ENGINEERING TOMORROW

Data Sheet

Check and Stop valve Type **OFC**

For Oil Free Refrigerants, Fits Turbocor TTS/TGS/TTH/TGH Compressors

OFC type check and stop valve are designed for delivering a discharge solution that improves performance and reliability of oil-free centrifugal compressors with magnetic bearings by incorporating a damped check valve, while reliably and efficiently incorporating stop and diffuser functions.

Features

- Nozzle check valve closes quickly if backflow
- PTFE protects against reverse refrigerant migration; compatible with oil-free applications
- Gas damper and special opening characteristic prevents from violent movements in surge conditions
- Damped nozzle check valve reduces chattering noises
- Decoupled stop function from check function allows faster access and improves reliability of sealing
- Lock ring design prevents from unintentional closing of the valve
- Built-in sight glass gives direct visibility to proper valve functioning and refrigerant flow
- Built-in pressure port provides connection to high pressure cut out
- Built-in staging port on both sides to enable more flexibility in system designs
- Optimized flow path enhances flow capacity with lower pressure drop
- Bolt on to all TTS/TGS/TTH/TGH compressor discharge ports
- Multiple orientations possible

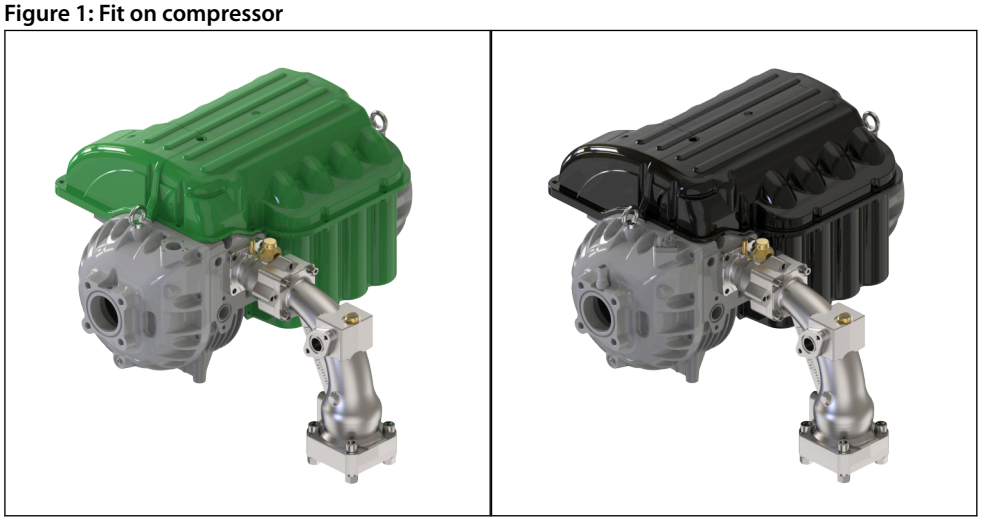
Functions

The OFC is intended for use on Turbocor compressors up to size TTS700 as a combined diffuser elbow, shut off valve and check valve with integrated staging port and pressure port (Schrader valve). The device contains:
Integrated stop function
Damped check valve function
Integrated diffuser elbow
Integrated staging port

Table 1: Used for Danfoss Turbocor® Compressors:

Image	Compressor type	Refrigerant
	TTS300: 60-90 TR TTS350: 70-120TR TTS400: 90-150 TR TTS450: 100-150 TR TTS700: 130-200 TR TTH375: 75-115 TR	R134a, R513A
	TGS230: 40-70 TR TGS310: 60-90 TR TGS380: 88-110 TR TGS390: 70-120 TR TGS490: 110-140 TR TGS520: 90-150 TR TGH285: 70-90 TR	R515B, R1234ze(E)

Figure 1: Fit on compressor



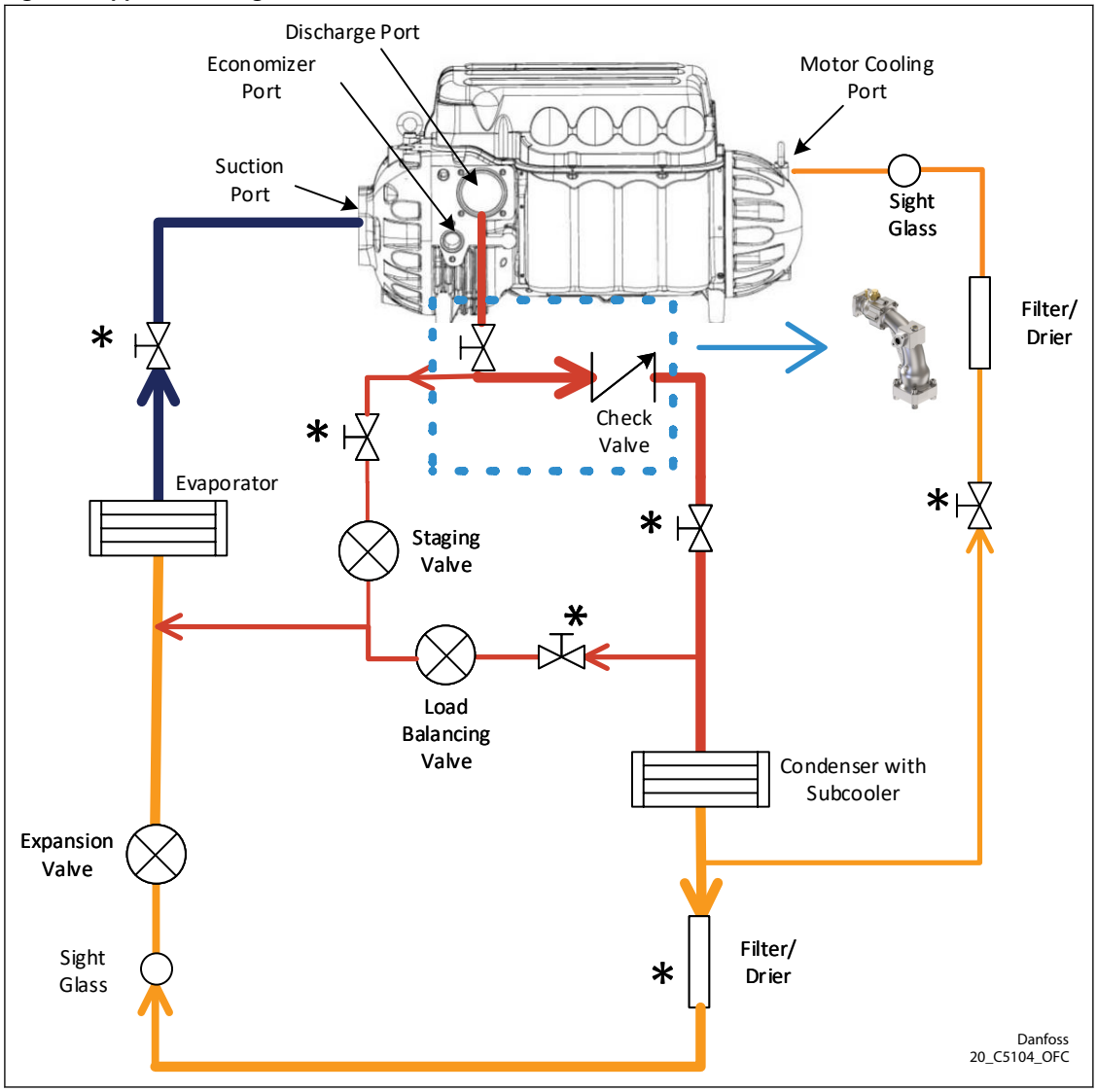
Applications

Typical applications for OFC valves are:

Only for oil free system

- Air-Cooled Chiller
- Water-Cooled Chiller
- Water-to-Water Heat Pump
- Air-to-Water Heat Pump

Figure 2: Application Diagram



Media

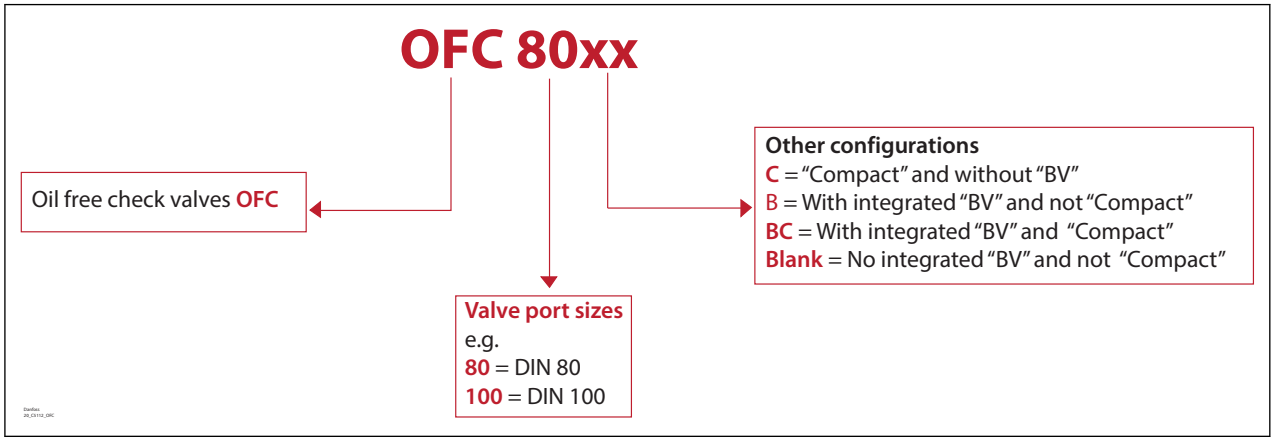
Valve type	Refrigerants	Max. working pressure (PS/ MWP)	Media temperature range	Approval	
OFC 80B	R134a, R513A, R515B, R1234ze(E)	23 bar / 334 psig	-40°C to +100°C (-40°F to +212°F)	PED certificate for [Fluid Group 2] Cat. I	UL Recognized
OFC 80					
OFC 80BC					
OFC 80C					

Oil: OFC valve is designed for an oil-free environment

NOTE:

- For a complete list of approved refrigerants, visit http://store.danfoss.com/ and search for individual code numbers, where refrigerants are listed as part of product details.
- The UL recognized OFC models are not suitable for field installation without further evaluation.

Designation



Portfolio overview

OFC 80B with upstream ball valve	OFC 80 without ball valve
	
OFC 80BC compact version with upstream ball valve	**OFC 80C compact version without ball valve**
	
OFC 80B with downstream ball valve	**OFC 80BC compact version with downstream ball valve**
	

Product specification

Technical data

Table 2: Technical data

Technical data	Values
Max. working pressure	23 bar / 334 psig
Media temperature	-40°C to +100°C (-40°F to +212°F)
Ambient temperature	-40°C to +100°C (-40°F to +212°F)
Humidity	5-95% (Non-Condensing)
Flow direction	Single-flow
Valve direction	Angleway
Liquid detection	SGR socket sight glass in elbow
State of Delivery	With blue spring installation mounted as default. Ball valve is open. Included outlet flange, staging port flange and alternative springs packed separately
Orientation [1]	see available orientations on page 7
Serviceable	Check valve spare parts
Compressor interface	to fit directly on outlet of the listed Turbocor compressors(see page 2) Connection: Ø54 mm (2 1/8") Flange thickness: 17 mm (O-ring is not included)
Staging port	Solder staging flange and blind flange for dual staging port are delivered in the accessory box
Tube Brazing and flange connection	3-1/8" outlet steel flange for brazing of 3-1/8" copper pipe 4-1/8" outlet steel flange for brazing of 4-1/8" copper pipe Two sizes flanges are also available as spare part and shall be purchased separately
Support bracket	Thread: 2 x M10 Thread depth: 18mm

[1] Check valve spring must be exchanged if elbow orientations change

Contents of accessory box

- Outlet flange (1 pcs)
- Outlet flange fasteners M16x70 (4 pcs)
- Nut M16 for outlet flange (4 pcs)
- Spring washer M16 for outlet flange (4 pcs)
- Plain washer M16 for outlet flange (4 pcs)
- O-ring for outlet flange/GBC (1 pcs)
- O-ring lubrication (2 gram)
- Inlet flange fasteners M10x40 (4 pcs)
- Spring washer M10 for inlet flange (4 pcs)
- Plain washer M10 for inlet flange (4 pcs)
- Solder staging flange for dual staging port (1 pc)
- Blind flange for dual staging port (1 pc)
- Staging port fasteners M10x35 (4 pcs)
- Spring washer M10 for staging port (4 pcs)
- Plain washer M10 for staging port (4 pcs)
- O-ring for staging port (2 pcs)
- Additional check valve springs (2 pcs):
  - Yellow spring, for 45°->89° orientation
  - Red spring, for 90°->134°orientation

Orientation and Spring Selection

Figure 3: Available orientations for check and stop valve

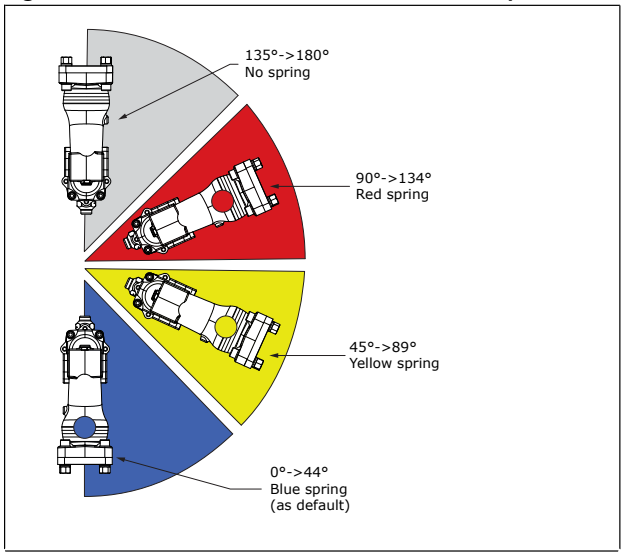
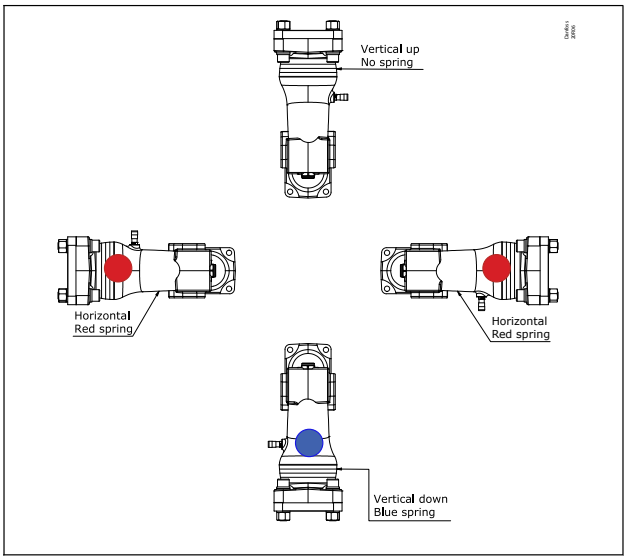


Figure 4: Available orientations for check valve without ball valve



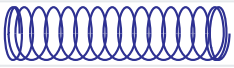
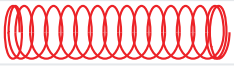
Available orientations

At delivery, ball valve actuating axle is orientated same way on all versions as shown.

Ball valve clocking may be changed by removing bolts and rotating ball valve housing without retracting the ball valve assembly away from the elbow.

NOTE:
For more detailed information about OFC mounting, please refer to OFC installation guide.

Table 3: Check valve spring

0°->44°: Blue spring. Mounted at delivery	
45°->89°: Yellow spring	
90°->134°: Red spring	

Identification

Relevant product data is available on the product and box label. An example of a box label and product label are shown, including an explanation of the content.

Table 4: Box label & product label (example)

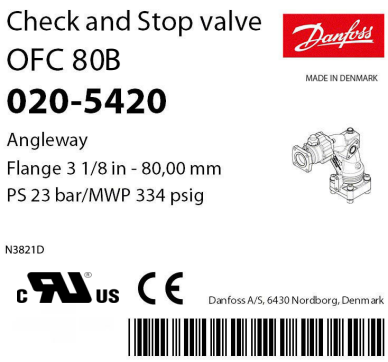
Box label	Product label
	

Table 5: Product and label text

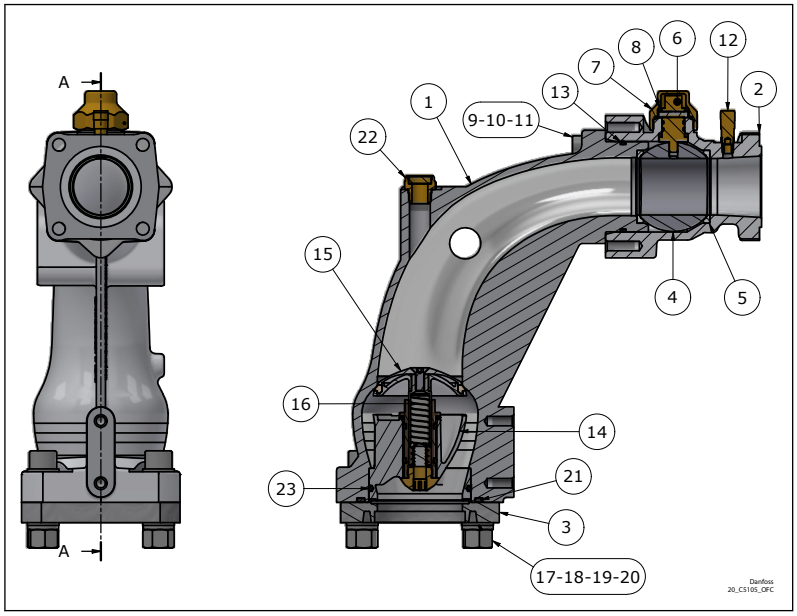
Position	Inscription	Explanation
Box label; Product label	Check and Stop valve	Product name
Box label; Product label	020-5420	Code number for ordering
Box label; Product label	OFC 80B	Product type
Box label	Angleway	Direction
Box label	Flange 3 1/8 in-80,00 mm	Connection size and type
Box label; Product label	PS 23 bar/MWP 334 psig	Max. working pressure in bar and psig
Box label	N3821D	Code for production place and time: week 38, year 2021, Thursday
Product label	020-5420N381D00241	Code for production place and time: • 020-5420 = code number • N = Nordborg • 381D = week 38, year 2021, Thursday) (A-B-C-D-E-F-G is used for weekdays) • 00241 = serial number
Box label; Product label	MADE IN DENMARK	Manufacturing site acc. to EN standards
Box label	EAN code	Barcode for individual code no. identification according to EAN standard
Product label	TS: -40 - 100 °C/-40 - 212F	Operating media temperature range, min and max.
Product label	DN80	Connection size
Product label	Fluid group:2	PED category
Box label; Product label	Additional information: Relevant approval authority logos	

Design and Materials

Straight through, 90 degree diffuser elbow. Integration of all functions into diffuser elbow dimensions:

- Ball valve placed at inlet before staging port
- Sight glass function into 90 degree diffuser elbow
- Check valve function placed at outlet after staging port
- Pressure tap at inlet before ball valve

Figure 5:



Position	Description	Material
1	Elbow housing	Aluminum
2	Ball valve housing	Aluminum
3	Steel flange	Steel
4	Ball	Stainless steel
5	Seat	PTFE
6	Spindle	Brass
7	Cap	Brass
8	Stop ring	Stainless Steel
9	Plain washer	Stainless Steel
10	Spring washer	Stainless Steel
11	Bolt	Stainless Steel
12	Schrader valve	Brass
13	O-ring	EPDM
14	Check valve stationary part	Aluminum, bronze, brass, steel, rubber
15	Check valve moving part	Aluminum, steel, PTFE
16	Spring	Steel
17	Bolt	Stainless Steel
18	Plain washer	Stainless Steel
19	Nut	Stainless Steel
20	Spring washer	Stainless Steel
21	O-ring	EPDM
22	Sight Glass	Brass, glass
23	O-ring	EPDM

Dimensions

You will find downloadable dimension drawings for individual code numbers on Danfoss store as part of the Visuals tab for individual code numbers.

Figure 6: 020C5420

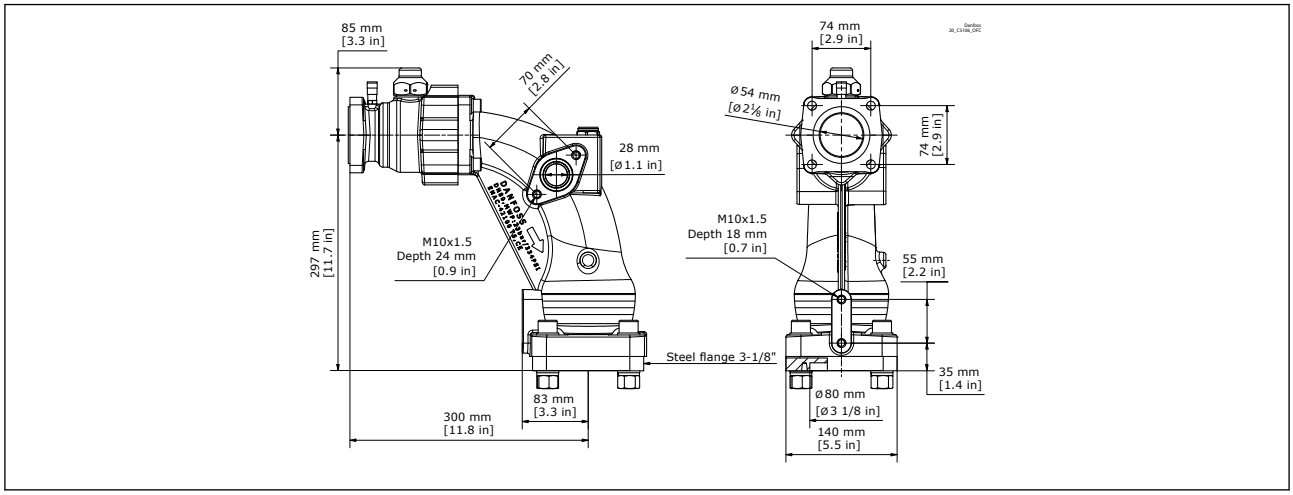


Figure 7: 020C5423

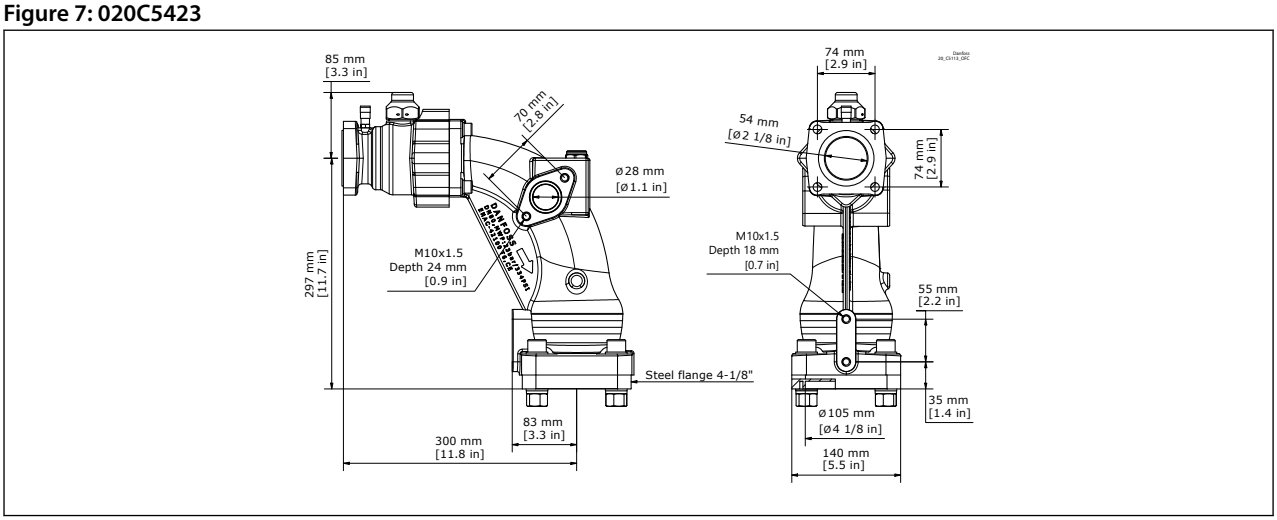


Figure 8: 020C5428

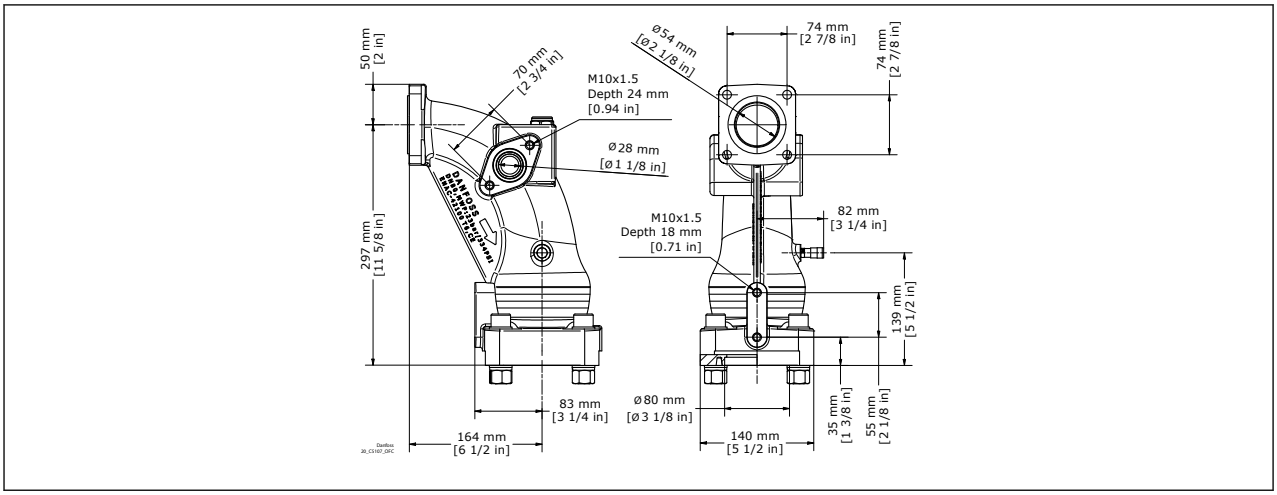


Figure 9: 020C5429

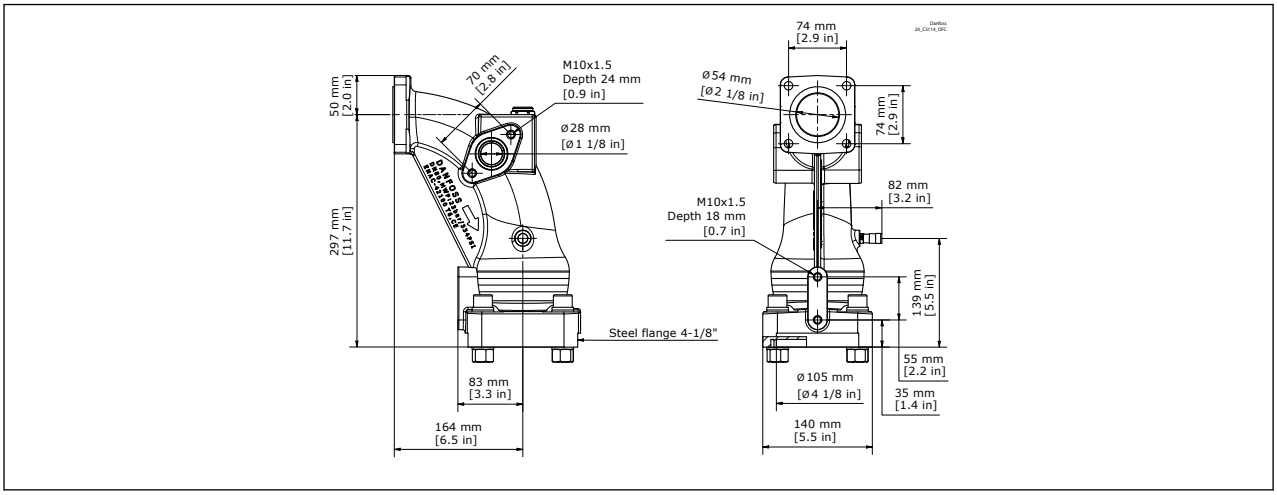


Figure 10: 020C5424

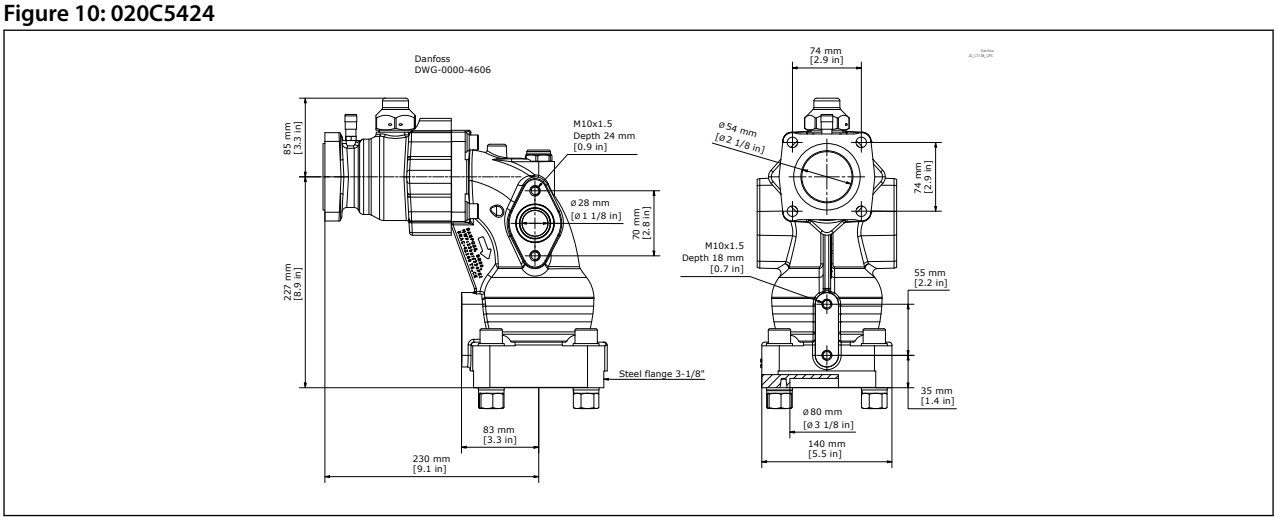


Figure 11: 020C5421

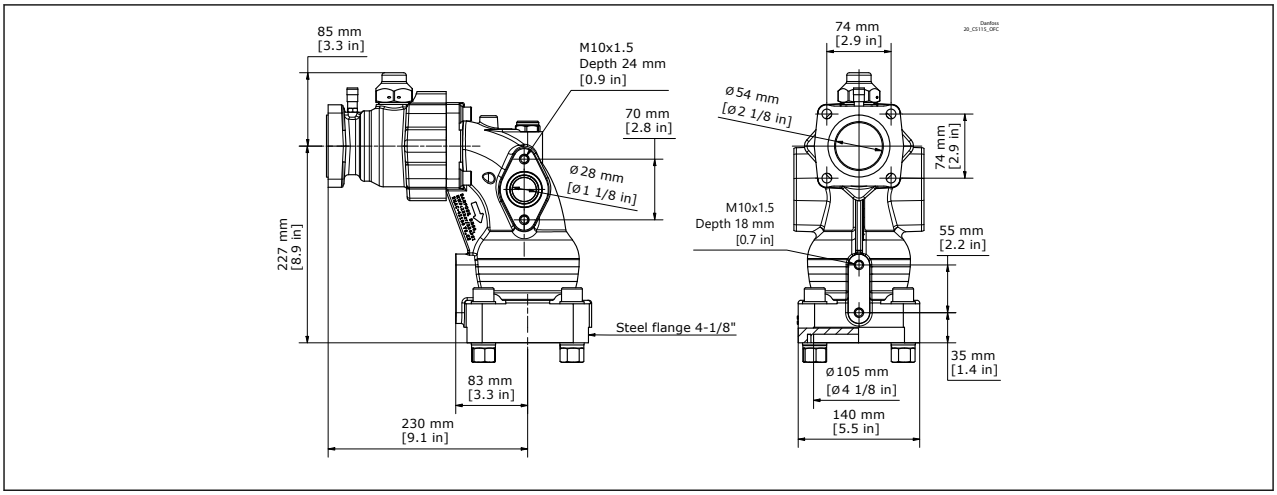


Figure 12: 020C5422

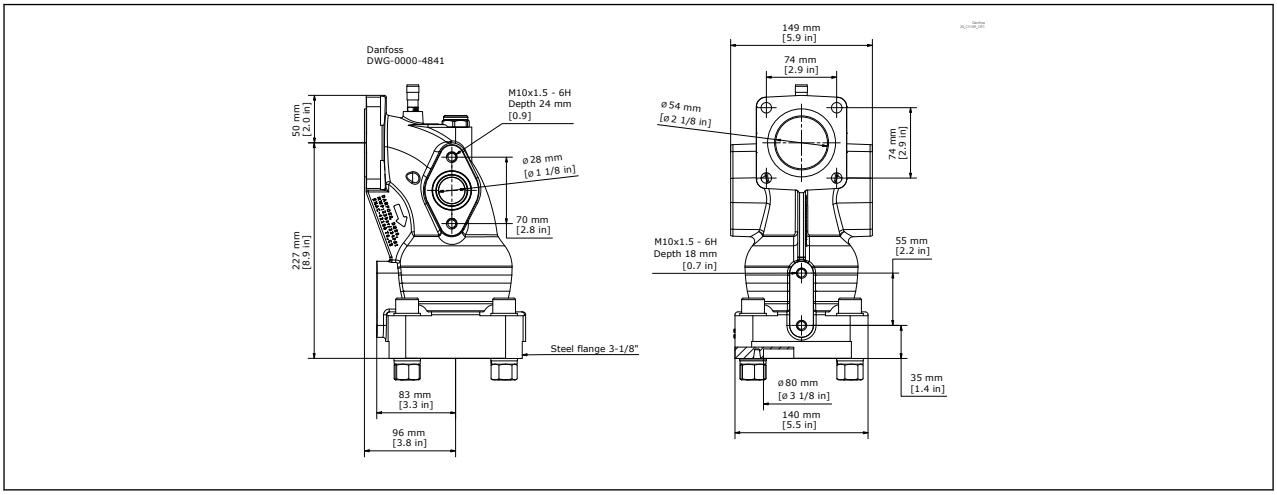


Figure 13: 020C5431

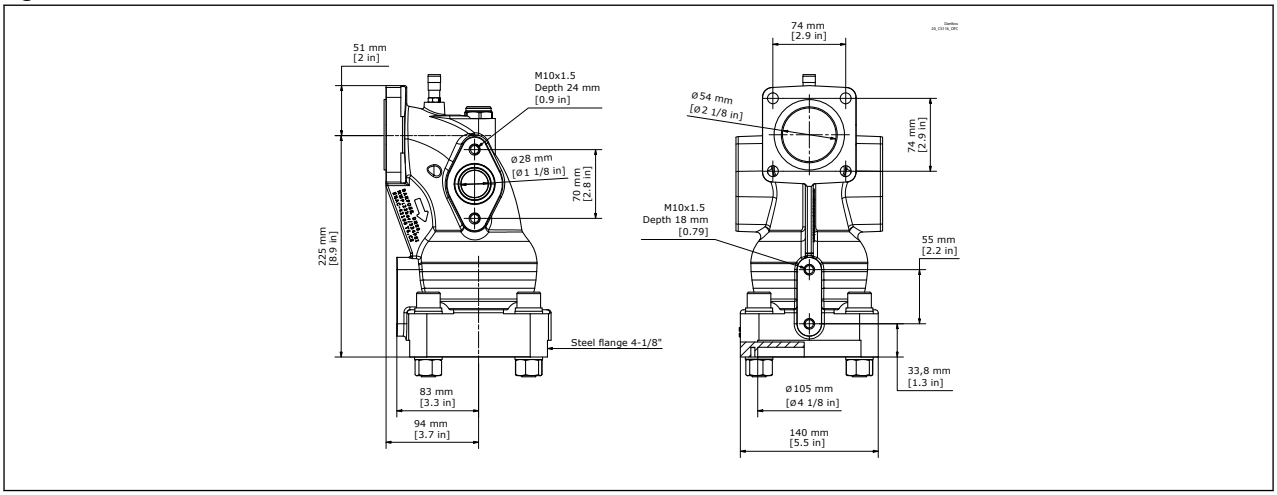


Figure 14: 020C5427

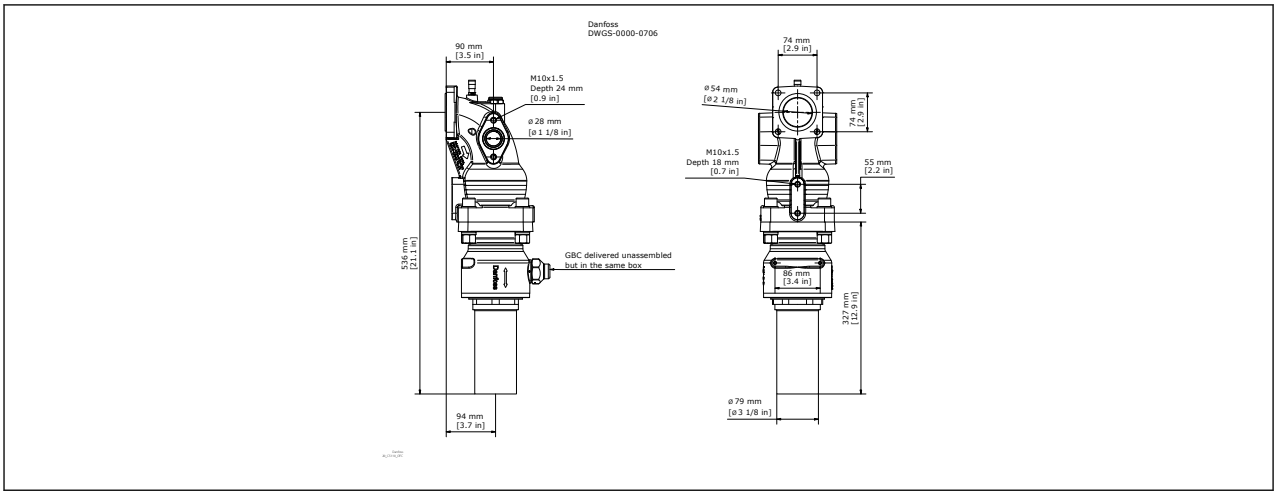


Figure 15: 020C5425

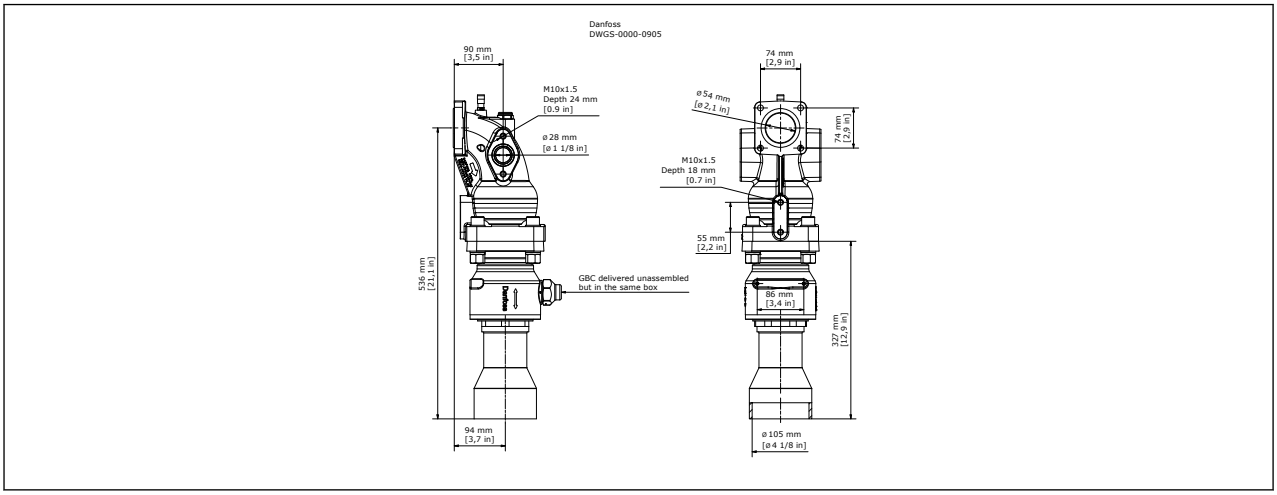


Figure 16: 020C5426

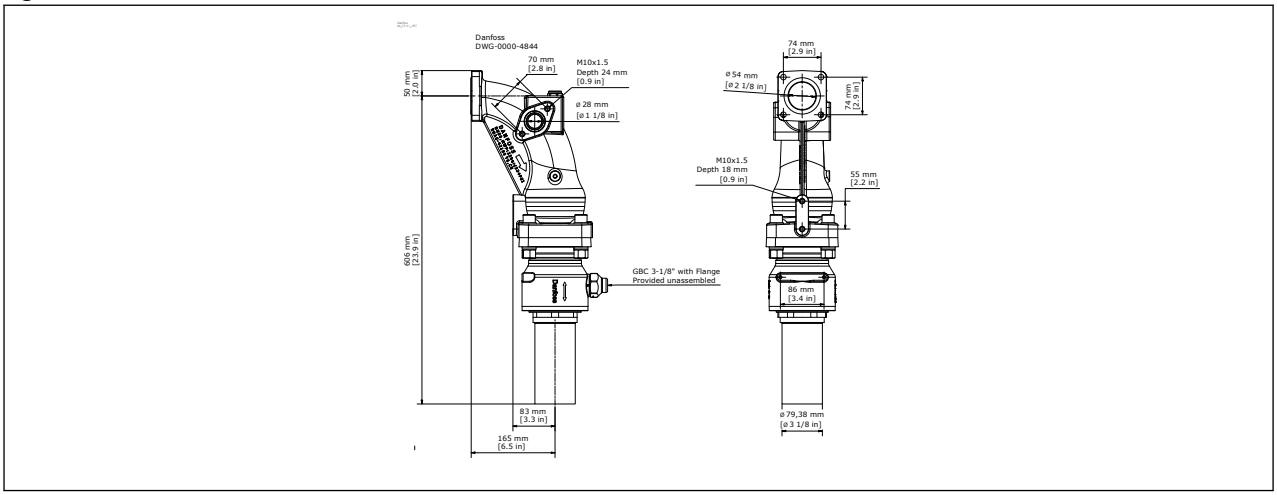


Figure 17: 020C5430

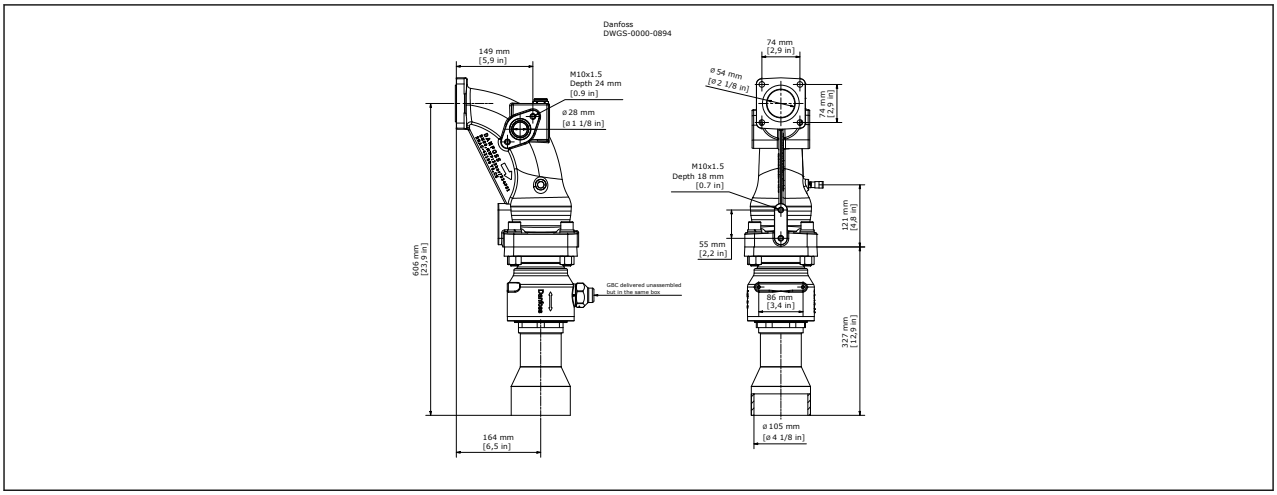


Figure 18: 020-5081

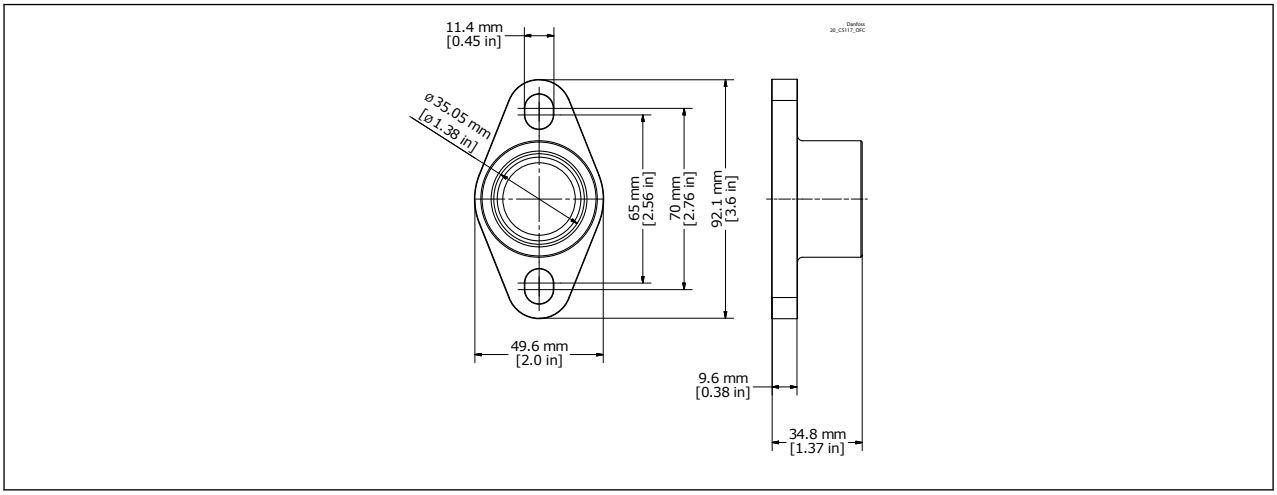


Figure 19: 009G7988

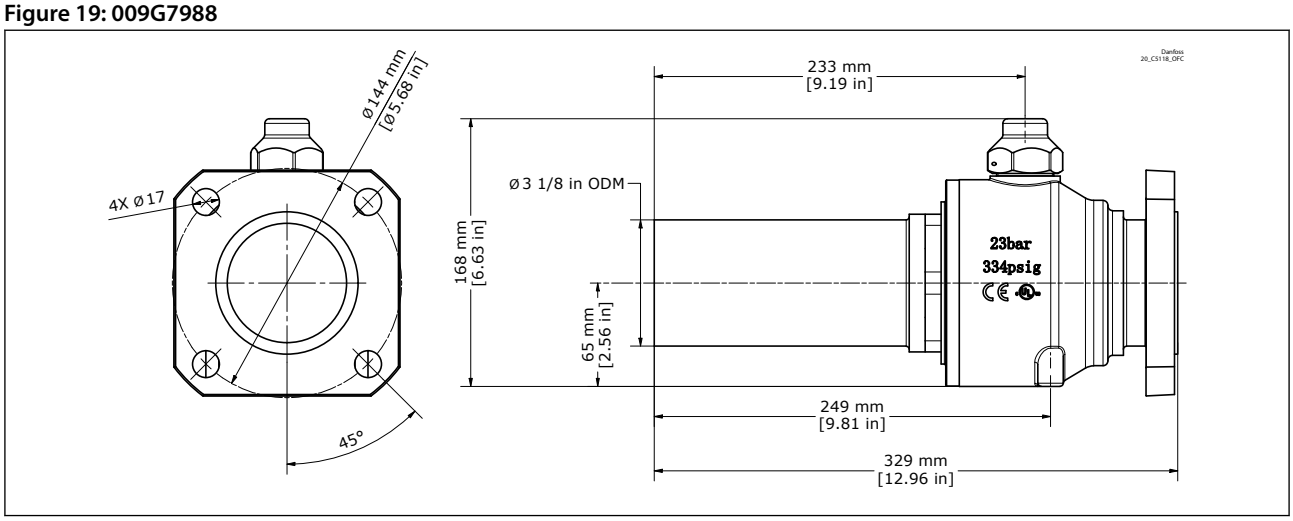


Figure 20: 009G7989

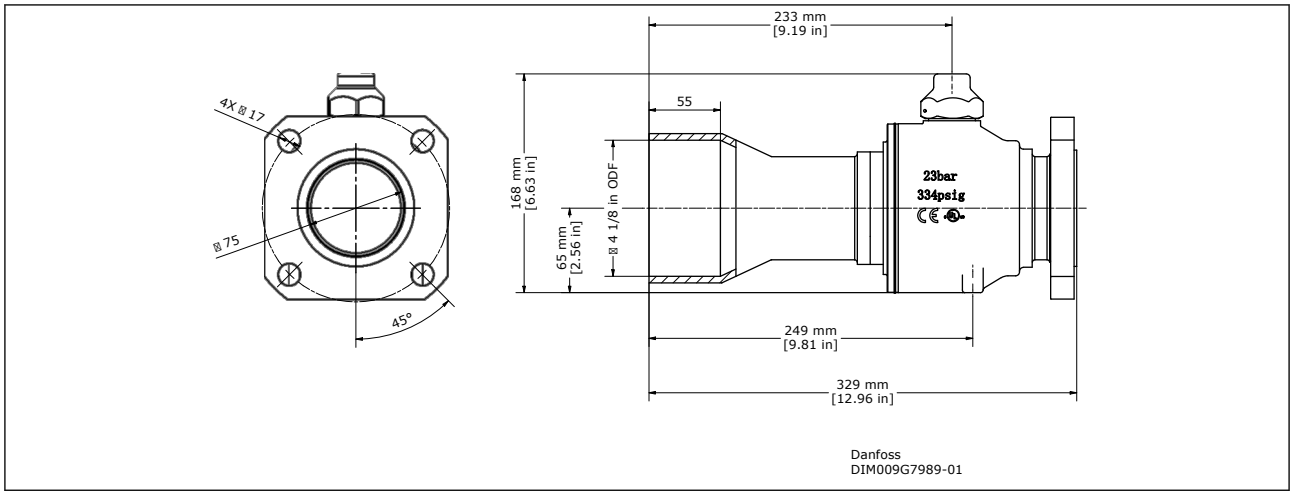
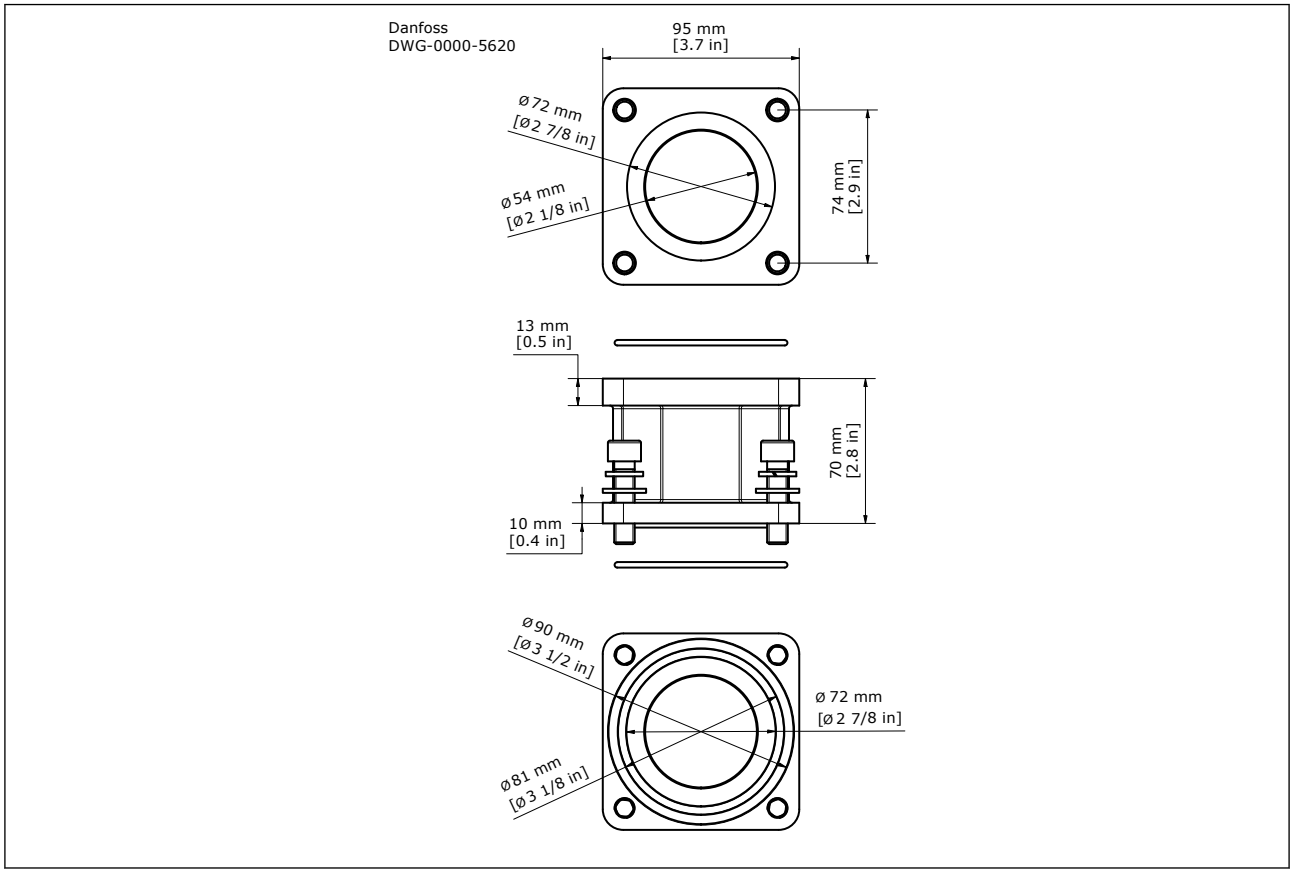


Figure 21: 020C5308



Ordering

OFC 80B with upstream ball valve

Figure 22: OFC 80B with upstream ball valve

Table 6: Ordering

Type	Code no.	Flange Connection				Staging port	Kv [1]	Cv [1]	Min.OPD Δp [2]	Max. working pressure: PS/MWP	Media temperature range	PED category
	Single pack	Inlet		Outlet			[m3/h]	[gal/min]				[Fluid Group 2]
		[in.]	[mm]	[in.]	[mm]							
OFC 80B	020-5420	2-⅛	54	3-⅛	80	Single port	270	312	0.0025bar/ 0.036 psi	23 bar / 334 psig	-40°C to +100°C / -40°F to +212°F	Cat. I
	020C5420	2-⅛	54	3-⅛	80	Dual port						
	020C5423	2-⅛	54	4-⅛	105	Dual port						

[1] Calculated based on fluid dynamic equations. Does not include elbow.
[2] Δp = Minimum Opening Pressure Differential for full open

OFC 80 without ball valve

Figure 23: OFC 80 without ball valve

Table 7: Ordering

Type	Code no.	Flange Connection				Staging port	Kv [1]	Cv [1]	Min.OPD Δp [2]	Max. working pressure: PS/MWP	Media temperature range	PED category
	Single pack	Inlet		Outlet			[m3/h]	[gal/min]				[Fluid Group 2]
		[in.]	[mm]	[in.]	[mm]							
OFC 80	020-5422	2-⅛	54	3-⅛	80	Single port	270	312	0.0025bar/ 0.036 psi	23 bar / 334 psig	-40°C to +100°C / -40°F to +212°F	Cat. I
	020C5428	2-⅛	54	3-⅛	80	Dual port						
	020C5429	2-⅛	54	4-⅛	105	Dual port						

[1] Calculated based on fluid dynamic equations. Does not include elbow.
[2] Δp = Minimum Opening Pressure Differential for full open

OFC 80BC compact version with upstream ball valve

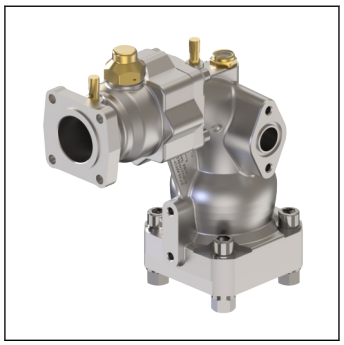


Table 8: Ordering

Type	Code no.	Flange Connection				Staging port	Kv [1]	Cv [1]	Min.OPD Δp [2]	Max. working pressure: PS/MWP	Media temperature range	PED category
	Single pack	Inlet		Outlet			[m3/h]	[gal/min]				[Fluid Group 2]
		[in.]	[mm]	[in.]	[mm]							
OFC 80BC	020C5424	2-⅛	54	3-⅛	80	Dual port	270	312	0.0025bar/ 0.036 psi	23 bar / 334 psig	-40°C to +100°C / -40°F to +212°F	Cat. I
	020C5421	2-⅛	54	4-⅛	105	Dual port						

[1] Calculated based on fluid dynamic equations. Does not include elbow.
[2] Δp = Minimum Opening Pressure Differential for full open

OFC 80C compact version without ball valve

Table 9: Ordering

Type	Code no.	Flange Connection				Staging port	Kv [1]	Cv [1]	Min.OPD Δp [2]	Max. working pressure: PS/MWP	Media temperature range	PED category
	Single pack	Inlet		Outlet			[m3/h]	[gal/min]				[Fluid Group 2]
		[in.]	[mm]	[in.]	[mm]							
OFC 80C	020C5422	2-⅛	54	3-⅛	80	Dual port	270	312	0.0025bar/ 0.036 psi	23 bar / 334 psig	-40°C to +100°C / -40°F to +212°F	Cat. I
	020C5431	2-⅛	54	4-⅛	105	Dual port						

[1] Calculated based on fluid dynamic equations. Does not include elbow.
[2] Δp = Minimum Opening Pressure Differential for full open

OFC 80B with downstream ball valve

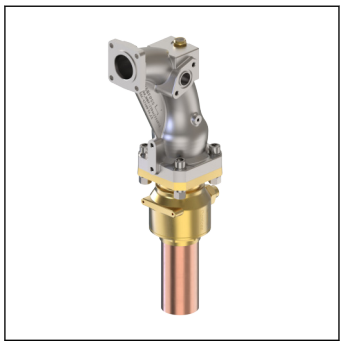


Table 10: Ordering

Type	Code no. Single pack	Connection Flange				Staging port	Kv [1]	Cv [1]	Min.OPD Δp [2]	Max. working pressure: PS/MWP	Media temperature range	PED category [Fluid Group 2]
		Inlet		Outlet								
		[in.]	[mm]	[in.]	[mm]		[m³/h]	[gal/min]				
OFC 80B	020C5426	2-⅛	54	3-⅛	80	Dual port	270	312	0.0025bar/ 0.036 psi	23 bar / 334 psig	-40°C to +100°C / -40°F to +212°F	Cat. I
	020C5430	2-⅛	54	4-⅛	105	Dual port						

[1] Calculated based on fluid dynamic equations. Does not include elbow.
[2] Δp = Minimum Opening Pressure Differential for full open

OFC 80BC compact version with downstream ball valve

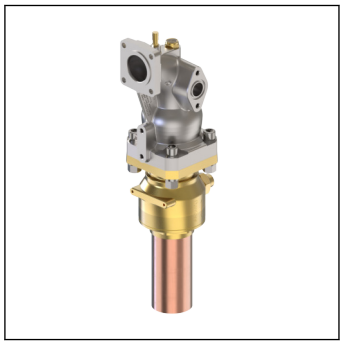


Table 11: Ordering

Type	Code no.	Flange Connection				Staging port	Kv [1]	Cv [1]	Min.OPD Δp [2]	Max. working pressure: PS/MWP	Media temperature range	PED category
	Single pack	Inlet		Outlet								[Fluid Group 2]
		[in.]	[mm]	[in.]	[mm]		[m3/h]	[gal/min]				
OFC 80BC	020C5427	2-⅛	54	3-⅛	80	Dual port	270	312	0.0025bar/ 0.036 psi	23 bar / 334 psig	-40°C to +100°C / -40°F to +212°F	Cat. I
	020C5425	2-⅛	54	4-⅛	105	Dual port						

[1] Calculated based on fluid dynamic equations. Does not include elbow.
[2] Δp = Minimum Opening Pressure Differential for full open

Spare parts

Figure 24: Check Valve kit

Table 12: Check Valve kit

Type	Multi pack	Code no.	Content in kit
	Quantity per packing [pcs]		
Check Valve kit	4	020-5427	• Check valve (1pc) • Blue spring, for 0°->44° orientation (1pc) • Yellow spring, for 45°->89° orientation (1pc) • Red spring, for 90°->134°orientation (1pc) • O-ring of check valve (1pc) • O-ring of outlet flange (1pc) • Silicon Oil (2 gram)

Figure 25: Flange kit

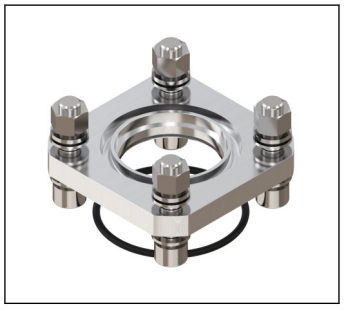


Table 13: Ordering

Type	Valve connection size		Multi pack	Code no.	Content in kit
	[inch]	[mm]	Quantity per packing [pcs]		
Flange kit 3 - ⅛ in	3 - ⅛	80	4	020-5428	• Steel flange (1pc) • O-ring of outlet flange (1pc) • Screw M16x70 (4pcs) • Nut M16 (4pcs) • Spring washer M16 (4pcs) • Plain washer M16 (4pcs) • Silicon Oil (2 gram)
Flange kit 4 - ⅛ in	4 - ⅛	105	4	020-5429	

Figure 26: Staging port flange

Figure 27: Blind flange

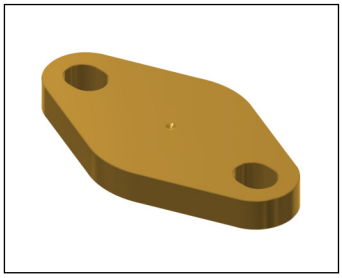


Table 14: Ordering

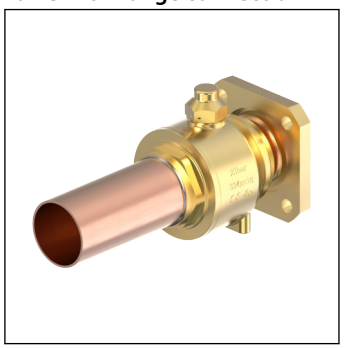
Type	Valve connection size		Multi pack	Code no.	Content in kit
	[inch]	[mm]	Quantity per packing [pcs]		
Staging port flange	1-3⁄8	35	20	020-5081	• Flange of staging port (1pc) • O-ring of staging port (1pc) • Screw M10x35 (2pcs) • Spring washer M10 (2pcs) • Plain washer M10 (2pcs)
Staging port flange + blind flange	1-3⁄8	35	10	020C5307	• Staging port flange (1pc) • Blind flange (1pc) • O-ring (2pcs) • Screw M10x35 (4pcs) • Spring washer M10 (4pcs) • Plain washer M10 (4pcs)

Figure 28: O-ring kit

Table 15: Ordering

Type	Multi pack	Code no.	Content in kit
	Quantity per packing [pcs]		
O-ring kit	18	020-5464	• O-ring of staging port (1pc) • O-ring of outlet flange (1pc) • O-ring between ball valve housing and elbow housing (1pc) • Silicon Oil (2 gram)

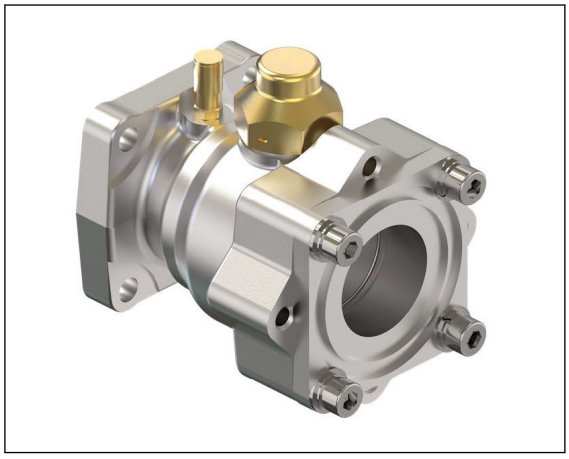
Figure 29: Downstream ball valve with flange connection



Type	Code no.	Connection		Kv[1]	Cv[1]	Single pack	Max. working pressure: PS/MWP	Media temperature range	PED category
	without access port	Inlet	Outlet	[m3/h]	[gal/min]	Qty/ pack			[Fluid Group 2]
GBC 79s F	009G7988	3-1/8 in. flange	3-1/8 in. ODM solder	528.87	611.37	1 pc	23 bar / 334 psig	-40 °C ~ +150°C / -40 °F ~ +302°F	Cat. I
GBC 105s F	009G7989	4-1/8 in. flange	4-1/8 in. ODF solder						

[1] *Calculated based on fluid dynamic equations.*

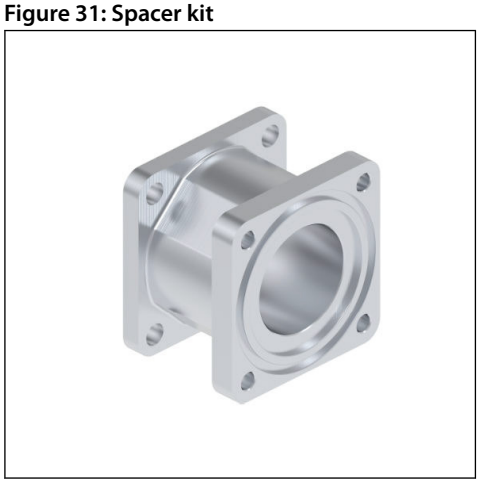
Figure 30: Adaptor and upstream ball valve spare part kit



Type	Connection	Multi pack Quantity per packing [pcs]	Code no.	Content in kit
Adaptor and ball valve spare part kit	2-1/8 in. flange	2	020-5472	• Ball valve (1pc) • Adaptor (1pc) • O-ring (1pc) • Screw M10x40 (4pcs) • Spring washer M10 (4pcs) • Plain washer M10 (4pcs)

NOTE:
020-5472 can be installed with OFC without ball valve

Figure 31: Spacer kit



Type	Connection	Multi pack	Code no.	Content in kit
		Quantity per packing [pcs]		
Spacer kit	2-1/8 in. flange	4	020C5308	• Spacer (1pc) • O-ring (2pcs) • Screw M10x40 (4pcs) • Spring washer M10 (4pcs) • Plain washer M10 (4pcs) • Silicon Oil (2 gram)

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 16: Certificates, declarations and approvals

File name	Document type	Document topic	Approval authority
033F0685	EU Declaration	PED	Danfoss
033F5420	Manufacturers Declaration	RoHS	Danfoss
UL SA7200	Mechanical - Safety Certificate	UL Recognized	UL

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