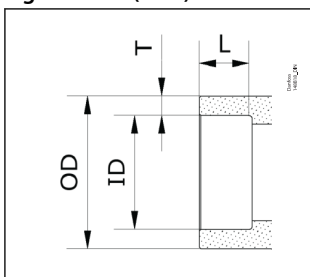
Size		ØD	T	ØD	T	k <sub>v</sub> Angleway	C <sub>v</sub> Angleway	k <sub>v</sub> Straightway	C <sub>v</sub> Straightway
mm	in.	mm	mm	in.	in.	m <sup>3</sup> /h	US <sub>gal</sub> /min	m <sup>3</sup> /h	US <sub>gal</sub> /min
15	½	21.3	3.7	0.839	0.146	8	9.3	4	4.6
20	¾	26.9	4.0	1.059	0.158	10	11.6	7	8.1
25	1	33.7	4.6	1.327	0.181	24	27.8	16	18.6
32	1¼	42.4	4.9	1.669	0.193	30	34.8	21	24.4
40	1½	48.3	5.1	1.902	0.201	30	34.8	21	24.4

## Check and stop valves, type SCA-X and CHV-X

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

Size		ØD	T	ØD	T	k <sub>v</sub> Angleway	C <sub>v</sub> Angleway	k <sub>v</sub> Straightway	C <sub>v</sub> Straightway
mm	in.	mm	mm	in.	in.	m <sup>3</sup> /h	US <sub>gal/min</sub>	m <sup>3</sup> /h	US <sub>gal/min</sub>
50	2	60.3	3.9	2.37	0.15	45	53	28	34
65	2½	76.1	5.2	2.87	0.20	72	85	41	48
80	3	88.9	5.5	3.50	0.22	103	129	81	94
100	4	114.3	6.0	4.50	0.24	196	232	157	182
125	5	141.3	6.6	5.56	0.26	301	356	250	290

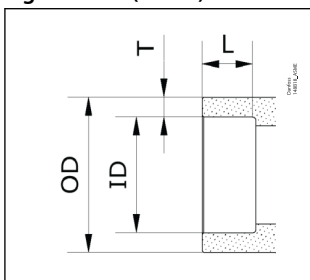
**Figure 5: SD (DIN)**



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

Size		ID	L	ØD	T	k <sub>v</sub> Angleway	C <sub>v</sub> Angleway	k <sub>v</sub> Straightway	C <sub>v</sub> Straightway
mm	in.	mm	mm	mm	mm	m <sup>3</sup> /h	US <sub>gal/min</sub>	m <sup>3</sup> /h	US <sub>gal/min</sub>
15	½	16	8	21.3	2.65	8	9.3	4	4.6
20	¾	22	11	26.9	2.45	10	11.6	7	8.1
25	1	28	11	33.7	2.85	24	27.8	16	18.6
32	1¼	35	15	42.4	3.7	30	34.8	21	24.4
40	1½	42	15	48.3	3.15	30	34.8	21	24.4
50	2	54	13.5	60.3	3.15	45	53	28	34
65	2½	64	13.5	73	4.5	72	85	41	48
80	3	76.1	15	88.9	6.4	103	129	81	94
100	4	108	17.5	118	5	196	232	157	182
125	5	133	20	145	6	301	356	250	290

**Figure 6: SA (ASME)**



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

Size	ID	L	ØD	T	k <sub>v</sub> Angleway	C <sub>v</sub> Angleway	k <sub>v</sub> Straightway	C <sub>v</sub> Straightway
in.	mm	mm	mm	mm	m <sup>3</sup> /h	US <sub>gal/min</sub>	m <sup>3</sup> /h	US <sub>gal/min</sub>
5/8	15.88	8	21.3	2.71	8	9.3	4	4.6
7/8	22.23	11	26.9	2.34	10	11.6	7	8.1
1 1/8	28.58	11	33.7	2.56	24	27.8	16	18.6
1 3/8	34.93	15	42.4	3.74	30	34.8	21	24.4
1 5/8	41.28	15	48.3	3.51	30	34.8	21	24.4
2 1/8	54	13.5	60.3	3.15	45	53	28	34
2 3/8	66.7	13.5	76.1	4.70	72	85	41	48
3 1/8	79.38	15	88.9	4.76	103	129	81	94
4 1/8	104.78	17.5	114.3	4.76	196	232	157	182

## **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. Teflon ring made of reinforced teflon

### **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).

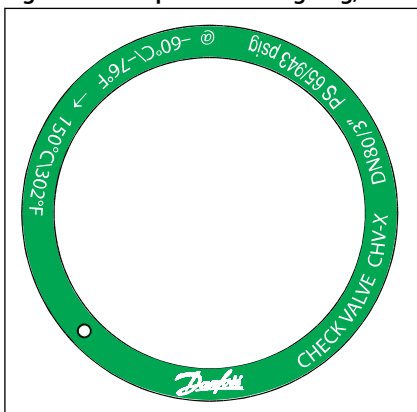
For special and/or high demanding applications/conditions which run with high constant temperatures, it is recommended to replace the packing gland with "HL Packing Gland" as spare part. For more information, please, contact your local Danfoss sales representative.

## **Installation**

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 guide 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.

Figure 7: Example of marking ring, CHV-X



## **Computation and selection**

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:

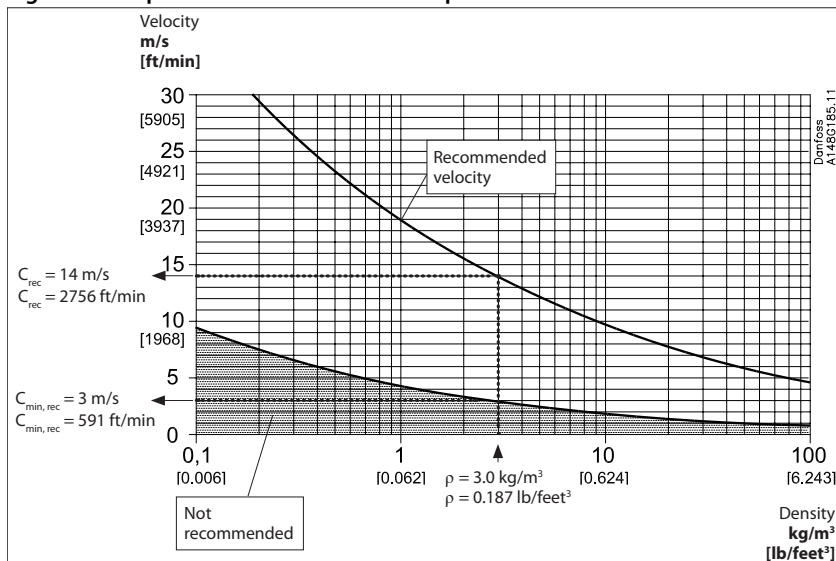
- Using the tables below.
- Using Coolselector™

## Check and stop valves, type SCA-X and CHV-X

**Table 7: Example**

SI-Units	US-Units
Assumed working conditions: Maximum flow $V = 1000 \text{ m}^3/\text{h}$ Density $\rho = 3.0 \text{ kg}/\text{m}^3$ Minimum part load = 33%	Assumed working conditions: Maximum flow $V = 1160 \text{ gpm}$ Density $\rho = 0.187 \text{ lb}/\text{feet}^3$ 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 $\rho \approx 3.0 \text{ kg}/\text{m}^3$ , consequently $C_{rec}$ as well as $C_{min, rec}$ can be found in the figure below (standard valve).	We know the density $\rho \approx 0.187 \text{ lb}/\text{feet}^3$ , consequently $C_{rec}$ as well as $C_{min, rec}$ can be found in the figure (standard valve).
$C_{rec} \approx 14 \text{ m/s}$ $C_{min, rec} \approx 3 \text{ m/s}$	$C_{rec} \approx 2756 \text{ ft}/\text{min}$ $C_{min, rec} \approx 591 \text{ ft}/\text{min}$

**Figure 8: computation and selection-example**



Knowing that  $V = 1000 \text{ m}^3/\text{h}$  (1160 gpm) fig. 2 gives the following choices

- For SCA-X/CHV-X in size DN 100 the maximum velocity  $C_{max} \approx 31 \text{ m/s}$  (6100 ft/min)
- For SCA-X/CHV-X in size DN 125 the maximum velocity  $C_{max} \approx 20 \text{ m/s}$  (3900 ft/min)

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

- We know that  $C_{max} \approx 20 \text{ m/s}$  (3900 ft/min) and that minimum part load is 33%. It follows that  $C_{part} \approx 6.5 \text{ m/s}$  (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.



Check and stop valves, type SCA-X and CHV-X

Figure 9: DN 15 - 40

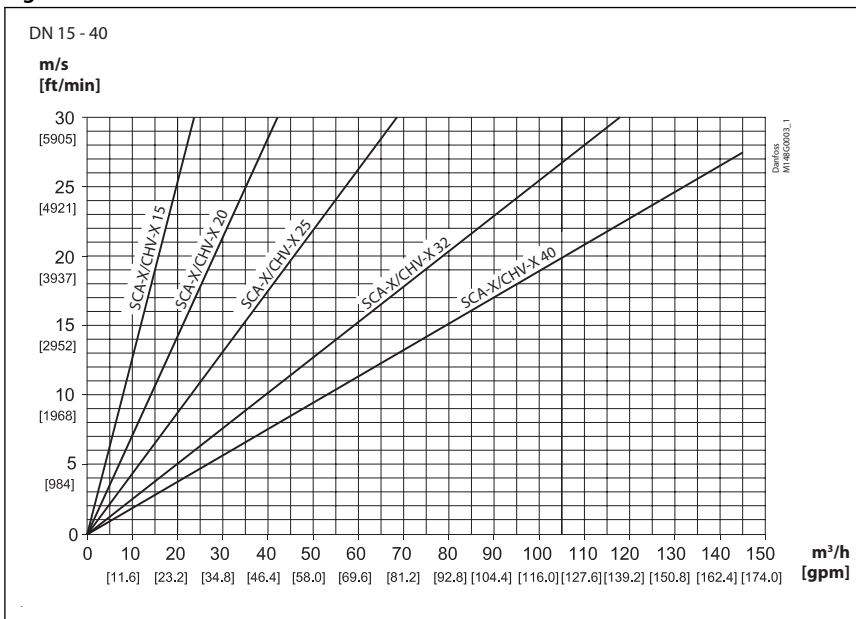
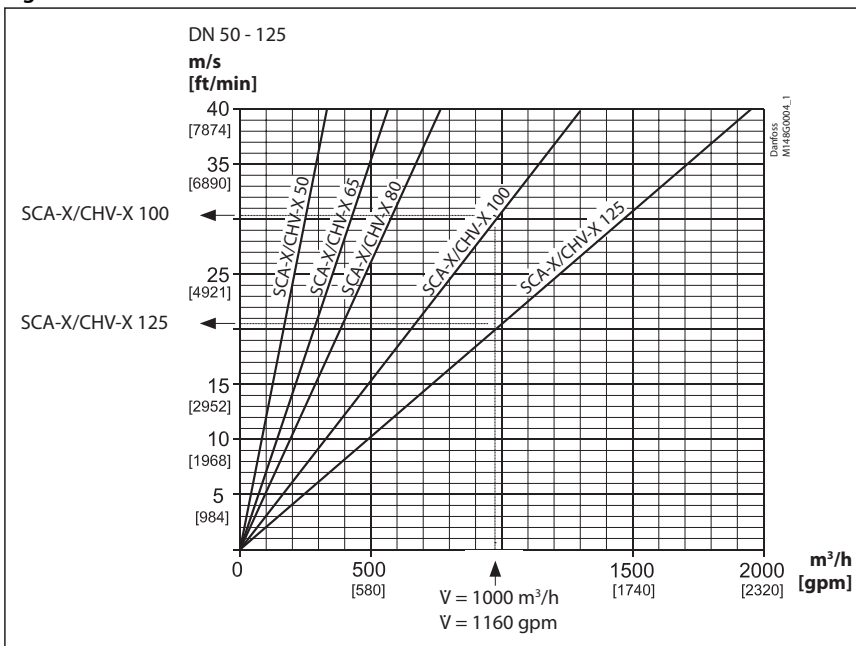


Figure 10: DN 50 - 125



## Material specification

Table 8: Material specification

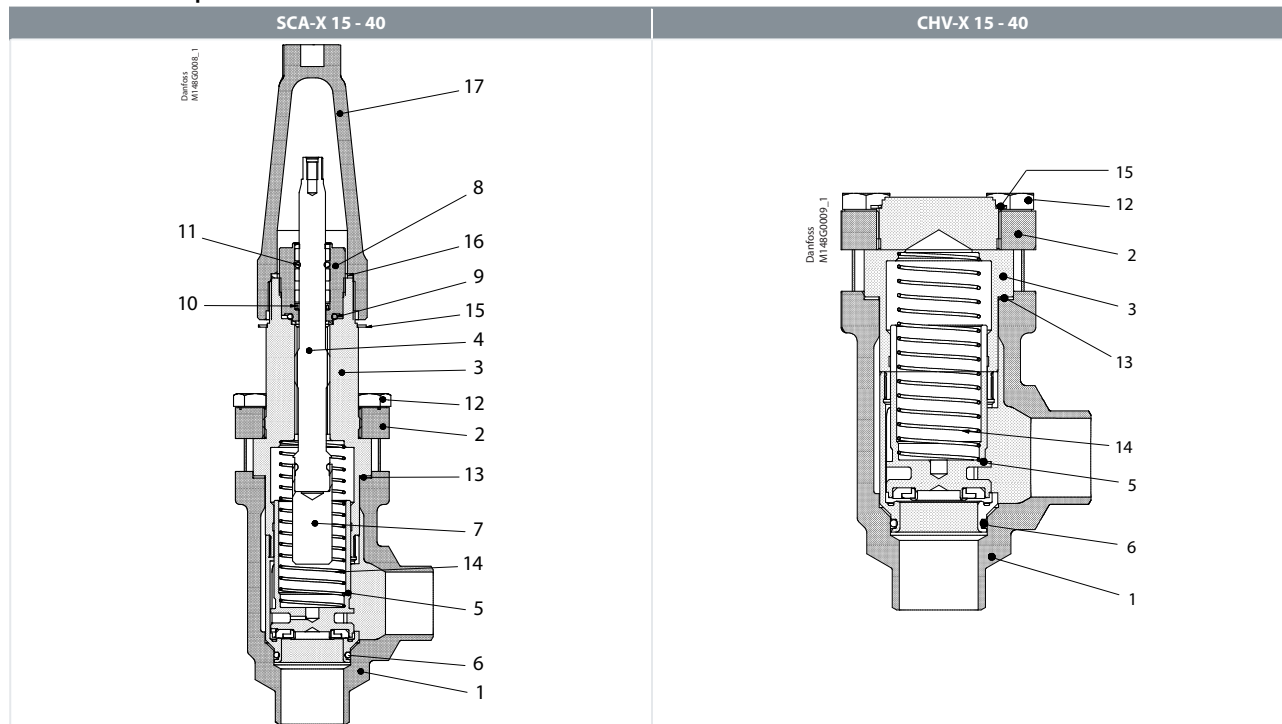


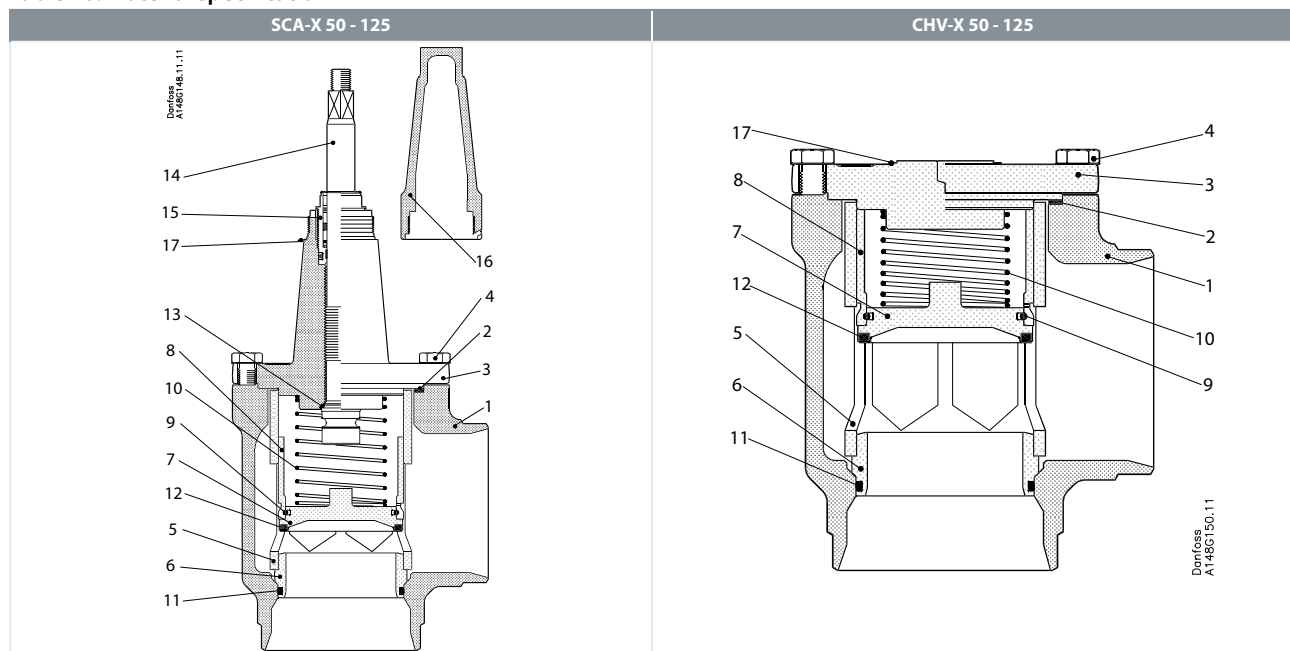
Table 9: Material specification

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
5	Cone	Steel			
		Teflon (PTFE)			
6	O-ring	Chloroprene (Neoprene)			
7	Spindle extension	Steel			
8	Packing gland	Stainless steel	X8CrNiS18-9 10088	Type 17 683/13	AISI 303
	O-rings	Chloroprene (Neoprene)			
9	Packing washer	Aluminium			
10	Spring loaded seal	Teflon (PTFE)			
11	O-ring	Chloroprene (Neoprene) <sup>(1)</sup>			
12	Bolts	High temperature steel	42CrMo4 10269		A193
13	Gasket	Fiber, non-asbestos			
14	Spring	Steel			
15	Identification ring	Stainless steel			
16	Seal cap gasket	Nylon			
17	Spindle seal cap	Aluminium			

<sup>(1)</sup> To be replaced in R717 Heat Pump and R1270 Propylene applications.

## Check and stop valves, type SCA-X and CHV-X

**Table 10: Material specification**



**Table 11: Material specification**

No.	Part	Material	DIN/EN	ISO	ASTM
1	Housing DN 50-65	Steel	G20Mn5QT, 10213-3		LCC, A352
	Housing DN 80-125		P285QH+QT, 10222-4		LF2, A350
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) <sup>(2)</sup>			
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			

<sup>(2)</sup> To be replaced in R717 Heat Pump and R1270 Propylene applications.

## Dimensions and weights

Table 12: SCA-X/CHV-X 15 - 40 (½- 1½ in.)

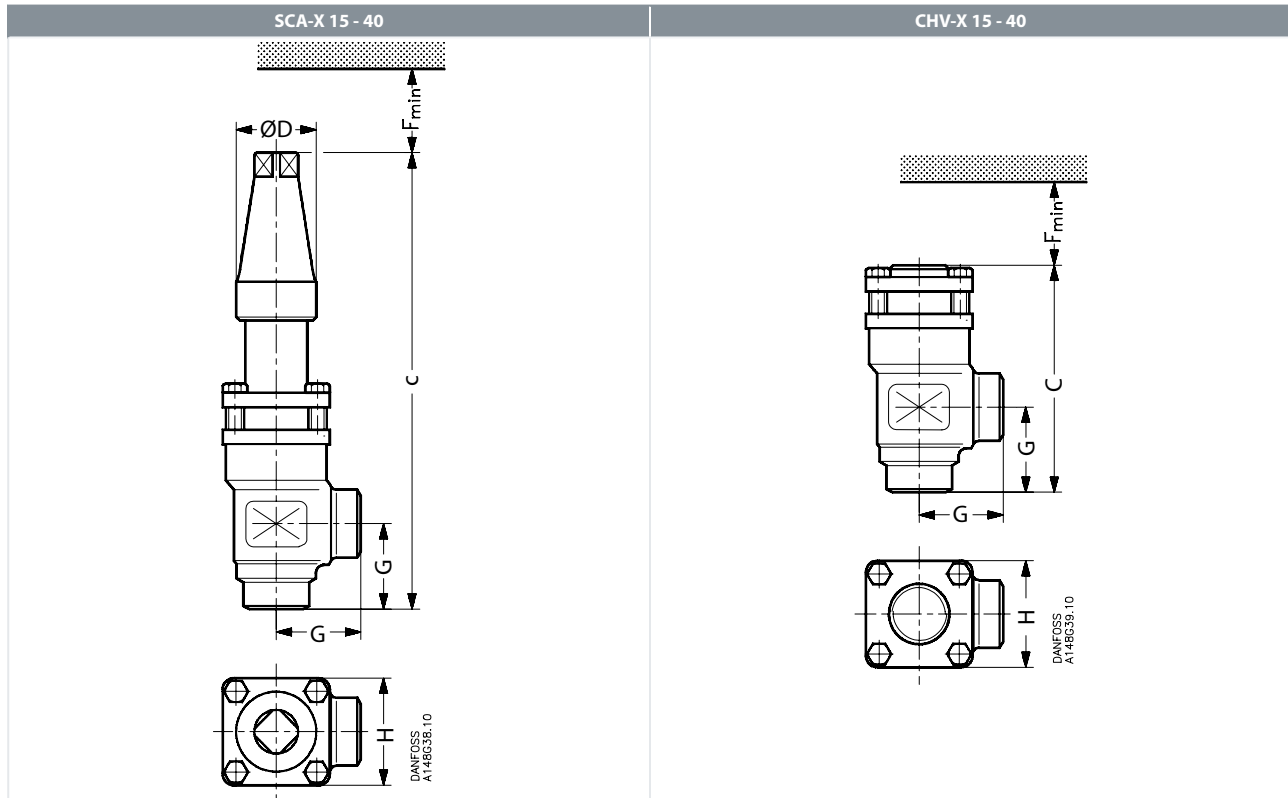


Table 13: SCA-X 15 - 40

Valve size		C	G	ØD	F <sub>min</sub>	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 14: CHV-X 15 - 40

Valve size		C	G	F <sub>min</sub>	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
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 in tables 8-9 are approximate values only.

Check and stop valves, type SCA-X and CHV-X

Table 15: SCA-X/CHV-X 50 - 65 (2 - 2½ in.)

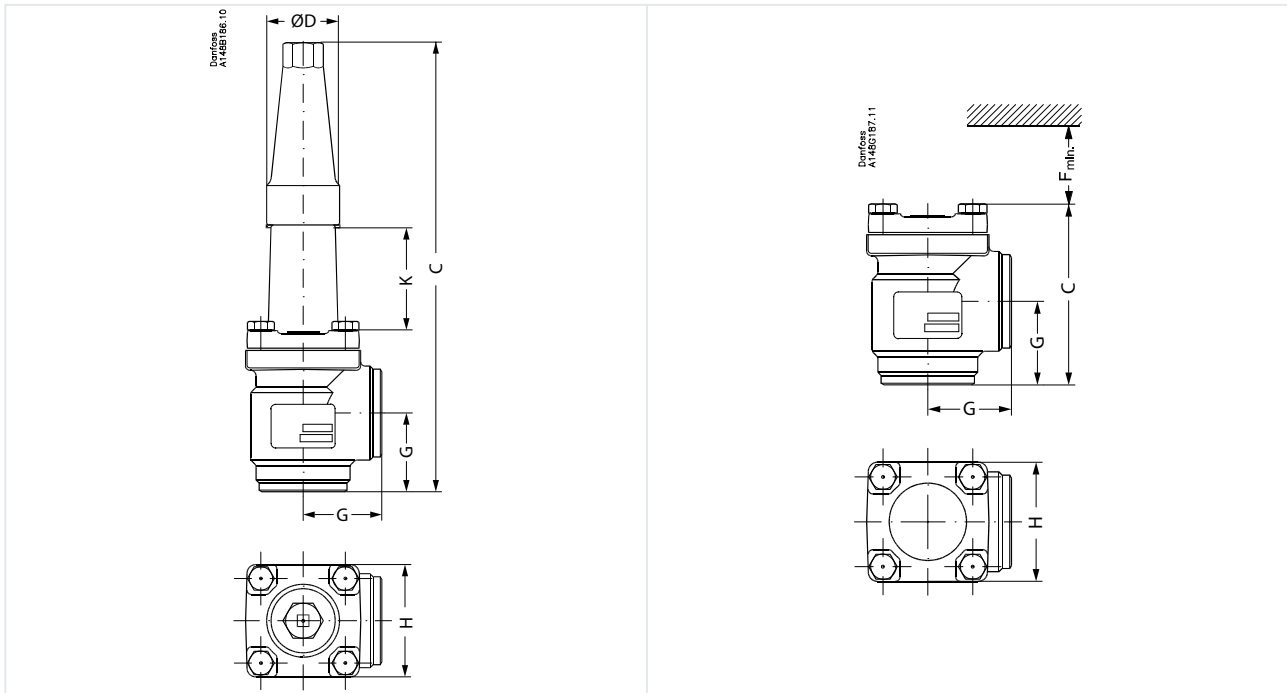


Table 16: SCA-X

Valve size		K	C	G	ØD	H	Weight
SCA-X 50 SCA-X (2 in.)	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 65 SCA-X (2½ in.)	mm	70	335	70	50	90	5.5 kg
	in.	2.76	13.19	2.76	1.97	3.54	12.16 lb

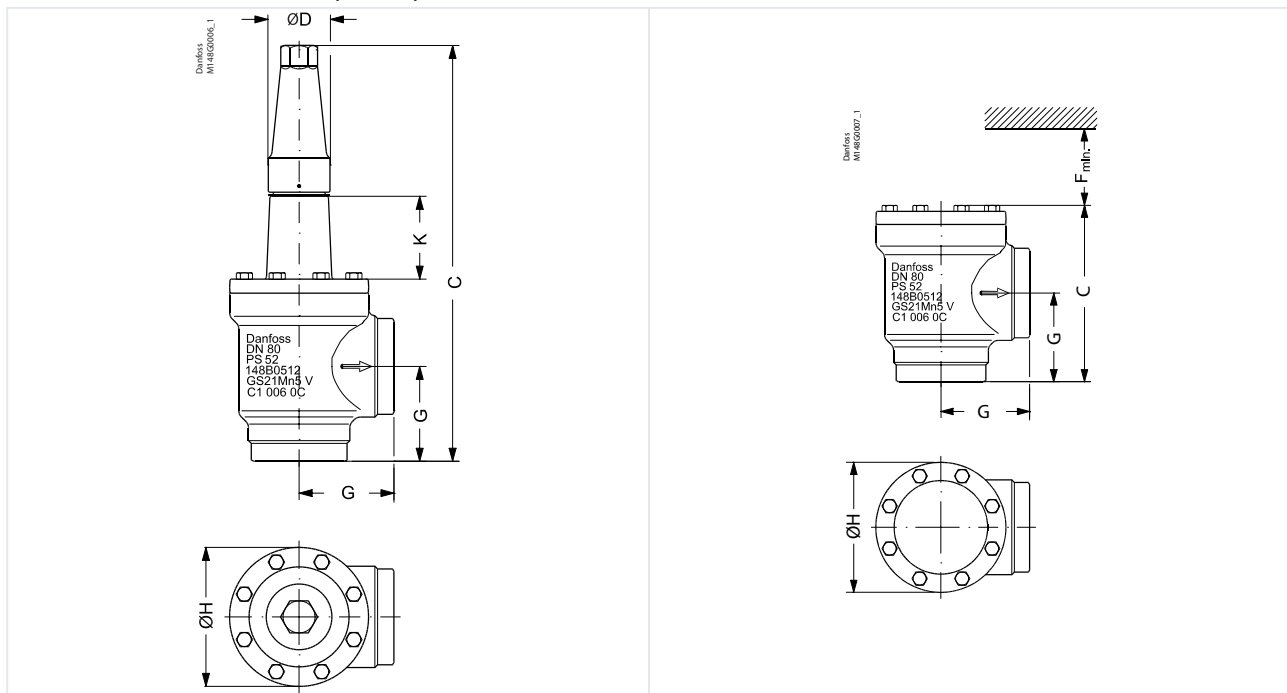
Table 17: CHV-X

Valve size		C	G	F <sub>min.</sub>	H	Weight
CHV-X 50 CHV-X (2 in.)	mm	132	60	92	77	3.2 kg
	in.	5.2	2.36	3.62	3.03	7.10 lb
CHV-X 65 CHV-X (2½ in.)	mm	152	70	107	90	4.5 kg
	in.	5.98	2.76	4.21	3.54	9.95 lb

Specified weights in tables 11-12 are approximate values only.

## Check and stop valves, type SCA-X and CHV-X

**Table 18: SCA-X/CHV-X 80 - 125 (3 - 5 in.)**



**Table 19: 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.)	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.)	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.)	in.	3.54	20.98	5.04	2.91	7.6	61.9 lb

**Table 20: CHV-X**

Valve size		C	G	F <sub>min.</sub>	ØH	Weight
CHV-X 80	mm	189	90	133	129	8.7 kg
CHV-X (3 in.)	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.)	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.)	in.	10.55	5.04	7.48	7.6	56.58 lb

Specified weights in tables 14-15 are approximate values only.

## Ordering

### Ordering SCA-X/CHV-X from the parts program

Table 21: Ordering SCA-X/CHV-X from the parts program

Size [DN]	Parts program											
	Housing								Top complete		Service Kit <sup>(1)</sup>	
	ANG				STR				SCA-X	CHV-X	O-ring kit for	
	DIN	ANSI	SD	SA	DIN	ANSI	SD	SA			R717 Heat Pump	R1270 Propylene
15	148B6622	148B6612	148B6724	148B6713	148B6642	148B6632	148B6745	148B6734	148B5769	148B5776		
20	148B6623	148B6613	148B6725	148B6714	148B6643	148B6633	148B6746	148B6735	148B5769	148B5776	148B6070	148B6077
25	148B6624	148B6614	148B6726	148B6715	148B6644	148B6634	148B6747	148B6736	148B5770	148B5777		
32	148B6625	148B6615	148B6727	148B6716	148B6645	148B6635	148B6748	148B6737	148B5770	148B5777	148B6071	148B6078
40	148B6626	148B6616	148B6728	148B6717	148B6646	148B6636	148B6749	148B6738	148B5770	148B5777		
50	148B6627	148B6617	148B6718		148B6647	148B6637	148B6739		148B5771	148B5778	148B6072	148B6079
65	148B6628	148B6618	148B6729	148B6719	148B6648	148B6638	148B6750	148B6740	148B5772	148B5779	148B6073	148B6080
80	148B6629	148B6619	148B6730	148B6720	148B6649	148B6639	148B6751	148B6741	148B5773	148B5780	148B6074	148B6081
100	148B6630	148B6620	148B6731	148B6721	148B6650	148B6640	148B6752	148B6742	148B5774	148B5781	148B6075	148B6082
125	148B6631	148B6621	148B6755		148B6651	148B6641			148B5775	148B5782	148B6076	148B6083

<sup>(1)</sup> Service 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.

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**Pressure Equipment Directive (PED)**

REG valves are approved according to the European standard specified in the Pressure Equipment Directive and are CE marked.

**Table 22: Pressure Equipment Directive (PED)**

SCA-X and CHV-X			
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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