ENGINEERING TOMORROW

Data Sheet

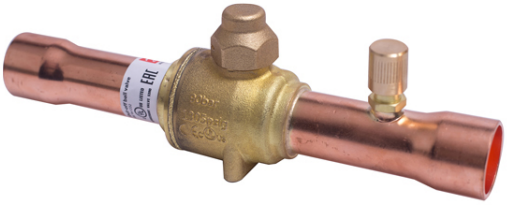
Shut-off ball valve
Type **GBC, GBCH** and **GBCT**

For CO_2 application

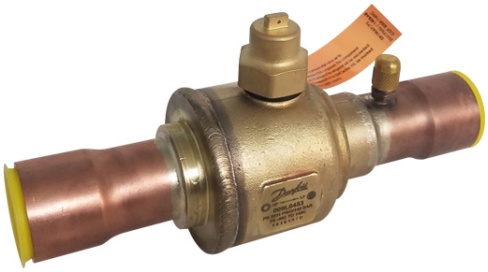
GBC



GBCH



GBCT



Danfoss shut-off ball valves, type GBC,GBCH,GBCT are manually operated shut-off valves for CO_2 refrigeration systems, in order to open and to shut off inner flow path by operating the valve spindle.

The valves are specifically designed for intrinsic standstill security, meaning that the valves can withstand pressures normally arising when the refrigeration system is shut off, i.e. during serving or during unexpected power failure.

The valve structure and materials are designed and tested specifically for use with CO_2 refrigerant.

GBC and GBCH valves are designed to use in subcritical CO_2 refrigeration systems. GBCT valves are approved for use in transcritical CO_2 systems.

Features:

- Bleed hole design to prevent liquid entrapment when the valve is closed
- Sealing material especially for CO_2 to ensure long term product reliability
- Customized brass material ensures consistent performance under aggressive environment
- GBCH 28s~42s with stainless-steel butt welding connections, suitable for systems with stainless-steel piping
- GBCT with reinforced copper-iron tube extensions to allow easy torch-brazing installation
- UL/cUL Listed, complies with Pressure Equipment Directive 2014/68/ EU

Applications

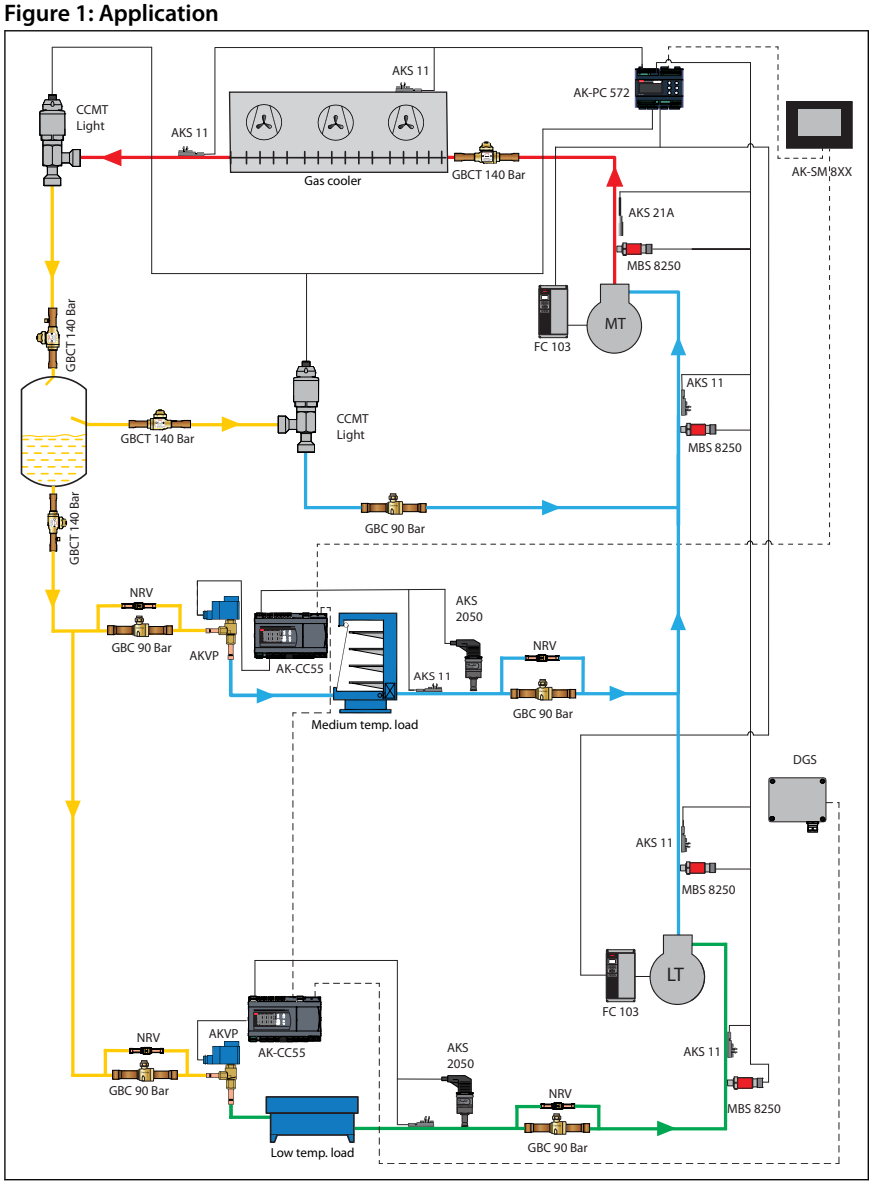
Typical applications for CO_2 ball valves are:

- Display cases
- Supermarket stores
- Food Retail
- Industrial refrigeration
- Heat pump

Danfoss CO_2 ball valves are designed for the following refrigerant cycles:

- GBC with PS = 45 bar, copper connections equipped, for subcritical systems
- GBCH with PS = 90/75 bar, copper/ stainless steel connections equipped, for subcritical systems
- GBCT with PS = 140 bar, reinforced copper connections (K65) equipped, for transcritical systems

Figure 1: Application



	HP High Pressure (120-140 bar)
	HP Receiver Pressure (60-90 bar)
	LP Suction Pressure MT (35-55 bar)
	LP Suction Pressure LT (25-30 bar)

Media

Table 1: Media

Refrigerants	R 744 (CO_2)
Refrigerant oil	POE, PAG (PVE, PAO)

NOTE:

For the application use with R744 as part of a secondary loop or cascade:

1. The design pressure of the refrigerant containing component is not less than the design pressure of the associated components.
2. The component is not provided with any pressure relief or pressure regulating relief valve and that a sufficient number of valves having capacity deemed adequate shall be field installed on the refrigeration system.
3. When the refrigeration system is de-energized, venting of R744 may occur through the pressure regulating relief valves, and may need to be recharged, but the valve should not be defeated or bypassed.
4. A sufficient number of pressure relief and pressure regulating valves may need to be provided based upon system capacity and located such that no stop valve is provided between the relief valve and the parts or section of the system being protected.

Product specification

Technical data

Table 2: Technical data

Technical data	GBC	GBCH	GBCT
Max. working pressure	45 bar / 650 psig	6s - 28s: 90 bar / 1305 psig 35s - 42s: 75 bar / 1085 psig	140 bar / 2031 psig
Media temperature range	-40 °C – 100 °C / -40 °F – 212 °F	-40 °C – 100 °C / -40 °F – 212 °F	-40 °C – 149 °C / -40 °F – 300 °F
Flow direction	Single flow	Bi flow	Bi flow
Environmental transport/storage temperature and humidity	-40 – 65 °C /-40 – 150 °F. Air humidity: RH≤95%.		

CAUTION:

Danfoss recommends that GBCT valves are installed so that the HP side is oriented towards the highest pressure side of the system when the valve is in the closed position.

GBCT CAUTION - RISK OF HIGH PRESSURE

Do not close with CO2 liquid temperature below ambient. This component shall be installed along with a pressure relief valve set to discharge at no higher than the rated pressure of this component. This component is intended for systems in which the critical pressure of the refrigerant will be exceeded. The relief valve shall comply with the requirements of ASME Section VIII, be marked “UV” and sized based on the refrigeration system capacity.

An orange Hanging tag is added on all valves as per requirement of UL certificate.

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.

Figure 2: Box label

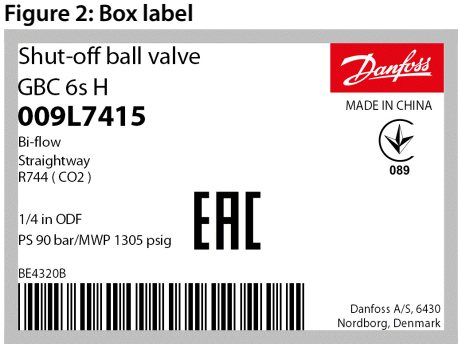


Figure 3: Product label

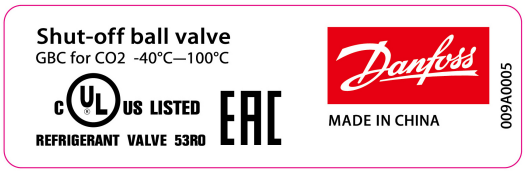


Table 3: Product and label text

Position	Inscription	Explanation
Box label; Product label	Shut-off ball valve	Product name
Box label	GBC 6s H	Product type
Box label	009L7415	Code number for ordering
Box label	Bi-flow	Flow type
Box label	Straightway	Direction
Box label	R744(CO_2)	Refrigerant
Box label	1/4 in ODF	Connection size and type
Box label	PS 90 bar/MWP 1305 psig	Max. working pressure in bar and psig
Box label	BE4320B	Code for production place and time (BE = Wuqing, week 43, year 2020, weekday B = Tuesday)
Box label; Product label	MADE IN CHINA	Manufacturing site acc. to EN standards
Box label	EAN code	Barcode for individual code no. identification according to EAN standard
Product label	-40 °C – 100 °C	Media temperature range
Box label; Product label	Additional information: Relevant approval authority logos	-

Figure 4: Marking of GBCT

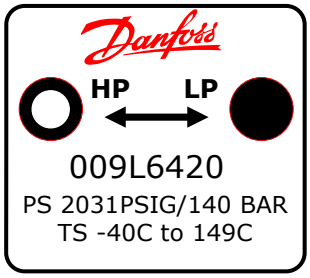


Table 4: Marking of GBCT

Inscription	Explanation
"HP"	Indicates where the bleed hole of ball is located and Danfoss recommends the HP side is oriented towards the highest pressure side of system when valve is in closed position.
"LP"	Indicates the side without bleed hole and shall be oriented towards to the low pressure side of system when valve is in closed position.

Design and materials

Direct flow gives maximum through-flow with minimum pressure drop across valve. The combination of laser-welded valve body (2) and valve tail (4), ball seat/seal (3), double O-ring seal in spindle (6), and cap seal (7) provides the best tightness.

Figure 5: Design and materials

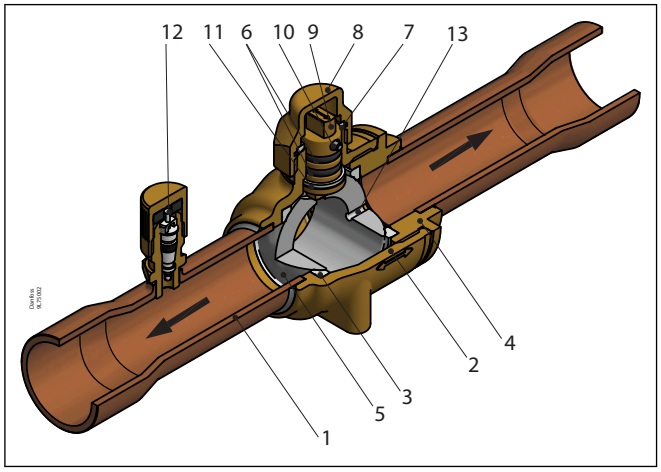


Table 5: Design and materials

Position	Description	Material
1	Connection tube	Copper (Stainless steel for GBCH 28s~42s)
2	Valve body	Brass
3	Ball seat	PTFE
4	Valve tail	Brass
5	Ball	Stainless steel
6	Double O-ring seal in spindle	EPDM Rubber
7	Cap seal	PTFE
8	Seal cap	Brass
9	Spindle	Brass
10	Pin	Stainless steel
11	Guide ring	PTFE
12	Schrader valve	Stainless steel
13	Bleed hole	-

Dimensions

We have chosen to show dimensions of the major versions.

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

Weights also differ depending on the design of the individual code numbers. Weights are available as part of the technical data for individual code numbers on Danfoss store.

GBC solder ODF/ODF, copper connections

Figure 6: GBC solder ODF/ODF

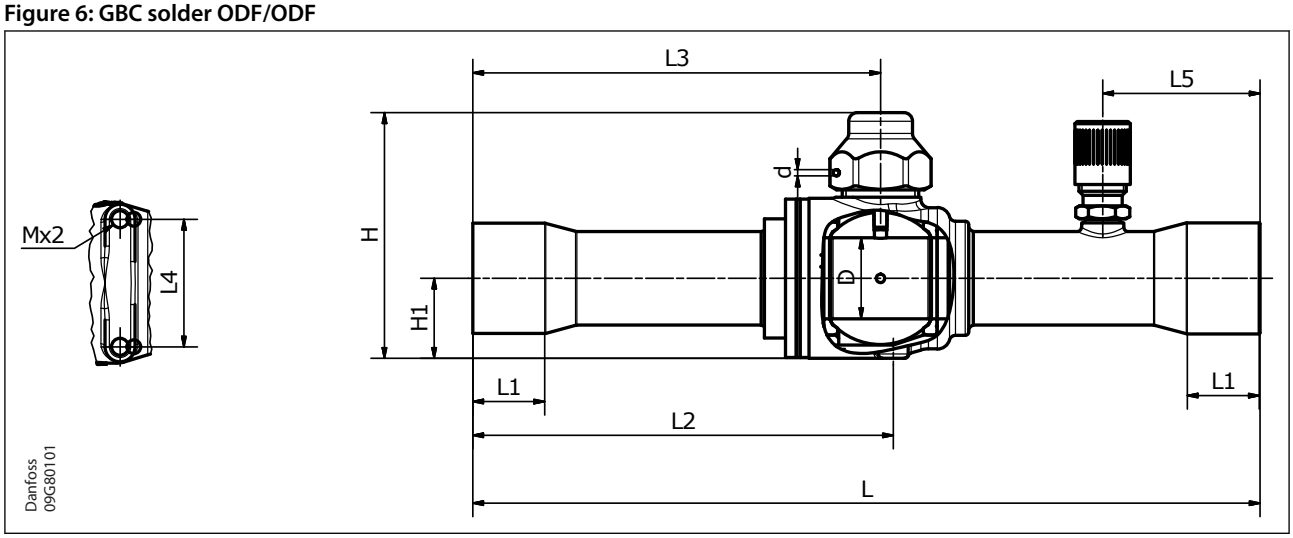


Table 6: GBC solder ODF/ODF, copper connections

Type	Size	Con-nec-tion	Connection tolerance	H	H1	L	L1	L2	L3	L4	L5	M	D	d	Weigh	Code no.	
		[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[kg]	without access port	with access port
GBC 6s	1/4 in.	6.35	+0.065/+0.155	50	15	139	7	75	73	22	31	M4 × 0.7	14	1.5	0.2	009L7520	009L7553
	6 mm	6.00														009L7570	009L7554
GBC 10s	3/8 in.	9.52		50	15	139	8	75	73	22	31	M4 × 0.7	14	1.5	0.2	-	009L7555
	3/8 in.	9.52		50	15	139	9	75	73	22	31	M4 × 0.7	14	1.5	0.2	009L7521	-
	10 mm	10.00														009L7571	009L7556
GBC 12s	1/2 in.	12.70		50	15	161	10	86	84	22	31	M4 × 0.7	14	1.5	0.2	009L7522	009L7557
	12 mm	12.00														009L7572	009L7558
GBC 16s	5/8 in.	16.00		50	15	161	12	86	84	22	31	M4 × 0.7	14	1.5	0.2	009L7523	009L7534
	16 mm																
GBC 18s	3/4 in.	19.05		58	19	185	14	99	96	30	37	M4 × 0.7	19	1.5	0.4	009L7524	009L7563
	18 mm	18.00														009L7574	009L7564
GBC 22s	7/8 in.	22.22	+0.075/+0.185	58	19	185	17	99	96	30	37	M4 × 0.7	19	1.5	0.4	009L7525	009L7536
	22 mm																
GBC 28s	1 1/8 in.	28.58		80	25	208	20	112	108	38	44	M4 × 0.7	26	1.5	0.9	009L7526	009L7565
	28 mm	28.00														009L7576	009L7566
GBC 35s	1 3/8 in.	35.00	+0.09/+0.23	89	30	251	25	136	130	48	44	M6 × 1.0	32	1.5	1.4	009L7528	009L7567
	35 mm																
GBC 42s	1 5/8 in.	41.28		110	35	281	29	151	145	55	56	M6 × 1.0	38	1.5	2.2	009L7529	009L7568
	42 mm	42.00														009L7579	009L7569

GBCH solder ODF/ODF, copper connections

Figure 7: GBC solder ODF/ODM

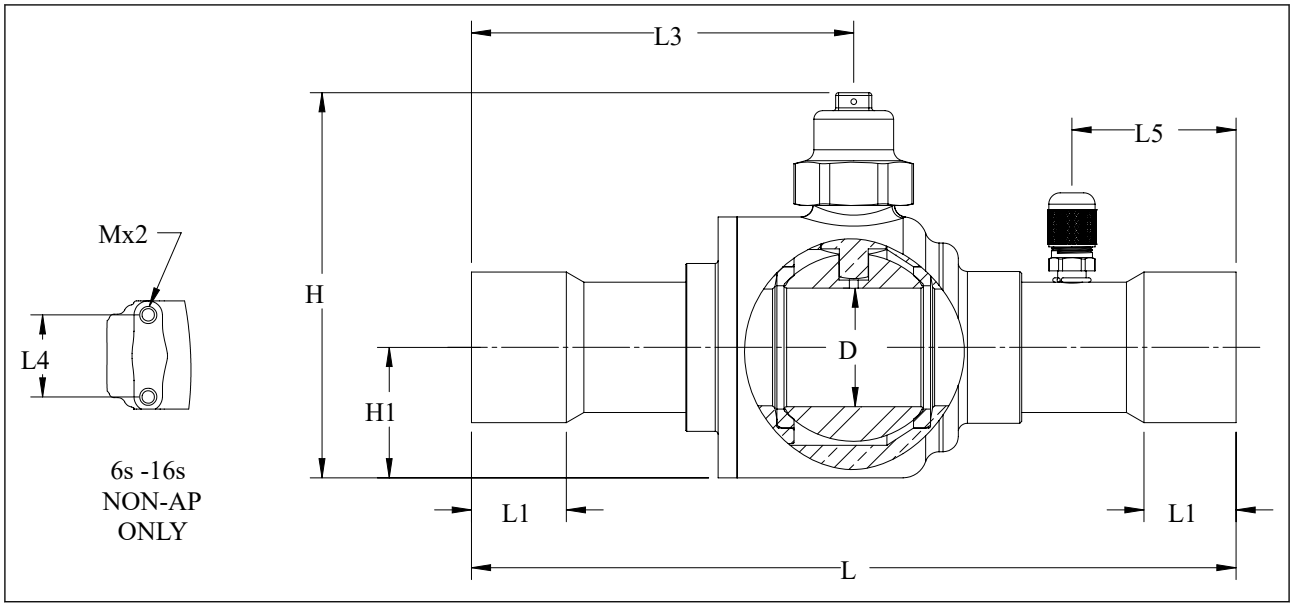


Table 7: GBCH solder ODF/ODF, copper connections

Type	Size	Con-nec-tion	Connection tolerance	H	H1	L	L1	L2	L3	L4	L5	M	D	d	Weigh	Code no.	
		[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[kg]	without access port	with ac-cess port
GBCH 6s	1/4 in.	6.35	+0.065/+0.155	50	15	139	5	75	73	22	31	M4 × 0.7	14	1.5	0.2	009L7415	009L7581
	6 mm	6.00														009L7395	009L7580
GBCH 10s	3/8 in.	9.52		50	15	139	7	75	73	22	31	M4 × 0.7	14	1.5	0.2	009L7416	009L7582
	10 mm	10.00														009L7396	009L7583
GBCH 12s	1/2 in.	12.70		50	15	161	8	86	84	22	31	M4 × 0.7	14	1.5	0.2	009L7417	009L7585
	12 mm	12.00														009L7397	009L7584
GBCH 16s	5/8 in.	16.00		50	15	161	10	86	84	22	31	M4 × 0.7	14	1.5	0.2	009L7418	009L7586
	16 mm																
GBCH 18s	3/4 in.	19.05		58	19	185	12	99	96	30	37	M4 × 0.7	19	1.5	0.4	009L7419	009L7588
	18 mm	18.00														009L7399	009L7587
GBCH 22s	7/8 in.	22.22	+0.075/+0.185	58	19	185	15	99	96	30	37	M4 × 0.7	19	1.5	0.4	009L7420	009L7589
	22 mm																

GBCH butt weld, stainless steel connections

Figure 8: GBC solder ODM/ODM, copper connections

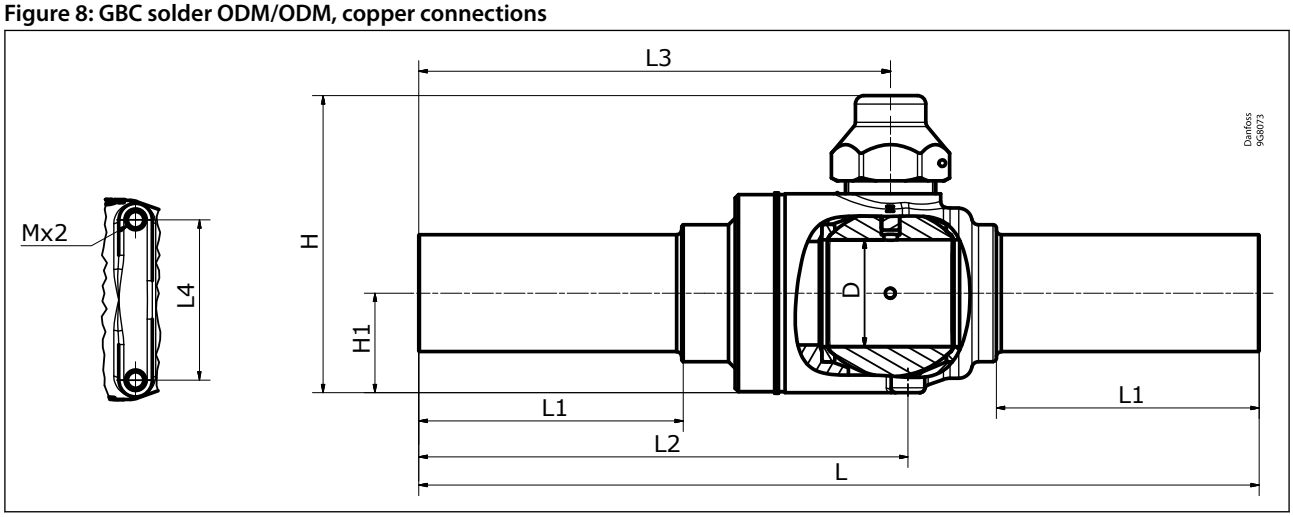


Table 8: GBCH butt weld, stainless steel connections

Type	Size	Connection	Connection tolerance	H	H1	L	L1	L2	L3	L4	M	D	d	Weight	Code no.
		[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[kg]	without access port
GBCH 28s	28 mm	28	-0.1/+0.1	80	25	208	65	115	116	38	M4 × 0.7	25.5	1.5	0.9	009L7406
GBCH 35s	35 mm	35		89	30	251	79	146	141	48	M6 × 1.0	32	1.5	1.5	009L7410
GBCH 42s	42 mm	42		110	35	281	88	162	156	55	M6 × 1.0	38	1.5	2.5	009L7411

GBCT solder ODF/ODF, copper connections

Figure 9: GBCT solder ODF/ODF, copper connections

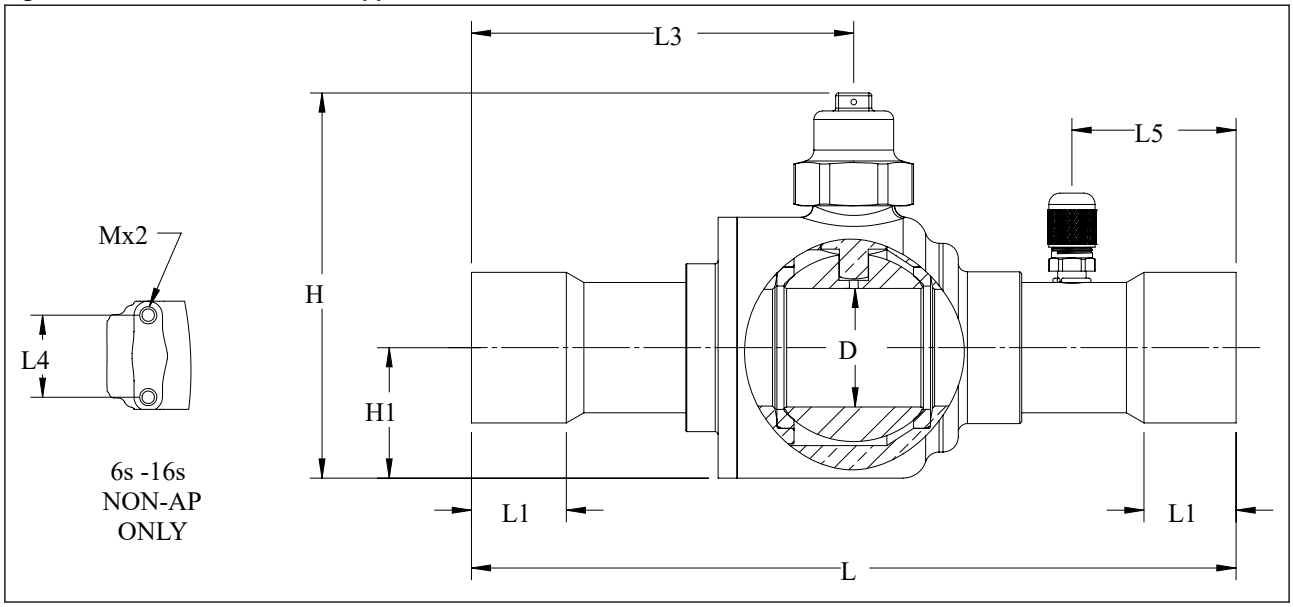


Table 9: GBCT solder ODF/ODF, copper connections

Type	Size	Connection	Connection tolerance	H	H1	L	L1	L3	L4	L5	M	D	Weight	Code no.	
		[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[kg]	without access port	with access port
GBCT 6s	1/4 in.	6.35	+0.051/+0.155	57	14	127	7	69	22	N/A	M4 × 0.7	13	0.2	009L6415	-
				57	14	127	7	55	N/A	44	N/A	13	0.3	-	009L6581
GBCT 10s	3/8 in.	9.52		57	14	132	9	72	22	N/A	M4 × 0.7	13	0.2	009L6416	-
				57	14	132	9	58	N/A	46	N/A	13	0.3	-	009L6582
GBCT 12s	1/2 in.	12.70		57	14	139	10	75	22	N/A	M4 × 0.7	13	0.2	009L6417	-
				57	14	139	10	61	N/A	50	N/A	13	0.3	-	009L6585
GBCT 16s	5/8 in.	15.88		57	14	148	13	80	22	N/A	M4 × 0.7	13	0.2	009L6418	-
				57	14	148	13	66	N/A	54	N/A	13	0.3	-	009L6586
GBCT 18s	3/4 in.	19.05		87	32	148	17	78	N/A	30	N/A	19	0.7	009L6419	009L6588
GBCT 22s	7/8 in.	22.22		87	32	185	20	96	N/A	40	N/A	19	0.7	009L6420	009L6589
GBCT 28s	1 1/8 in.	28.58	+0.075/+0.185	102	37	185	24	95	N/A	40	N/A	25	1.3	009L6406	009L6451
GBCT 35s	1 3/8 in.	34.93		103	35	205	25	102	N/A	44	N/A	32	2.0	009L6410	009L6453
GBCT 42s	1 5/8 in.	41.28	+0.075/+0.203	113	40	240	28	120	N/A	50	N/A	38	2.9	009L6411	009L6454
GBCT 54s	2 1/8 in.	53.98		144	52	275	35	138	N/A	56	N/A	51	6.1	009L6412	009L6456

Connections

Standard GBC, GBCH, GBCT versions can be provided with straightway, connection types solder ODF or butt weld in a wide variety of connection sizes. Solder ODF versions are with extended ends copper connections, butt weld versions with stainless steel connections.

For details on availability, see Ordering

Connection table

Table 10: Connection table

Type	Inlet	Outlet	mm connections	Inch connections
GBC	Solder ODF	Solder ODF	6 mm x 6 mm 10 mm x 10 mm 12 mm x 12 mm 16 mm x 16 mm 18 mm x 18 mm 22 mm x 22 mm 28 mm x 28 mm 35 mm x 35 mm 42 mm x 42 mm	¼ in x ¼ in ⅜ in x ⅜ in ½ in x ½ in ⅝ in x ⅝ in ¾ in x ¾ in ⅞ in x ⅞ in 1 ⅛ in x 1 ⅛ in 1 ⅜ in x 1 ⅜ in 1 ⅝ in x 1 ⅝ in
GBCH	Solder ODF	Solder ODF	6 mm x 6 mm 10 mm x 10 mm 12 mm x 12 mm 16 mm x 16 mm 18 mm x 18 mm 22 mm x 22 mm	¼ in x ¼ in ⅜ in x ⅜ in ½ in x ½ in ⅝ in x ⅝ in ¾ in x ¾ in ⅞ in x ⅞ in
	Butt weld	Butt weld	28 mm x 28 mm 35 mm x 35 mm 42 mm x 42 mm	-
GBCT	Solder ODF	Solder ODF	-	¼ in x ¼ in ⅜ in x ⅜ in ½ in x ½ in ⅝ in x ⅝ in ¾ in x ¾ in ⅞ in x ⅞ in 1 ⅛ in x 1 ⅛ in 1 ⅜ in x 1 ⅜ in 1 ⅝ in x 1 ⅝ in 2 ⅛ in x 2 ⅛ in

Ordering

GBC,GBCH,GBCT code numbers described in this data sheet are standard code numbers, i.e. made to stock.

Besides code numbers made to stock GBC,GBCH,GBCT is also made to order. Make to order options include:
- Mechanical connection type
- Mechanical connection size
- Access port size

Multipack contains several items, individually packed, so that customers can purchase 1 item and receive all relevant documentation.

GBC solder ODF/ODF, copper connections

Figure 10: GBC without access port, solder ODF/ODF

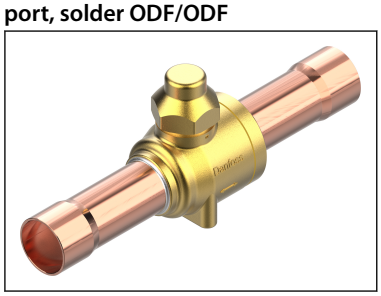


Figure 11: GBC with access port, solder ODF/ODF

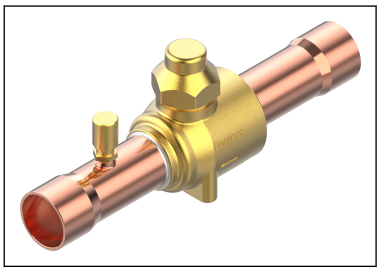


Table 11: GBC solder ODF/ODF, copper connections

Type	Solder ODF / ODF Connection		Kv (1)	Cv (1)	Max. working pressure: PS/MWP	Media temperature range	Code no.		Multi pack
	[in.]	[mm]	[m³/h]	[gal/min]			without access port	with access port	Qty/ pack
GBC 6s	1/4	-	1.74	2.01	45 bar / 650 psig	-40 °C – 100 °C / -40 °F – 212 °F	009L7520	009L7553	25
	-	6	1.74	2.01			009L7570	009L7554	25
GBC 10s	3/8	-	7.52	8.69			009L7521	009L7555	25
	-	10	7.52	8.69			009L7571	009L7556	25
GBC 12s	1/2	-	12.92	14.94			009L7522	009L7557	25
	-	12	12.92	14.94			009L7572	009L7558	25
GBC 16s	5/8	16	15.66	18.10			009L7523	009L7534	25
GBC 18s	3/4	-	21.93	25.35			009L7524	009L7563	25
	-	18	21.93	25.35			009L7574	009L7564	25
GBC 22s	7/8	22	33.34	38.54			009L7525	009L7536	25
GBC 28s	1 1/8	-	62.25	71.96			009L7526	009L7565	5
	-	28	62.25	71.96			009L7576	009L7566	5
GBC 35s	1 3/8	35	92.76	107.23			009L7528	009L7567	5
GBC 42s	1 5/8	-	134.76	155.78			009L7529	009L7568	4
	-	42	134.76	155.78			009L7579	009L7569	4

(1) Calculated based on fluid dynamic equations

GBCH solder ODF/ODF, copper connections

Figure 12: GBCH without access port,solder ODF

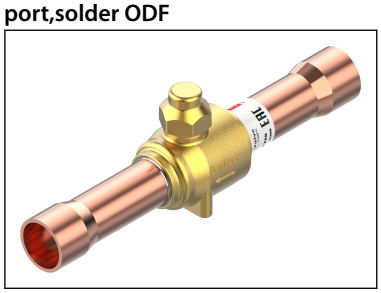


Figure 13: GBCH with access port,solder ODF

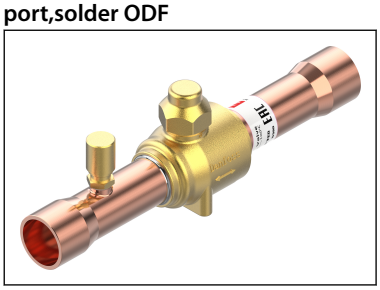


Table 12: GBCH solder ODF/ODF, copper connections

Type	Solder ODF/ODF connection		Kv (1)	Cv (1)	Max. working pressure: PS/MWP	Media temperature range	Code no.		Multi pack
	[in.]	[mm]	[m³/h]	[gal/min]			without access port	with access port	Qty/ pack
GBC 6s H	1/4	-	1.78	2.06	90 bar / 1305 psig	-40 °C – 100 °C / -40 °F – 212 °F	009L7415	009L7581	25
	-	6	1.78	2.06			009L7395	009L7580	25
GBC 10s H	3/8	-	6.31	7.29			009L7416	009L7582	25
	-	10	6.31	7.29			009L7396	009L7583	25
GBC 12s H	1/2	-	12.87	14.88			009L7417	009L7585	25
	-	12	12.87	14.88			009L7397	009L7584	25
GBC 16s H	5/8	16	11.77	13.61			009L7418	009L7586	25
GBC 18s H	3/4	-	31.07	35.92			009L7419	009L7588	25
	-	18	31.07	35.92			009L7399	009L7587	25
GBC 22s H	7/8	22	24.47	28.29			009L7420	009L7589	25

(1) Calculated based on fluid dynamic equations

GBCH butt weld, stainless steel connections

Figure 14: GBCH without access port,butt weld

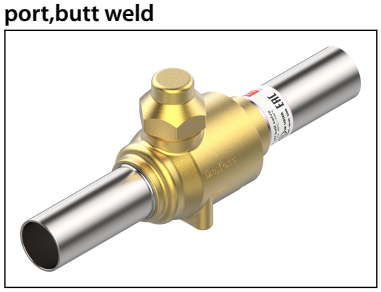


Table 13: GBCH butt weld, stainless steel connections

Type	Solder ODF/ODF connection		Kv (1)	Cv (1)	Max. working pressure: PS/MWP	Media temperature range	Code no.		Multi pack
	[in.]	[mm]	[m³/h]	[gal/min]			without access port	with access port	Qty/ pack
GBC 28s H	-	28	96.72	111.81	90 bar / 1305 psig	-40 °C – 100 °C / -40 °F – 212 °F	009L7406	-	5
GBC 35s H	-	35	106.95	123.63	75 bar / 1088 psig		009L7410	-	5
GBC 42s H	-	42	150.98	174.53			009L7411	-	4

(1) Calculated based on fluid dynamic equations

GBCT solder ODF/ODF, copper connections

Figure 15: GBCT without access port,solder ODF

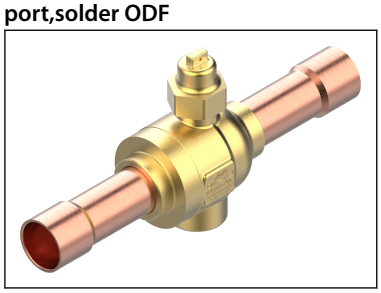


Figure 16: GBCT with access port,solder ODF

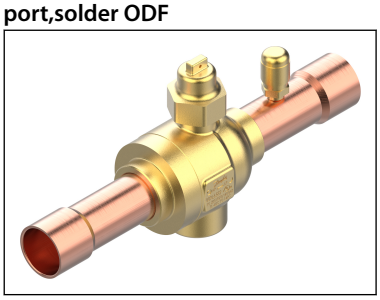


Table 14: GBCT solder ODF/ODF, copper connections

Type	Connec-tion	Kv	Cv	Max. working pressure: PS/MWP	Media tempera-ture range	Code no.		Multi pack
	[in.]	[m³/h]	[gal/min]			without access port	with access port	Qty/ pack
GBCT 6s	1/4	0.9	1.0	140 bar / 2031 psig	-40 °C – 149 °C / -40 °F – 300 °F	009L6415	009L6581	30
GBCT 10s	3/8	3.7	4.3			009L6416	009L6582	30
GBCT 12s	1/2	5.4	6.2			009L6417	009L6585	30
GBCT 16s	5/8	10.4	12.1			009L6418	009L6586	30
GBCT 18s	3/4	16.4	19.0			009L6419	009L6588	18
GBCT 22s	7/8	23.7	27.5			009L6420	009L6589	18
GBCT 28s	1 1/8	42.3	48.9			009L6406	009L6451	4
GBCT 35s	1 3/8	67.1	77.6			009L6410	009L6453	4
GBCT 42s	1 5/8	83.1	96.1			009L6411	009L6454	4
GBCT 54s	2 1/8	171.3	198.0			009L6412	009L6456	2

Spare parts

Figure 17: Seal cap kit



Table 15: Seal cap kit

Type	Valve connection size		Industrial pack [pcs]	Code no.
	[inch]	[mm]		
GBC/GBCH 6s - 22s	1/4 – 7⁄8	6 – 22	6	**009L7210**
GBC/GBCH 28s - 35s	1 1/8 – 1 3/8	28 – 35	3	**009L7211**
GBC/GBCH 42s	1 5⁄8	42	3	**009L7212**

Figure 18: Bracket kit



Type	Valve connection size		Industrial pack [pcs.]	Code no.
	[inch]	[mm]		
GBC/GBCH 6s -16s	1/4 – 5⁄8	6 – 16	12	**009G7084**
GBC/GBCH 18s - 22s	3/4– 7⁄8	18 – 22	12	**009G7085**
GBC/GBCH 28s	1 1⁄8	28	10	**009G7086**
GBC/GBCH 35s	1 3⁄8	35	5	**009G7087**
GBC/GBCH 42s	1 5⁄8	42	4	**009G7088**

NOTE:
The spare parts are only for GBC and GBCH. For GBCT spare parts, please consult Danfoss

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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Type	File name	Document type	Document topic	Approval authority
GBC, GBCH, GBCT	Д-DK.PA01.B.02567_19	EAC Declaration	Machinery & Equipment	EAC RU
GBC, GBCH, GBCT	Д-DK.БЛ08.B.02139_19	EAC Declaration	PED	EAC RU
GBC, GBCH	033F4001.AE	Manufacturers Declaration	PED	Danfoss
GBC, GBCH	033F4002.AE	EU Declaration	PED	Danfoss
GBCT	033F4003.AA	Manufacturers Declaration	PED	Danfoss
GBC, GBCH, GBCT	033F4006	Manufacturers Declaration	China RoHS	Danfoss
GBC, GBCH, GBCT	033F4010	Manufacturers Declaration	RoHS	Danfoss
GBCT	033F4013.AA	EU Declaration	PED	Danfoss
GBC, GBCH	UA.089. D. 00189-17	UA Declaration	PED	LLC CDC EURO TYSK
GBC, GBCH	UA.TR-089.0995-17	Pressure - Safety Certificate	PED	LLC CDC EURO TYSK
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