

Data sheet

Pilot-operated servo valve

Type ICS



The valve comprises three main components: valve body, function module and top cover.

ICS pilot-operated servo valves are pilot operated valves for regulating pressure, temperature and ON/OFF function in refrigeration systems. ICS valves are designed for low and high-pressure refrigerants.

ICS valves can be used on the high and low-pressure sides, in wet and dry suction lines and in liquid lines without phase change (i.e. where no expansion takes place in the valve).

The function of ICS valves is dependent on the pilot pressure applied from either a pilot valve or external pilot pressure source.

ICS 1 pilot has one pilot pressure connection and ICS 3 pilot has three pilot pressure connections.

Features

- Designed for industrial refrigeration applications for a maximum working pressure of 754 psig / 52 bar g.
- Applicable to HCFC, HFC, R717 (Ammonia) and R744 (CO₂).
- Direct coupled connections
- Connection types include butt weld, socket weld, solder and threaded connections.
- Low temperature steel body
- Low weight and compact design.
- V-port regulating cone ensures optimum regulating accuracy particularly at part load.
- Function module has a QPQ surface treated insert and a steel piston ring ensuring precise control accuracy.
- Modular Concept
 - Each valve body is available with several different connection types and sizes
 - Valve overhaul on ICS 25-80 is done by replacing the function module
 - Possible to convert ICS Pilot-operated servo valve to ICM motor operated valve
- Manual opening.
- The ICS valve is a multifunction valve where several pilot valves can be mounted into the pilot ports.
- Pressure gauge connection port to measure valve inlet pressure.
- The top cover can be rotated into any possible position without affecting the operation of the valve.
- Classification: DNV, CRN, BV, EAC etc.
To get an updated list of certification on the products please contact your local Danfoss Sales Company.

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Design

ICS valves are designed as pilot operated valves requiring minimal pressure differential to open. If the pressure difference is 0 psi (0 bar), the ICS valve will be closed. If the pressure difference is 2.9 psi (0.2 bar) or more, the ICS valve will be fully open. At pressure differences between 1 psi (0.07 bar) and 2.9 psi (0.2 bar), the opening degree will be correspondingly proportional.

The ICS is available for use with either one or three pilot valves.

Two of the three pilot pressure connections (S1 and S2) are connected in series while the third (P) is connected in parallel to S1 and S2. This allows different combinations of pilot valves to be used, thus providing numerous variations in control functions.

There is a very wide range of connection types available with ICS valves.

Approvals

The ICV valve concept is designed to fulfill global refrigeration requirements. For specific approval information, please contact Danfoss.

The ICS valves 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

Valve body and top cover material:
Low temperature steel



ICS valves			
Nominal bore	DN ≤ 25 (1 in.)	DN 32-65 (1¼ - 2½ in.)	DN 100-150 (4-6 in.)
Classified for	Fluid group I		
Category	Article 3, paragraph 3	II	III

Technical data

- *Refrigerants*
Applicable to HCFC, HFC, R717 (Ammonia) and R744 (CO₂).
Use with flammable hydrocarbons cannot be recommended; please contact Danfoss.
- *Temperature range*
-76/+248°F (-60/+120°C).
- *Surface protection*
ICS 25-150:
The external surface is zinc-chromated to provide good corrosion protection.

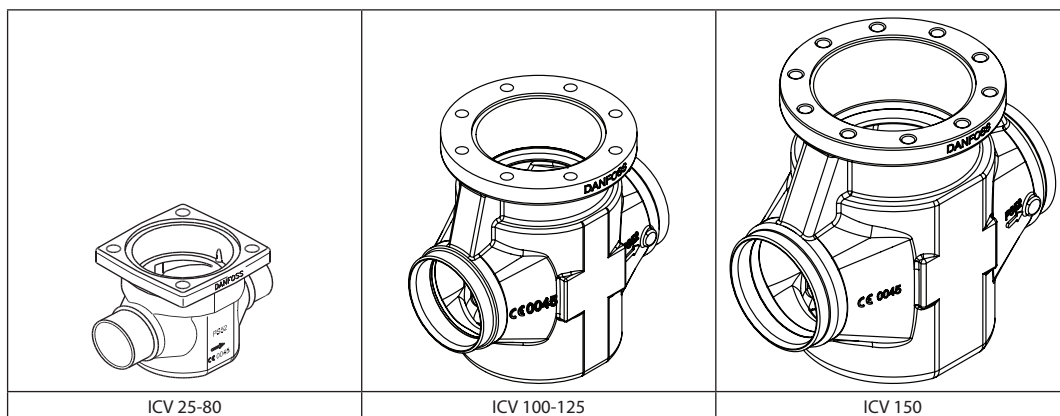
- *Pressure range*
The valve is designed for:
Max. working pressure: 754 psig (52 bar)

Opening differential pressure:
Fully open: Min. 2.9 psig (0.2 bar)
Max. Opening Pressure Differential (MOPD), solenoid valves only - at nominal conditions.
- 10 W a.c. up to 305 psi (21 bar)
- 20 W a.c. up to 580 psi (40 bar)

The ICS Concept

The ICS concept is developed around a modular principle. This gives the possibility of combining function modules and top covers with special valve body size that is available in a variety of connection possibilities.

- There are eight valve bodies available.

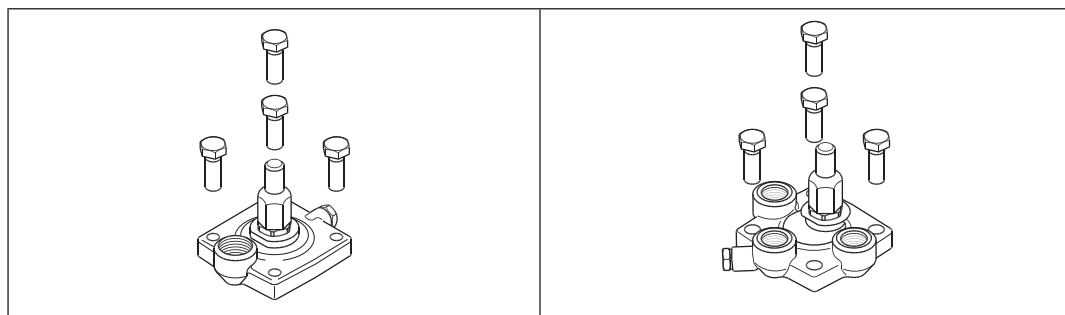


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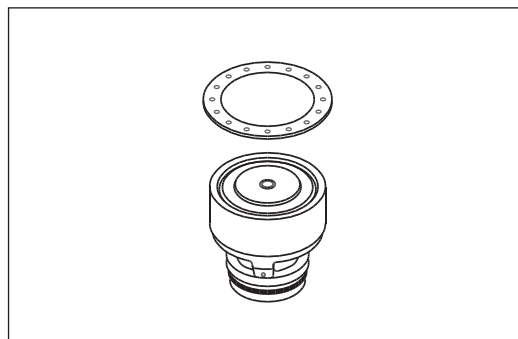
- Valve bodies in the sizes ICS 25-65 are available with a range of nominal through oversized connection sizes and types. ICS100 - 150 are available in butt-weld nominal sizes

BW	SOC	ODS	FPT
Butt-weld ANSI	Socket weld ANSI	Solder ANSI	Female Pipe Thread

- Each valve body may be fitted with a 1 pilot or 3 pilot top cover.

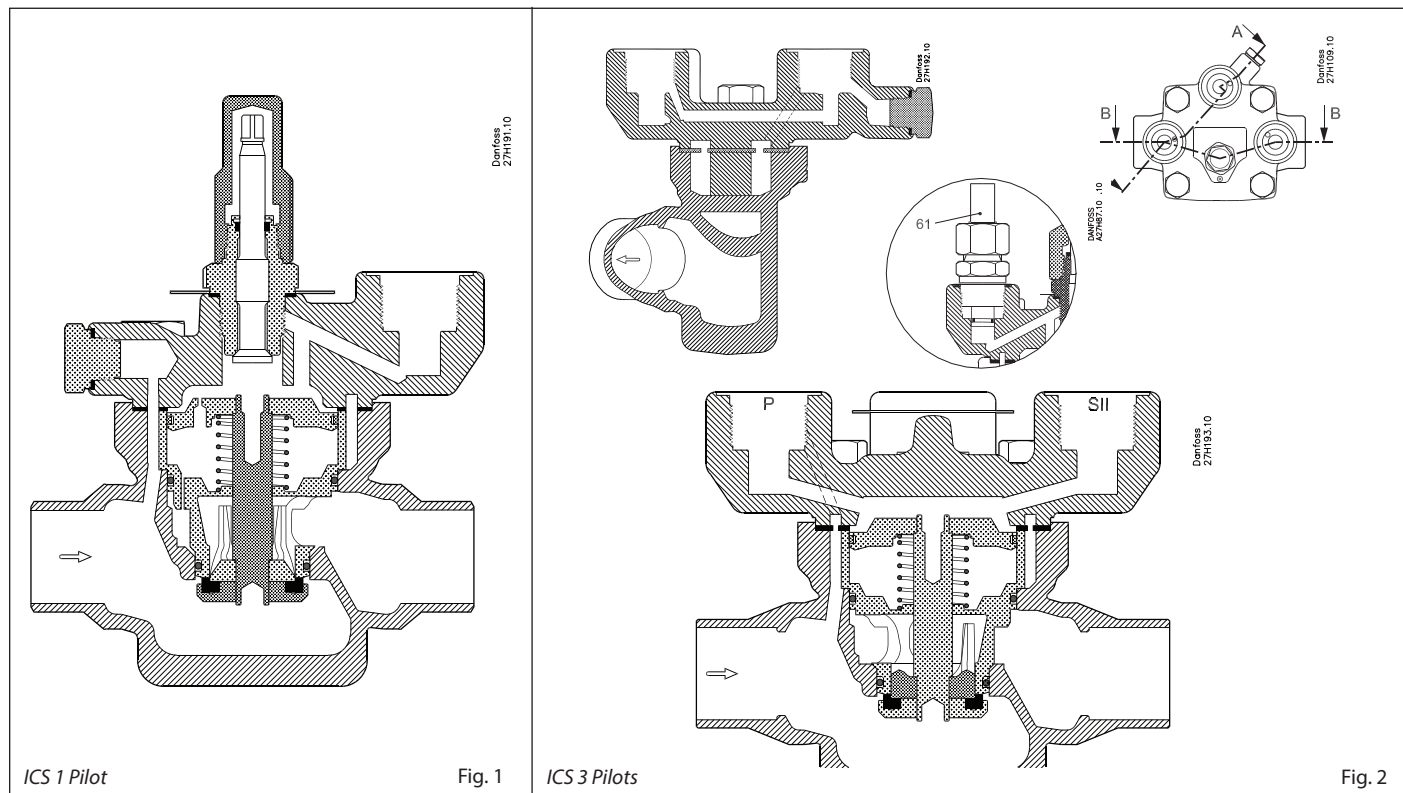


In ICS, multiple inserts (function modules) are available to give different capacities. ICS 25 body size is available in reduced port modules for better control at low capacities.



Type	Valve body size	K _v (m ³ /h)	C _v (USgal/min)
ICS 25-5	25	1.7	2.0
ICS 25-10		3.5	4.1
ICS 25-15		6.0	7.0
ICS 25-20		8	9.3
ICS 25-25		11.5	13.3
ICS 32	32	17	20
ICS 40	40	27	31
ICS 50	50	44	51
ICS 65	65	70	81
ICS 80	80	85	98
ICS 100	100	142	165
ICS 125	125	207	240
ICS 150	150	354	410

Function



ICS 1 Pilot and ICS 3 Pilot

- 1. Body
- 1a Pilot channel to inlet side
- 1b Circular gap between house and module
- 2. Top cover
- 2a Pilot channels in top cover
- 2b Pilot insertion hole
- 2c Pressure gauge connection
- 2d Piston top inlet channel
- 2e Cross channel SI to SII
- 2f Inlet channel
- 2g Circular groove
- 3 Function module
- 3a Cylinder
- 3b Piston
- 3c Valve plate
- 3d Spring
- 3e Cone
- 3f Equalization orifice
- 3g Piston rod
- p_1 Inlet pressure
- p_2 Pressure on piston
- p_3 Pressure underneath piston
- p_4 Outlet pressure
- 8 Manual operating spindle

The ICS main valve is a pilot operated valve. The types of pilot valves used determine the function. The ICS main valve with pilot valve(s) controls refrigerant flow by modulation or on/off in accordance with the pilot valve and main valve status. The manual spindle can be used to manually open the valve.

The opening degree of the main valve is determined by the pressure difference (differential pressure) between pressure p_2 , which acts on top of the servo piston (3b), and pressure p_3 , which acts on the underside of the servo piston.

If this pressure difference is 0, the main valve will be fully closed.

If the pressure difference is 2.9 psi (0.2 bar) or greater, the main valve will be fully open. At pressure differences ($p_2 - p_3$) between 1 psi (0.07 bar) and 2.9 psi (0.2 bar), the degree of opening will be correspondingly proportional.

The port of the throttle cone (3e) is V-shaped, which provide good regulation characteristic to pilot operated main valves even at low loads.

p_3 pressure is equal to the valve outlet pressure (p_4), due to a clearance between the piston rod (3g) and the function module. The opening degree of the ICS valve is therefore controlled by the p_2 pressure acting on top of the servo piston, which is equal to or greater than valve outlet pressure (p_4).

The maximum pressure (p_2) can act on the top of the servo piston (3b). p_2 normally corresponds to the pressure, p_1 - ICS main valve inlet pressure.

Inlet pressure p_1 is led, via the drilled channels (1a, 1b, 2f, 2b (pilot), 2a, 2d) in the valve body (1) and cover (2) through the individual pilot valves and onto the top of the servo piston (3b).

The degree of opening of the individual pilot valves determines the magnitude of pressure p_2 and thus the degree of opening of the main valve. The equalization hole (3f) in the servo piston (3b) ensures that pressure p_2 is balanced in accordance with the degree of opening of the pilot valve.

Note:

When ICS valves with 3 pilot ports are used with external pressure connector (fig. 2, pos. 61), the valve port inlet pressure will be isolated.

The ICS can be fitted with just a single screwed-in pilot valve or external pilot connection. The degree of opening of the main valve will be in accordance with the control status of the pilot valve or external pilot flow control.

ICS main valve with one pilot connection is fully closed when the pilot valve is fully closed and fully open when the pilot valve is fully open. Otherwise the degree of opening of the main valve is proportional to the degree of opening of the pilot valve.

The ICS 3 pilot version can be fitted with one, two, or three pilot valves so that up to three regulating functions are possible. If the external pilot connection is used, more functions can be added.

Function (continued)

In the ICS three pilot version, the pilot ports are related as follows:

- The pilot valves fitted in ports SI and SII are connected in series.
- The ICS 3 pilot operated main valve will be fully closed if just one of the series-connected pilot valves is closed. The main valve can only open if both pilot valves are open at the same time.
- The pilot valve fitted in port P is connected in parallel to the pilot valves in ports SI and SII.

The ICS valve will be fully open if the pilot valve in P is fully open, irrespective of the degree of opening of pilot valves SI and SII.

The ICS valve will be fully closed if the pilot valve in P is fully closed and at least one of the valves in SI or SII is fully closed at the same time. The relation between the pilot valves in ports SI, SII and P is shown in Table 1 below.

If the ICS is not fitted with three pilot valves, the unused port(s) must be sealed with a pilot cap A or a combination of pilot cap A and blanking plug B. If the pilot cap and blanking plug are fitted as an assembled unit, A + B, the channels from the specific port will be closed. (See Figure 1)

If only cap A is fitted, the channels from the ports in question will be open. If the degree of opening of the ICS main valve is not to be a function of the main valve inlet pressure, or if more than three regulating functions are required, ports SI, SII or P can be fitted with a nipple for the connection

of external pilot pressure. This applies to all ICS versions.

The pressure to which the external pilot line is connected will then determine the main valve function. Pilot valves installed in external lines must be mounted in a type CVH housing.

Depending on the function of the pilot valves, the ICS regulating characteristic becomes:

- on/off
- proportional
- integral or
- cascade.

ICS main valves are therefore especially suitable for all forms of temperature and pressure regulating systems.

An overview of the types of pilot valves available can be found in Table 2 (on the following page), or technical leaflet: "Pilot valves for operated main valves" (RD4XC).

On the following pages, a number of standard configuration examples can be found. These are only for explanatory purpose. However, by using the literature regarding pilot valves these examples are easier to comprehend.

Table 1

Pilot valve port			ICS valve
SI	SII	P	
Open	Open	Closed	Open
Open	Open	Open	Open
Open	Closed	Closed	Closed
Open	Closed	Open	Open
Closed	Open	Closed	Closed
Closed	Open	Open	Open
Closed	Closed	Closed	Closed
Closed	Closed	Open	Open

Figure 1

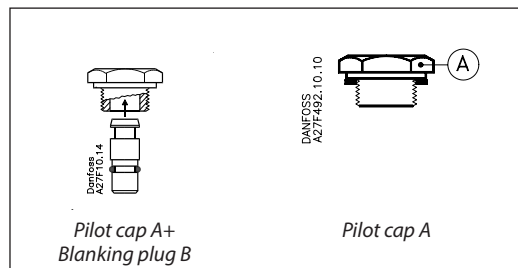
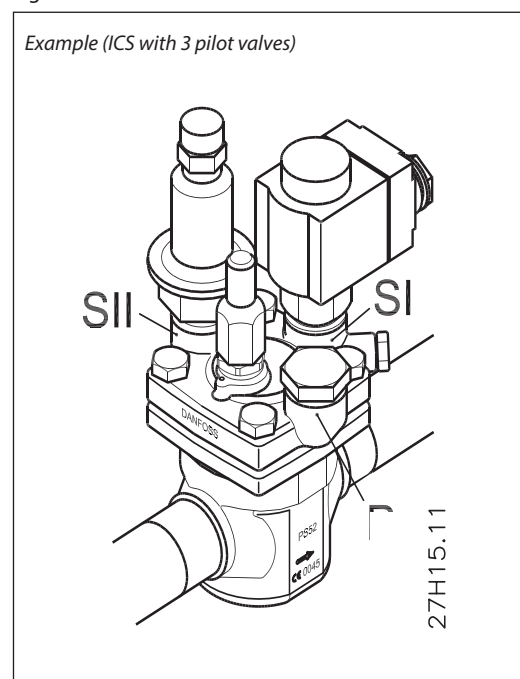


Figure 2

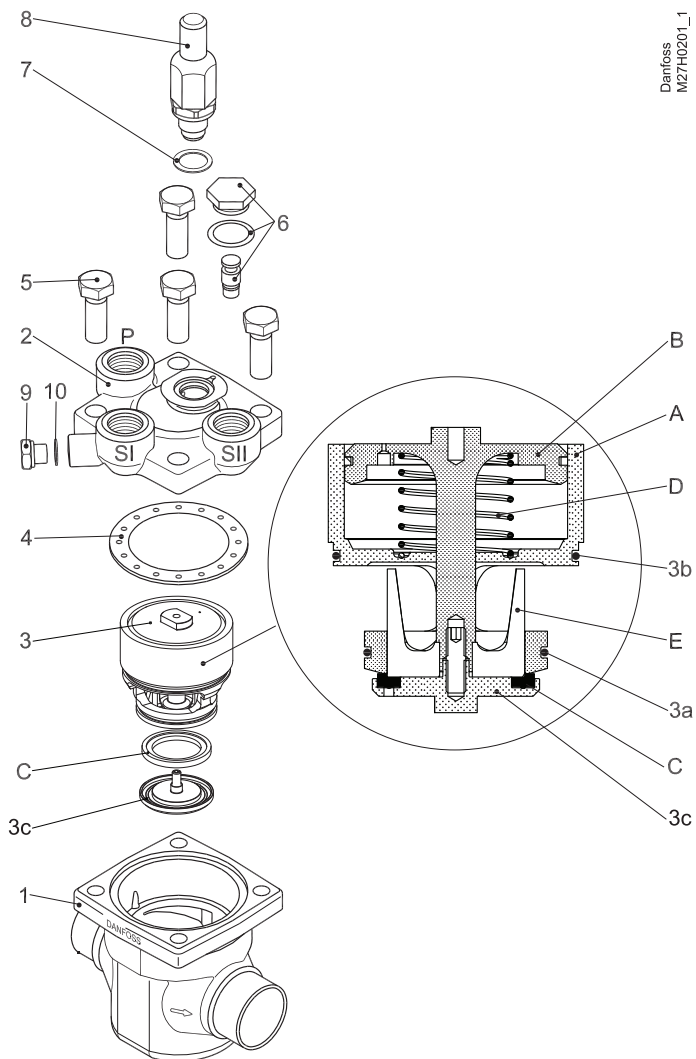


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Table 2
Pilots and
accessories for ICS

	Type	Description	Range	MWP psig	Part No.
	CVP (LP)	Pilot Valve, Inlet Pressure	0 to 102 psig	250	027B1100
	CVP (HP)	Pilot Valve, Inlet Pressure	20" to 102 psig	406	027B1164
			58 to 319 psig	406	027B1160
			58 to 406 psig	406	027B1161
	CVP (XP)	Pilot Valve, Inlet Pressure	363 to 754 psig	754	027B0080
	CVC	Pilot Valve, Outlet Pressure	58-406 psig	754/360	027B0087
	CVPP (HP)	Pilot Valve, Diff. Pressure	0 to 102 psig	406	027B1162
			58 to 319 psig	580	027B1268
	CVQ	Pilot Valve, Electronic	29.5" to 72.5 psig	250	027B1139
			0 to 87 psig	250	027B1140
			25 to 116 psig	250	027B1141
	EVM (NC)	Pilot Valve, Solenoid (Normally Closed) Does Not Include Coil	-	655	027B1120
	EVM (NO)	Pilot Valve, Solenoid (Normally Open) Does Not Include Coil	-	655	027B1130
	-	Pilot Blanking Plug	-	-	027F1046
	-	External Pilot Connector for ICS 5 to 80	¼" FPT	-	027B2065
		External Pilot Connector for ICS 100 to 150	¼" FPT	-	027B2066

Material specification - ICS 25, 32, 40, 50, 65, 80

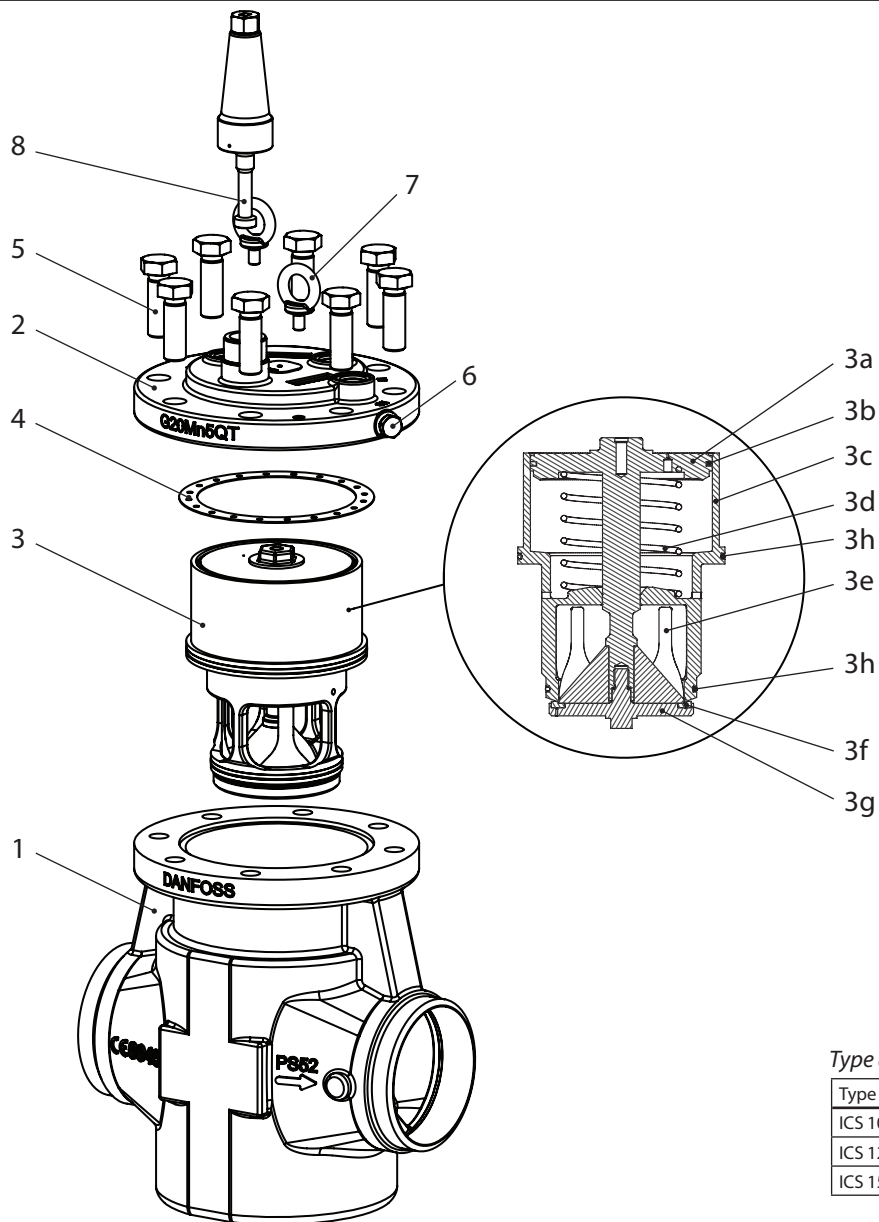


Type and size of Bolt (pos. 5)

Type	Screw
ICS 25	M12 × 30 A2-70 DIN 933
ICS 32	M14 × 35 A2-70 DIN 933
ICS 40	M14 × 40 A2-70 DIN 933
ICS 50	M16 × 40 A2-70 DIN 933
ICS 65	M16 × 50 A2-70 DIN 933

No.	Part	Material	EN	ASTM	JIS
1	Body	Low temperature steel	G20Mn5QT, EN 10213-3	LCC A352	SCPL1 G5151
2	Top cover	Low temperature steel	G20Mn5QT, EN 10213-3 P285QH+QT 10222-4	LCC A352 LF2, A350	SCPL1 G5151
3	Function module (assembled)				
3a	o-ring	Cloroprene (Neoprene)			
3b	o-ring	Cloroprene (Neoprene)			
3c	Washer plate	Steel			
A	Cylinder	Steel			
B	Piston	Steel			
C	Valve plate	PTFE			
D	Spring	Steel			
E	Cone	Steel			
4	Gasket	Fiber, non-asbestos			
5	Bolts	Stainless steel	A2-70, EN 1515-1	Grade B8 A320	A2-70, B 1054
6	Plug	Steel			
7	Gasket	Aluminium			
8	Manual operating spindle	Steel			
9	Plug	Steel			
10	Gasket	Aluminium			

Material specification - ICS 100, 125, 150



Type and size of Bolt (pos. 5)

Type	Screw
ICS 100	M20 × 60 A2-70 DIN 933
ICS 125	M20 × 60 A2-70 DIN 933
ICS 150	M20 × 70 A2-70 DIN 933

No.	Part	Material	EN	ASTM	JIS
1	Body	Low temperature steel	G20Mn5QT, EN 10213-3	LCC A352	SCPL1 G5151
2	Top cover	Low temperature steel	G20Mn5QT, EN 10213-3	LCC A352	SCPL1 G5151
3	Function module (assembled)				
3a	Piston/rod	Stainless steel / steel			
3b	Piston ring	Steel			
3c	Insert	Steel			
3d	Spring	Steel			
3e	Cone	Stainless steel / steel			
3f	Teflon plate	Teflon unfilled			
3g	Washer plate	PTFE			
3h	o-ring	Cloroprene (Neoprene)			
4	Gasket	Fiber, non-asbestos			
5	Bolts	Stainless steel	A2-70, EN 1515-1	Grade B8 A320	A2-70, B 1054
6	Plug	Steel			
7	Eye bolt	Galvanized steel			
8	Manual operating spindle	Steel			

Steps for ordering valves assembled with pilots:

- Step 1: Determine the correct ICS valve size for your application using the nominal capacity selection tables on pages 20 to 42.
- Step 2: Specify the ICS type/size selected from the capacity tables.
- Step 3: Specify the configuration; consult Danfoss for configurations not listed, figures 3-13.
- Step 4: Specify connections type and size from Table 3, page 13.
- Step 5: Specify coil voltage and accessories where applicable.

Example for ordering:

- Dual inlet pressure regulator type ICS with 3/4" Port size, 1" SOC connections and gauge valve with adapter for fitting into regulator.
- Item 1: ICS 25-20-D with 1" SOC connections (see Figure 11)
- Item 2: 1/4" gauge valve with adapter, p/n 148B418062 (selected from ICS accessories)

Standard configurations

<p>Figure 3 - Solenoid Valve</p> <p>On/off regulation</p>		<p>Products</p> <p>1 × ICS 1 Pilot 1 × EVM 1 × coil</p>	
<p>Figure 4 - STD</p> <p>Constant pressure regulation - ICS sizes 5 to 80 are standard with CVP(LP) pilot range 0 to 102 psig. ICS sizes 100 to 150 are standard with CVP(HP) pilot range 20 in.HG to 102 psig.</p>		<p>Products</p> <p>1 × ICS 1 Pilot 1 × CVP</p>	
<p>Figure 5 - "O"</p> <p>Outlet pressure regulation - Standard with CVC pilot range 13 in.HG to 102 psig. Does not include external pilot mounting set for connection between CVC pilot and the outlet of the valve.</p>		<p>Products</p> <p>1 × ICS 1 Pilot 1 × CVC</p>	
<p>Figure 6 - "J"</p> <p>Electronically controlled pressure regulation - Standard with CVQ pilot range 0 to 87 psig.</p>		<p>Products</p> <p>1 × ICS 1 Pilot 1 × CVQ</p>	

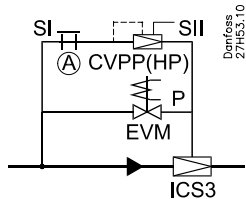
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<p>Figure 7 - "L"</p> <p>Differential pressure regulation - Standard with CVPP(HP) pilot range 0 to 102 psi. Does not include the external pilot mounting set for connection between CVPP pilot and the outlet of the valve.</p>		<p>Products</p> <p>1 × ICS 1 Pilot 1 × CVPP (HP)</p>	
<p>Figure 8 - "S"</p> <p>Inlet pressure regulation combined with forced closing - ICS sizes 5 to 80 are standard with CVP(LP) pilot range 0 to 102 psig and EVM(NC) pilot. ICS sizes 100 to 150 are standard with CVP(HP) pilot range 20 in.HG to 102 psig and EVM(NC) pilot.</p>		<p>Products</p> <p>1 × ICS 3 Pilots 1 × pilot plug A + blanking plug B 1 × CVP 1 × EVM 1 × coil</p>	
<p>Figure 9 - "B"</p> <p>Constant inlet pressure regulation combined with electrical forced wide opening - ICS sizes 5 to 80 are standard with CVP(LP) pilot range 0 to 102 psig and EVM(NC) pilot. ICS sizes 100 to 150 are standard with CVP(HP) pilot range 20 in.HG to 102 psi.</p>		<p>Products</p> <p>1 × ICS 3 Pilots 1 × pilot cap A 1 × CVP 1 × EVM</p>	
<p>Figure 10 - "D"</p> <p>Dual inlet pressure regulation with changeover between two preset evaporating pressures - ICS sizes 5 to 80 are standard with two CVP(LP) pilots range 0 to 102 psig and EVM(NC) pilot. ICS sizes 100 to 150 are standard with two CVP(HP) pilots range 20 in.HG to 102 psig.</p>		<p>Products</p> <p>1 × ICS 3 Pilots 2 × CVP 1 × EVM 1 × coil</p>	
<p>Figure 11 - "OS"</p> <p>Outlet pressure regulation combined with electrical forced closing - Standard with CVC pilot range 13 in.HG to 102 psig, and EVM(NC) pilot. Does not include external pilot mounting set for connection between CVC pilot and the outlet of the valve.</p>		<p>Products</p> <p>1 × ICS 3 Pilots 1 × pilot cap A + blanking cap B 1 × CVC 1 × EVM 1 × coil</p>	

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Figure 12 - "BL"

Differential pressure regulation combined with electrical forced wide opening - Standard with CVPP(HP) pilot range 0 to 102 psi and EVM(NC) pilot. Does not include external pilot mounting set for connection between CVPP pilot and the outlet of the valve.



Products

- 1 × ICS 3 Pilots
- 1 × pilot cap A
- 1 × CVPP (HP)
- 1 × EVM
- 1 × coil

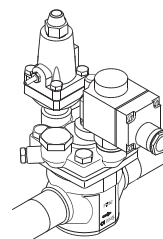
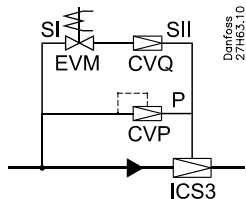


Figure 13 - "JD"

Electronically controlled temperature regulation combined with electric forced closing and changeover to constant pressure regulation - ICS sizes 5 to 80 are standard with CVQ pilot range 0 to 87 psig, EVM(NC) pilot and CVP(LP) pilot range 0 to 102. ICS sizes 100 to 150 are standard with CVP (HP) range 20 in.HG to 102 psig and same CVQ and EVM.



Products

- 1 × ICS 3 Pilots
- 1 × CVQ
- 1 × CVP
- 1 × EVM
- 1 × coil

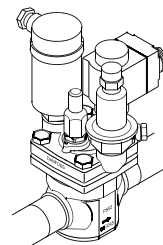


Table 3

Valve Size	Nominal Size		Flow Coefficient Cv (Kv)		Connection Type and Size			
	Inches	(mm)			FPT	SW	BW	ODS
ICS 25-5	3/16"	(5)	2	(1.7)	3/4", 1"	3/4", 1"	3/4", 1", 1 1/4"	7/8", 1-1/8", 1-3/8"
ICS 25-10	3/8"	(10)	4.1	(3.5)	3/4", 1"	3/4", 1"	3/4", 1", 1 1/4"	7/8", 1-1/8", 1-3/8"
ICS 25-15	5/8"	(15)	7	(6.0)	3/4", 1"	3/4", 1"	3/4", 1", 1 1/4"	7/8", 1-1/8", 1-3/8"
ICS 25-20	3/4"	(20)	9.3	(8.0)	3/4", 1"	3/4", 1"	3/4", 1", 1 1/4"	7/8", 1-1/8", 1-3/8"
ICS 25-25	1"	(25)	13.3	(11.5)	1"	1"	1", 1 1/4"	7/8", 1-1/8", 1-3/8"
ICS 32	1 1/4"	(32)	20	(17)	-	1 1/4"	1 1/4", 1 1/2"	1-3/8", 1-5/8"
ICS 40	1 1/2"	(40)	31	(27)	-	1-1/2"	1 1/2", 2"	1-5/8"
ICS 50	2"	(50)	51	(44)	-	2"	2", 2 1/2"	2-1/8"
ICS 65	2 1/2"	(65)	81	(70)	-	2 1/2"	2 1/2", 3"	2-5/8"
ICS 80	3"	(100)	98	(85)	-	-	3"	-
ICS 100	4"	(100)	165	(142)	-	-	4"	-
ICS 125	5"	(125)	240	(207)	-	-	5"	-
ICS 150	6"	(150)	410	(354)	-	-	6"	-

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Accessories

ICV PM flanged valve housings

ICV PM flanged valve housings can replace the PM valves on already installed refrigeration systems.

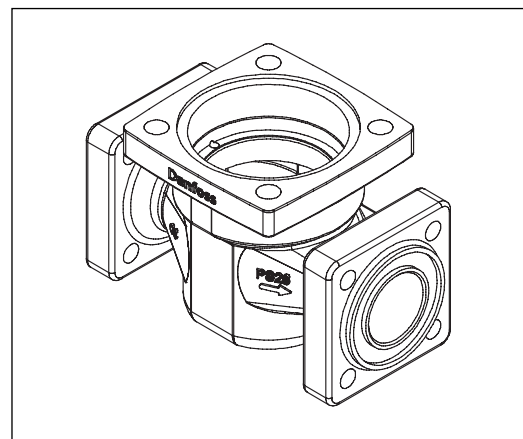
Pressure range

The ICV PM valve housing is designed for a max. working pressure of 28 bar g (406 psig) and therefore a suitable replacement for PM valves in the service market. They also offer the same drop-in dimensions as the PM valves.

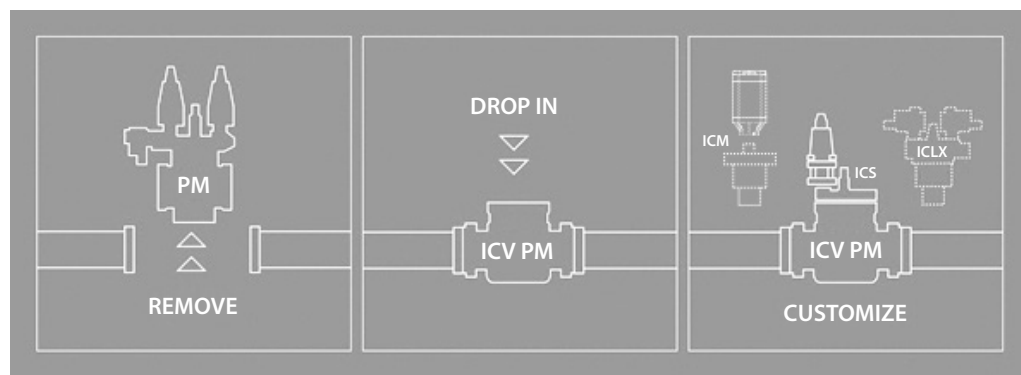
Description	Code no.
ICV 25 PM Valve housing	027H2119 *)
ICV 32 PM Valve housing	027H3129 *)
ICV 40 PM Valve housing	027H4128 *)
ICV 50 PM Valve housing	027H5127 **)
ICV 65 PM Valve housing	027H6128 **)

*) Includes ICV PM valve housing, flange gaskets and flange bolts.

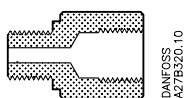
***) Includes ICV PM valve housing, flange gaskets, flange bolts and flange nuts.



Function modules and top covers must be ordered separately (see the section "Ordering").



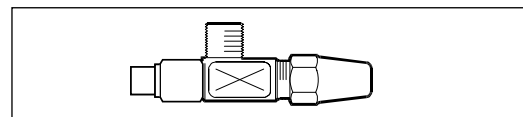
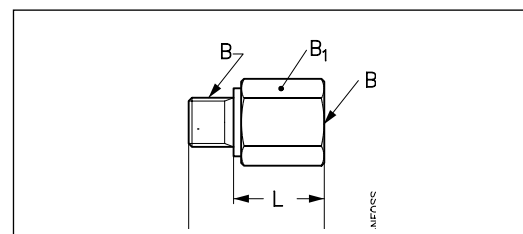
Pressure gauge adapter.



Description	Code no.
1/4 FPT adapter	027B2062

Dimensions			L	L ₁	B	B ₁	B ₂
	mm	in.	23	35.5	G 1/4 A	AF 22	1/4 FPT
			0.91	1.40			

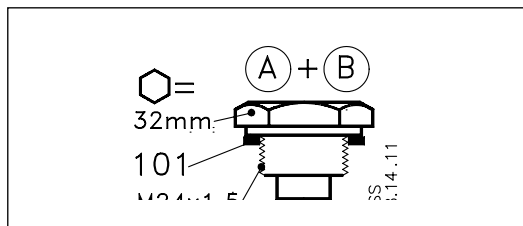
Description	Code no.
Pressure Gauge Connection Adapter and SNV-ST 1/4" MPT x 1/4" FPT gauge valve	148B418062



Blanking plug for pilot valves.



Description	Code no.
Blanking plug	027F1046

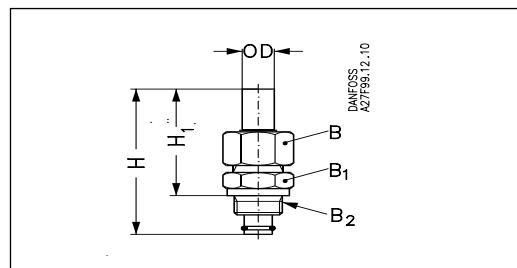


Accessories

External pilot connection, 1/4" female - NPT



ICS	Description	Code no.
5 - 80	External pilot connection, 1/4" female - NPT (incl. damping orifice, D: 1.0 mm)	027B2065
100-150	External pilot connection, 1/4" female - NPT (incl. damping orifice, D: 1.8 mm)	027B2066



Dimensions			H	H ₁	OD	B	B ₁	B ₂
	mm	in.	90	66	18	AF 32	AF 32	M 24 × 1.5
			3.54	2.60	0.71			

Multi-function tool

Description	Code no.
For all sizes of ICS and ICM 20 to 32	027H0180
For all sizes of ICS and ICM 40 to 150	027H0181

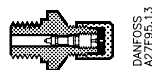
- The multi-function tool can be used for:
- Removing the ICS function module
 - Operating the ICS manual spindle
 - Manually operating motorized valve type ICM

For further information please see instr. PIHU0A.

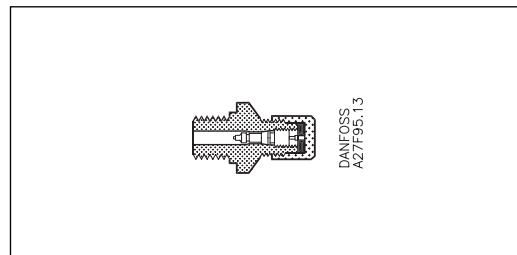


Flare

Pressure gauge connection, 1/4 in. flare (self-closing)
Must not be used in R 717 plant.



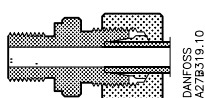
Description	Code no.
1/4 in. flare	027B2041



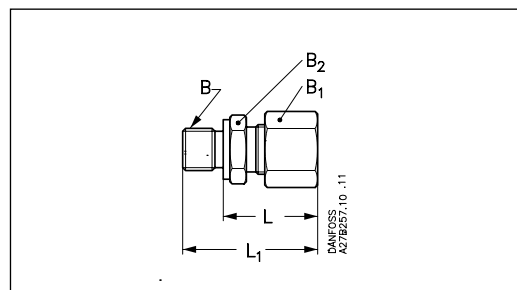
Dimensions			B	B ₁	B ₂
1/4 in. flare	mm	in.	G 1/4 A	AF 19	1/4 in. flare

Cutting ring

Pressure gauge connection



Description	Code no.
Cutting ring connection, 6 mm	027B2063
Cutting ring connection, 10 mm	027B2064



Dimensions			L	L ₁	B	B ₁	B ₂
6 mm	mm	in.	27	39	G 1/4 A	AF 19	AF 14
			1.06	1.54			
10 mm	mm	in.	29	40	G 1/4 A	AF 19	AF 14
			1.14	1.57			

ICS 25

Spare parts

ICS 25 valve body	
Connection size/type	Code Number
¾ in. SOC	027H2132
1 in. SOC	027H2122
¾ in. FPT	027H2133
1 in. FPT	027H2127
¾ in. BW	027H2131
1 in. BW	027H2121
1¼ in. BW	027H2130
7/8 in. ODS	027H2125
1½ in. ODS	027H2126
1¾ in. ODS	027H2134

ICS 25 function module	
Description	Code Number
ICS 25-5	027H2201 *)
ICS 25-10	027H2202 *)
ICS 25-15	027H2203 *)
ICS 25-20	027H2204 *)
ICS 25-25	027H2200 *)

*) Including gasket and O-rings

ICS 25 top cover	
Description	Code Number
Top cover 1 Pilot	027H2172 *)
Top cover 3 Pilots	027H2173 **)

*) Including bolts
**) Including bolts and one blanking plug

ICS 32

Spare parts

ICS 32 valve body	
Connection size/type	Code Number
1¼ in. SOC	027H3122
1¼ in. BW	027H3121
1½ in. BW	027H3126
1¾ in. ODS	027H3123
1¾ in. ODS	027H3127

ICS 32 function module	
Description	Code Number
ICS 32	027H3200 *)

*) Including gasket and O-rings

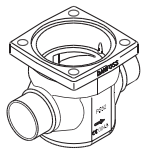
ICS 32 top cover	
Description	Code Number
Top cover 1 Pilot	027H3172 *)
Top cover 3 Pilots	027H3173 **)

*) Including bolts
**) Including bolts and one blanking plug

ICS 40

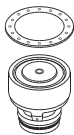
Spare parts

ICS 40 valve body



Connection size/type	Code Number
1½ in. SOC	027H4122
1½ in. BW	027H4121
2 in. BW	027H4127
1¾ in. ODS	027H4124

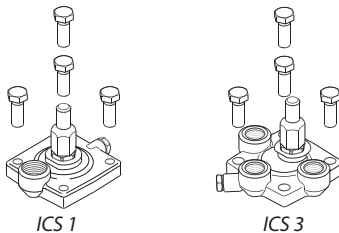
ICS 40 function module



Description	Code Number
ICS 40	027H4200 *

*) Including gasket and O-rings

ICS 40 top cover



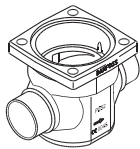
Description	Code Number
Top cover 1 Pilot	027H4172 *
Top cover 3 Pilots	027H4173 **

*) Including bolts
**) Including bolts and one blanking plug

ICS 50

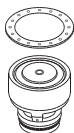
Spare parts

ICS 50 valve body



Connection size/type	Code Number
2 in. SOC	027H5122
2 in. BW	027H5121
2½ in. BW	027H5125
2¾ in. ODS	027H5123

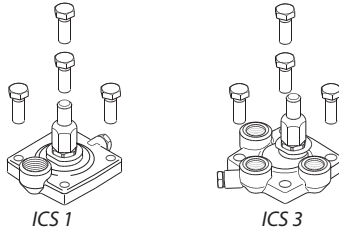
ICS 50 function module



Description	Code Number
ICS 50	027H5200 *

*) Including gasket and O-rings

ICS 50 top cover



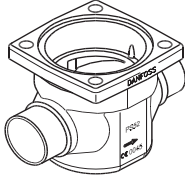
Description	Code Number
Top cover 1 Pilot	027H5172 *
Top cover 3 Pilots	027H5173 **

*) Including bolts
**) Including bolts and one blanking plug

ICS 65 / 80


Spare parts

ICS 65/80 valve body



ICS size	Connection size/type	Code Number
ICS 65	2½ in. SOC	027H6123
ICS 65	2½ in. BW	027H6121
ICS 65/80	3 in. BW	027H6127
ICS 65	2¾ in. ODS	027H6125

ICS 65 and ICS 80 function module

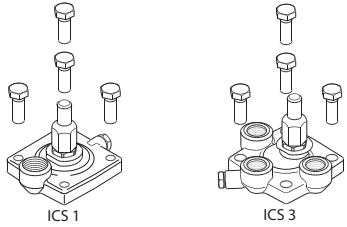


Description	Code Number
ICS 65	027H6200 *)
ICS 80	027H8200 *)

*) Including gasket and O-rings

ICS 65/80 top cover

Table III



Description	Code Number
Top cover 1 Pilot (65)	027H6172 *)
Top cover 3 Pilots (65)	027H6173 **)
Top cover 1 Pilot (80)	027H8192 *)
Top cover 3 Pilots (80)	027H8193 **)

*) Including bolts

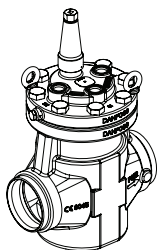
***) Including bolts and one blanking plug

Spare parts

Please see DKRCI.PY.HS0.C

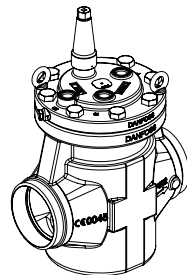
ICS 100 - 150

Ordering complete factory assembled valve without pilots
(body, function module and top cover)



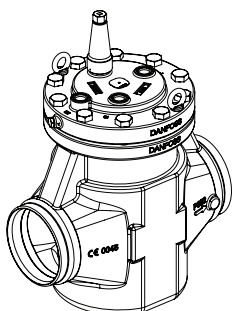
ICS 100 *)

Connections
4 in. BW with 3/8 in. NPT pressure outlet
027H7122



ICS 125 *)

Connections
5 in. BW with 3/8 in. NPT pressure outlet
027H7142

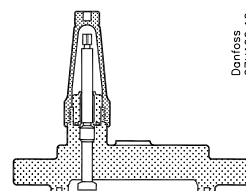


ICS 150 *)

Connections
6 in. BW with 3/8 in. NPT pressure outlet
027H7162

*) Including two blanking plugs (A) and one sealing plug (B)

Accessories

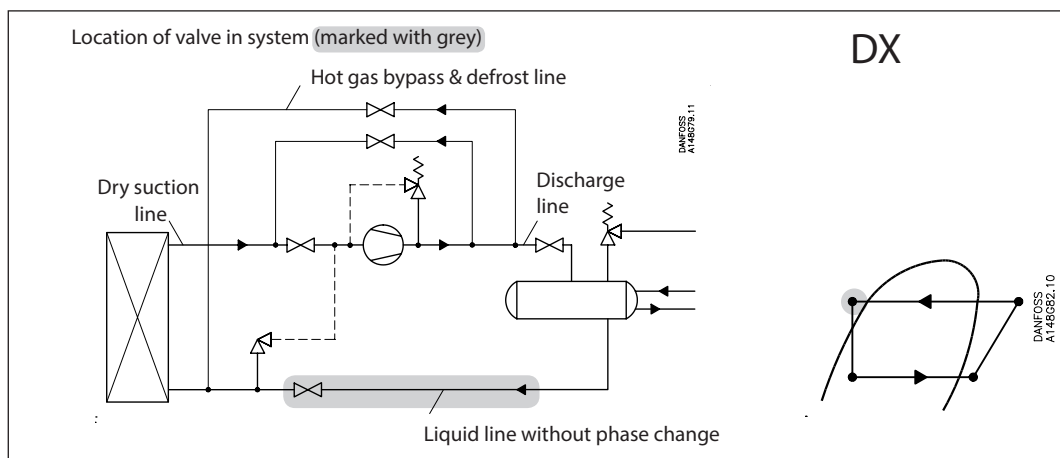
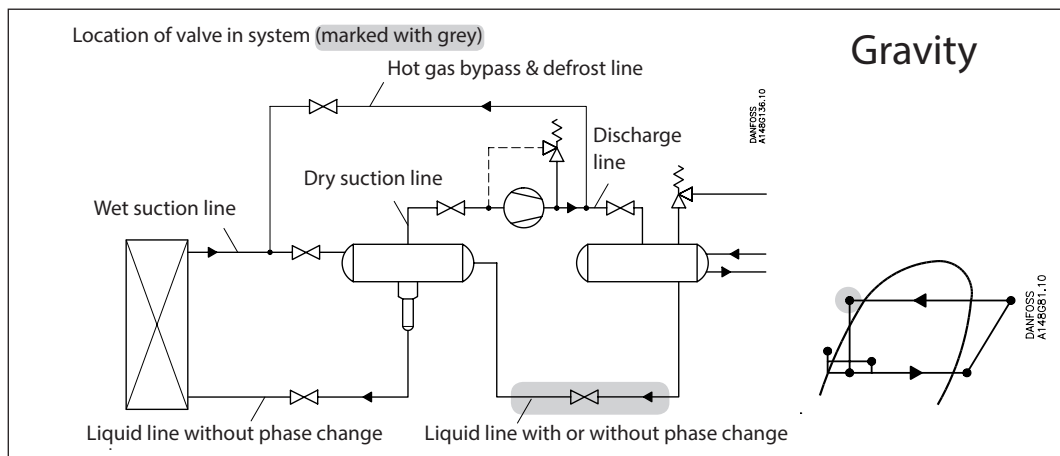
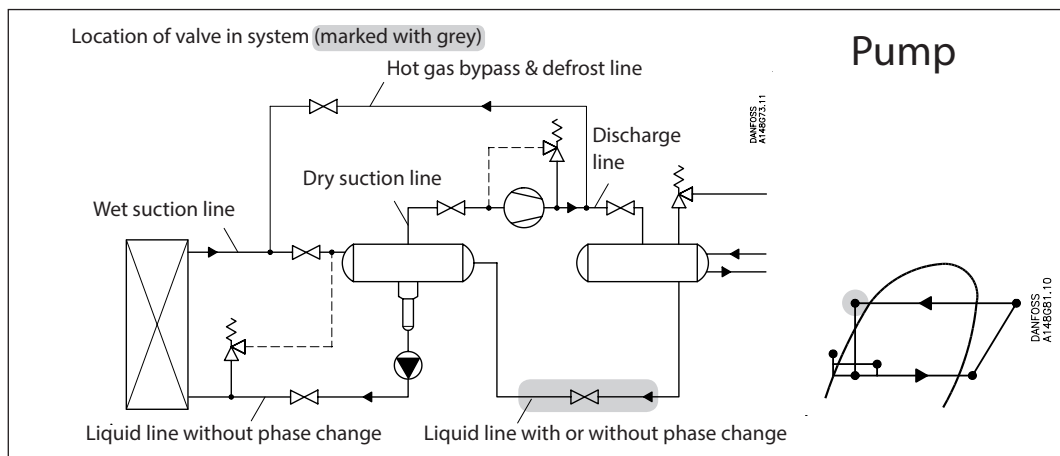


Danfoss
27H190.10

Consist of: Top cover complete with manuel spindle, and gasket	Top covers	
	Size	Code number
	ICS 100	027H7123
	ICS 125	027H7143
	ICS 150	027H7163

Nominal capacities

Liquid line with/without phase change



Nominal capacities

Liquid line with/without phase change

Calculation example (R 717 capacities):

Running conditions in a plant are as follows:

$T_e = -20^\circ\text{F}$
 $Q_o = 130 \text{ TR}$
Liquid temperature = 50°F
Max. $\Delta p = 4 \text{ psi}$

The capacity table is based on nominal condition
(pressure drop $\Delta p = 3 \text{ psi}$, $T_{liq} = 90^\circ\text{F}$)

Therefore the actual capacity must be corrected to
nominal condition by means of correction factors.

Correction factor for Δp 4 psi, $f_{\Delta p} = 0.87$

Correction factor for liquid temperature $f_{T_{liq}} = 0.92$

$$Q_n = Q_o \times f_{\Delta p} \times f_{T_{liq}} = 130 \times 0.87 \times 0.92 = 104 \text{ TR}$$

From the capacity table a ICS25-15 with Q_n capacity
175 TR is selected.

Nominal capacities

Liquid line with/without phase change

R 717

Capacity table for nominal conditions, Q_N [Tons of Refrigeration],
 $T_{liq} = 90^\circ\text{F}$,
 $\Delta P = 3 \text{ psi}$

Type	Valve body size	C_v (USgal/min)	Evaporating temperature [°F]						
			-60°F	-40°F	-20°F	0°F	20°F	40°F	60°F
ICS25-5	25	2	48.0	48.8	49.6	50.6	51.0	51.4	52.0
ICS25-10		4.1	99.0	100	102	104	105	106	107
ICS25-15		7	169	172	175	178	180	181	183
ICS25-20		9.3	226	230	233	237	240	242	244
ICS25-25		13.3	324	330	335	341	345	348	351
ICS32	32	20	480	488	496	503	509	514	518
ICS40	40	31	762	775	788	799	808	816	822
ICS50	50	51	1242	1262	1285	1302	1317	1330	1340
ICS65	65	81	1975	2010	2043	2070	2095	2115	2130
ICS80	80	98	2377	2416	2456	2496	2524	2546	2568
ICS100	100	165	4002	4068	4135	4202	4249	4287	4324
ICS125	125	240	5820	5916	6015	6113	6181	6235	6289
ICS150	150	410	9943	10107	10275	10443	10559	10651	10745

Correction factor for liquid temperature (T_{liq})

Liquid temperature	Correction factor
-10°F	0.82
10°F	0.85
30°F	0.88
50°F	0.92
70°F	0.96
90°F	1.00
110°F	1.04
130°F	1.09

Correction factor for ΔP ($f_{\Delta P}$)

ΔP (psi)	Correction factor
3	1.00
4	0.87
5	0.79
6	0.72
7	0.66
8	0.62

R 744

Capacity table for nominal conditions, Q_N [Tons of Refrigeration],
 $T_{liq} = 50^\circ\text{F}$,
 $\Delta P = 3 \text{ psi}$

Type	Valve body size	C_v (USgal/min)	Evaporating temperature [°F]						
			-60°F	-40°F	-20°F	0°F	20°F	40°F	60°F
ICS25-5	25	2	11.7	11.9	12.0	12.0	11.9	11.6	10.9
ICS25-10		4.1	24.2	24.6	24.8	24.8	24.5	23.8	22.4
ICS25-15		7	41.5	42.1	42.5	42.5	42.0	40.8	38.4
ICS25-20		9.3	55.3	56.2	56.7	56.7	56.0	54.4	51.0
ICS25-25		13.3	79.5	81.8	81.5	81.5	80.5	78.0	73.5
ICS32	32	20	118	119	120	120	119	115	109
ICS40	40	31	187	190	191	191	189	184	173
ICS50	50	51	304	309	312	312	308	299	281
ICS65	65	81	484	492	496	496	490	476	448
ICS80	80	98	582	592	596	596	589	572	539
ICS100	100	165	980	997	1004	1004	992	964	907
ICS125	125	240	1426	1450	1460	1460	1444	1402	1319
ICS150	150	410	2436	2477	2494	2494	2466	2395	2254

Correction factor for liquid temperature (T_{liq})

Liquid temperature	Correction factor
-10°F	0.48
10°F	0.64
30°F	0.88
50°F	1.00

Correction factor for ΔP ($f_{\Delta P}$)

ΔP (psi)	Correction factor
3	1.00
4	0.87
5	0.79
6	0.72
7	0.66
8	0.62

Nominal capacities

Liquid line with/without phase change

Capacity table for nominal conditions, Q_N [Tons of Refrigeration],
 $T_{liq} = 90^\circ\text{F}$,
 $\Delta P = 3 \text{ psi}$

R 134a

Type	Valve body size	C_v (USgal/min)	Evaporating temperature [°F]						
			-40°F	-20°F	0°F	20°F	40°F	60°F	80°F
ICS25-5	25	2	8.5	9.0	9.4	9.8	10.3	10.7	11.1
ICS25-10		4.1	17.5	18.4	19.4	20.3	21.2	22.0	22.8
ICS25-15		7	30.0	31.6	33.2	34.7	36.2	37.7	39.0
ICS25-20		9.3	40.0	42.1	44.3	46.3	48.4	50.3	52.0
ICS25-25		13.3	57.4	60.6	63.6	66.5	69.5	72.3	75.0
ICS32	32	20	85	89	94	98.5	103	107	111
ICS40	40	31	135	142	149	156	163	170	176
ICS50	50	51	220	232	244	255	266	277	287
ICS65	65	81	350	369	387	405	423	440	456
ICS80	80	98	421	443	466	487	509	530	549
ICS100	100	165	709	747	784	820	857	892	924
ICS125	125	240	1031	1086	1141	1193	1247	1297	1344
ICS150	150	410	1761	1855	1949	2038	2131	2216	2296

Correction factor for ΔP ($f_{\Delta P}$)

ΔP (psi)	Correction factor
3	1.00
4	0.87
5	0.79
6	0.72
7	0.66
8	0.62

Correction factor for liquid temperature (T_{liq})

Liquid temperature	Correction factor
-10°F	0.64
10°F	0.68
30°F	0.74
50°F	0.81
70°F	0.89
90°F	1.00
110°F	1.15
130°F	1.35

Capacity table for nominal conditions, Q_N [Tons of Refrigeration],
 $T_{liq} = 90^\circ\text{F}$,
 $\Delta P = 3 \text{ psi}$

R 404A

Type	Valve body size	C_v (USgal/min)	Evaporating temperature [°F]						
			-60°F	-40°F	-20°F	0°F	20°F	40°F	60°F
ICS25-5	25	2	5.4	5.8	6.2	6.6	7.0	7.4	7.8
ICS25-10		4.1	11.0	11.9	12.8	13.7	14.5	15.3	16.0
ICS25-15		7	18.9	20.4	22.0	23.4	24.9	26.2	27.4
ICS25-20		9.3	25.2	27.2	29.2	31.3	33.0	35.0	36.5
ICS25-25		13.3	36.1	39.1	42.0	45.0	47.6	50.0	52.5
ICS32	32	20	53.5	57.8	62.0	66.4	70.4	74.0	77.6
ICS40	40	31	85.0	92.0	99.0	106	112	118	123
ICS50	50	51	138	150	161	172	182	192	201
ICS65	65	81	220	238	256	274	290	306	320
ICS80	80	98	265	287	308	329	348	367	385
ICS100	100	165	446	483	518	554	587	619	648
ICS125	125	240	649	702	754	806	853	900	942
ICS150	150	410	1109	1199	1288	1377	1458	1537	1609

Correction factor for ΔP ($f_{\Delta P}$)

ΔP (psi)	Correction factor
3	1.00
4	0.87
5	0.79
6	0.72
7	0.66
8	0.62

Correction factor for liquid temperature (T_{liq})

Liquid temperature	Correction factor
-10°F	0.52
10°F	0.57
30°F	0.63
50°F	0.72
70°F	0.83
90°F	1.00
110°F	1.29
130°F	1.92

Nominal capacities

Liquid line with/without phase change

R 22

Capacity table for nominal conditions, Q_N [Tons of Refrigeration],
 $T_{liq} = 90^\circ\text{F}$,
 $\Delta P = 3 \text{ psi}$

Type	Valve body size	C_v (USgal/min)	Evaporating temperature [°F]						
			-60°F	-40°F	-20°F	0°F	20°F	40°F	60°F
ICS25-5	25	2	9.5	9.8	10.1	10.5	10.7	11.0	11.3
ICS25-10		4.1	19.5	20.2	20.9	21.5	22.1	22.7	23.2
ICS25-15		7	33.5	34.6	35.9	37.0	38.0	39.0	39.8
ICS25-20		9.3	44.5	46.2	47.8	49.2	50.6	52.0	53.0
ICS25-25		13.3	64.0	66.4	68.6	71.0	73.0	75.0	76.0
ICS32	32	20	95.0	98.0	101	105	108	110	112
ICS40	40	31	151	156	161	166	171	175	179
ICS50	50	51	245	254	263	271	279	285	291
ICS65	65	81	390	404	418	431	443	454	464
ICS80	80	98	470	486	502	519	533	546	558
ICS100	100	165	791	818	846	874	897	920	939
ICS125	125	240	1150	1190	1230	1271	1305	1338	1366
ICS150	150	410	1965	2033	2102	2171	2230	2286	2333

Correction factor for ΔP ($f_{\Delta P}$)

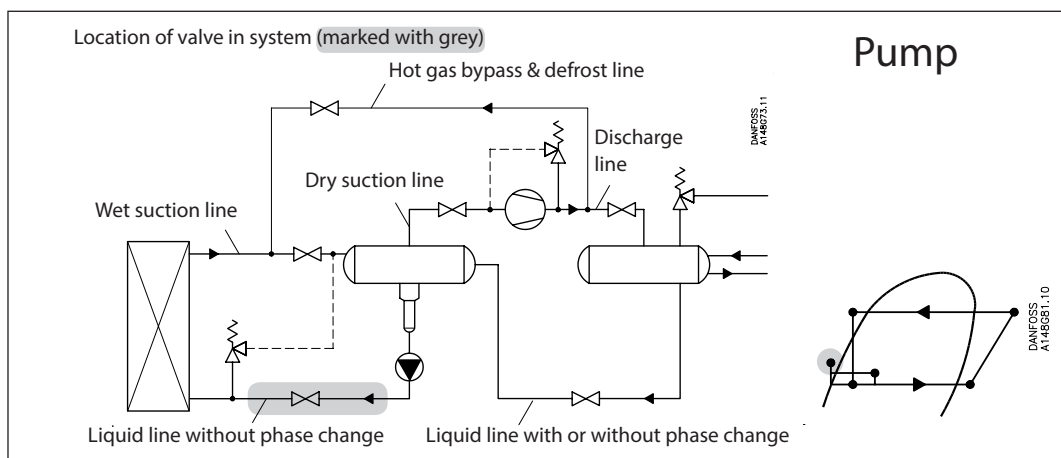
ΔP (psi)	Correction factor
3	1.00
4	0.87
5	0.79
6	0.72
7	0.66
8	0.62

Correction factor for liquid temperature (T_{liq})

Liquid temperature	Correction factor
-10°F	0.73
10°F	0.77
30°F	0.82
50°F	0.87
70°F	0.93
90°F	1.00
110°F	1.09
130°F	1.20

Nominal capacities

Pumped liquid line without phase change



Calculation example (R 717 capacities):

Running conditions in a plant are as follows:

$T_e = -20\text{ F}$
 $Q_o = 130\text{ TR}$
 Circulation rate = 3
 Max. $\Delta p = 4\text{ psi}$

Correction factor for Δp 4 psi, $f_{\Delta p} = 0.87$
 Correction factor for circulation rate $f_{rec} = 0.75$

$$Q_n = Q_o \times f_{\Delta p} \times f_{rec} = 130 \times 0.87 \times 0.75 = 85\text{ TR}$$

From the capacity table a ICS 25 with Q_n capacity 114 TR is selected.

The capacity table is based on nominal condition (pressure drop $\Delta p = 3\text{ psi}$, circulation rate = 4)

Therefore the actual capacity must be corrected to nominal condition by means of correction factors.

Nominal capacities

Pumped liquid line without phase change

R 717

Capacity table for nominal conditions, Q_N [Tons of Refrigeration], circulation rate = 4, $\Delta P = 3$ psi

Type	Valve body size	C_v (USgal/min)	Evaporating temperature [°F]							
			-60°F	-40°F	-20°F	0°F	20°F	40°F	60°F	80°F
ICS25-5	25	2	18.0	17.4	16.9	16.2	15.6	14.9	14.2	13.4
ICS25-10		4.1	37.0	35.9	34.7	33.4	32.0	30.6	29.6	27.6
ICS25-15		7	63.4	61.5	59.4	57.3	55.0	52.5	50.0	47.3
ICS25-20		9.3	84.5	82.0	79.3	76.3	73.3	70.0	66.6	63.0
ICS25-25		13.3	122	118	114	110	105	102	95.7	91.0
ICS32	32	20	180	174	169	162	156	149	142	134
ICS40	40	31	285	276	267	258	247	236	225	213
ICS50	50	51	465	451	436	420	403	385	366	347
ICS65	65	81	740	717	694	668	641	613	583	552
ICS80	80	98	891	863	835	804	771	738	703	664
ICS100	100	165	1499	1453	1406	1353	1298	1243	1183	1118
ICS125	125	240	2181	2113	2045	1968	1889	1808	1721	1627
ICS150	150	410	3726	3609	3493	3363	3226	3088	2941	2779

Correction factor for ΔP ($f_{\Delta P}$)

ΔP (psi)	Correction factor
3	1.00
4	0.87
5	0.79
6	0.72
7	0.66
8	0.62

Correction factor for circulation rate (f_{rec})

Circulation rate	Correction factor
2	0.5
3	0.75
4	1
6	1.5
8	2
10	2.5

R 744

Capacity table for nominal conditions, Q_N [Tons of Refrigeration], circulation rate = 4, $\Delta P = 3$ psi

Type	Valve body size	C_v (USgal/min)	Evaporating temperature [°F]							
			-60°F	-40°F	-20°F	0°F	20°F	40°F	60°F	80°F
ICS25-5	25	2	5.6	5.8	4.8	4.3	3.8	3.2	2.4	1.4
ICS25-10		4.1	11.4	10.7	9.8	8.8	7.8	6.5	5.0	2.8
ICS25-15		7	19.6	18.3	16.8	15.2	13.3	11.2	8.6	4.8
ICS25-20		9.3	26.1	24.4	22.4	20.2	17.7	14.9	11.4	6.3
ICS25-25		13.3	37.6	35.0	32.2	29.0	25.5	21.4	16.4	9.1
ICS32	32	20	55.5	51.8	47.6	43.0	37.7	31.6	24.2	13.5
ICS40	40	31	88.0	82.0	75.5	68.0	60.0	50.2	38.5	21.4
ICS50	50	51	144	134	123	111	98.0	82.0	62.7	35.0
ICS65	65	81	229	213	196	177	155	130	100	55.4
ICS80	80	98	275	260	236	213	187	157	120	67
ICS100	100	165	463	438	397	358	315	264	202	113
ICS125	125	240	674	637	578	521	458	384	294	164
ICS150	150	410	1152	1087	987	889	783	656	502	281

Correction factor for ΔP ($f_{\Delta P}$)

ΔP (psi)	Correction factor
3	1.00
4	0.87
5	0.79
6	0.72
7	0.66
8	0.62

Correction factor for circulation rate (f_{rec})

Circulation rate	Correction factor
2	0.5
3	0.75
4	1
6	1.5
8	2
10	2.5

Nominal capacities

Pumped liquid line without phase change

R 134a

Capacity table for nominal conditions, Q_N [Tons of Refrigeration], circulation rate = 4, $\Delta P = 3$ psi

Type	Valve body size	C_v (USgal/min)	Evaporating temperature [°F]						
			-40°F	-20°F	0°F	20°F	40°F	60°F	80°F
ICS25-5	25	2	4.1	4.0	3.8	3.6	3.4	3.2	3.0
ICS25-10		4.1	8.5	8.1	7.7	7.4	7.0	6.6	6.1
ICS25-15		7	14.4	13.8	13.2	12.6	11.9	11.2	10.4
ICS25-20		9.3	19.2	18.4	17.6	16.7	15.8	14.9	13.8
ICS25-25		13.3	27.4	26.3	25.1	23.9	22.7	21.3	19.8
ICS32	32	20	41.2	39.5	37.8	35.9	34.1	32.0	29.8
ICS40	40	31	63.9	61.2	58.6	55.7	52.8	49.6	46.1
ICS50	50	51	105	101	96.3	91.6	86.9	81.5	75.9
ICS65	65	81	167	160	153	146	138	130	121
ICS80	80	98	202	194	185	176	167	157	146
ICS100	100	165	340	326	312	297	281	264	246
ICS125	125	240	495	475	453	432	409	384	357
ICS150	150	410	845	811	774	737	698	657	611

Correction factor for ΔP ($f_{\Delta P}$)

ΔP (psi)	Correction factor
3	1.00
4	0.87
5	0.79
6	0.72
7	0.66
8	0.62

Correction factor for circulation rate (f_{rec})

Circulation rate	Correction factor
2	0.5
3	0.75
4	1
6	1.5
8	2
10	2.5

R 404A

Capacity table for nominal conditions, Q_N [Tons of Refrigeration], circulation rate = 4, $\Delta P = 3$ psi

Type	Valve body size	C_v (USgal/min)	Evaporating temperature [°F]							
			-60°F	-40°F	-20°F	0°F	20°F	40°F	60°F	80°F
ICS25-5	25	2	3.6	3.5	3.2	3.0	2.9	2.7	2.4	2.2
ICS25-10		4.1	7.4	7.0	6.7	6.3	5.9	5.5	5.0	4.5
ICS25-15		7	12.5	12.1	11.4	10.8	10.1	9.4	8.6	7.7
ICS25-20		9.3	16.9	16.1	15.2	14.4	13.5	12.6	11.5	10.3
ICS25-25		13.3	24.2	23.2	21.9	20.7	19.4	18.0	16.5	14.7
ICS32	32	20	35.8	34.2	32.3	30.6	28.8	26.7	24.4	21.8
ICS40	40	31	57.0	54.4	51.3	48.6	45.6	42.5	38.8	34.6
ICS50	50	51	93.0	88.6	84.0	79.0	74.4	69.0	63.0	56.5
ICS65	65	81	147	141	133	126	118	110	101	90.0
ICS80	80	98	177	170	160	151	142	132	121	108
ICS100	100	165	299	286	270	255	240	223	203	182
ICS125	125	240	435	416	392	370	348	324	295	265
ICS150	150	410	742	711	670	633	595	554	505	453

Correction factor for ΔP ($f_{\Delta P}$)

ΔP (psi)	Correction factor
3	1.00
4	0.87
5	0.79
6	0.72
7	0.66
8	0.62

Correction factor for circulation rate (f_{rec})

Circulation rate	Correction factor
2	0.5
3	0.75
4	1
6	1.5
8	2
10	2.5

Nominal capacities

Pumped liquid line without phase change

R 22

Capacity table for nominal conditions, Q_N [Tons of Refrigeration], circulation rate = 4, $\Delta P = 3$ psi

Type	Valve body size	C_v (USgal/min)	Evaporating temperature [°F]							
			-60°F	-40°F	-20°F	0°F	20°F	40°F	60°F	80°F
ICS25-5	25	2	4.4	4.2	4.1	3.9	3.7	3.5	3.2	3.0
ICS25-10		4.1	9.0	8.7	8.3	8.0	7.6	7.1	6.7	6.2
ICS25-15		7	15.5	14.9	14.3	13.6	13.0	12.2	11.5	10.6
ICS25-20		9.3	20.6	19.9	19.1	18.2	17.3	16.3	15.3	14.2
ICS25-25		13.3	29.7	28.6	27.4	26.2	24.9	23.5	22.0	20.4
ICS32	32	20	44.0	42.2	40.5	38.7	36.8	34.6	32.5	30.2
ICS40	40	31	70.0	67.0	64.3	61.4	58.3	55.0	51.6	47.8
ICS50	50	51	114	109	105	100	95.0	90.0	84.0	78.0
ICS65	65	81	181	174	167	159	151	143	134	124
ICS80	80	98	218	209	201	192	182	172	161	149
ICS100	100	165	366	352	338	323	307	289	271	251
ICS125	125	240	533	512	492	470	446	421	394	365
ICS150	150	410	910	875	841	802	763	719	673	624

Correction factor for ΔP ($f_{\Delta P}$)

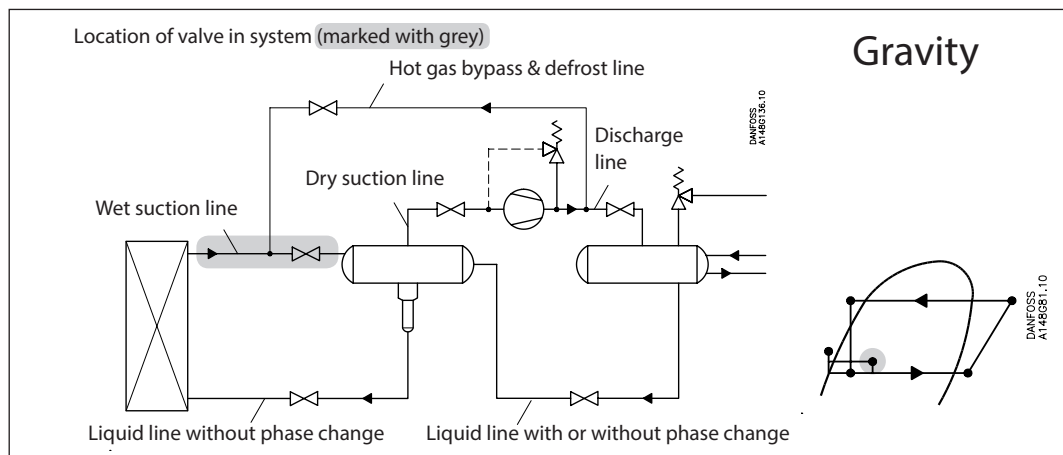
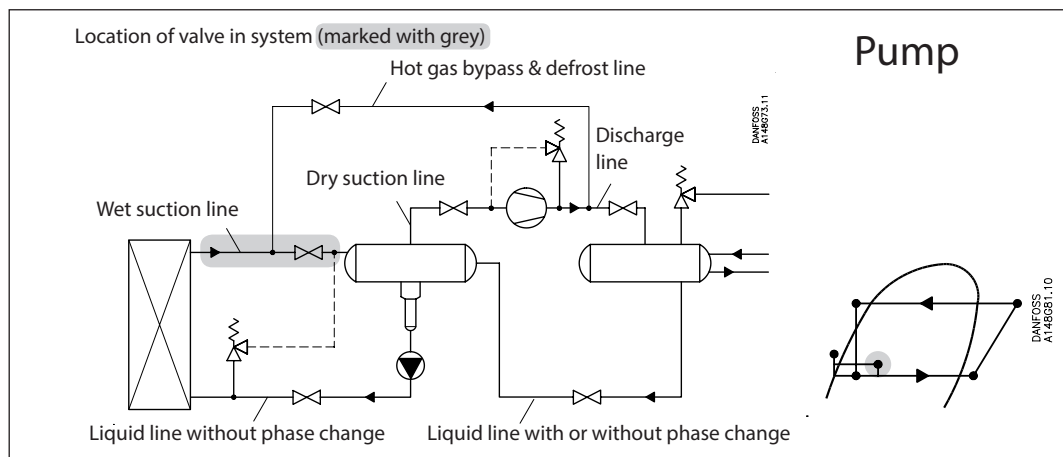
ΔP (psi)	Correction factor
3	1.00
4	0.87
5	0.79
6	0.72
7	0.66
8	0.62

Correction factor for circulation rate (f_{rec})

Circulation rate	Correction factor
2	0.5
3	0.75
4	1
6	1.5
8	2
10	2.5

Nominal capacities

Wet suction line



Calculation example (R 717 capacities):

An application has following running conditions:

- $T_e = -20\text{ F}$
- $Q_o = 8\text{ TR}$
- Circulation rate = 3
- Max. $\Delta p = 4\text{ psi}$

Correction factor for Δp 4 psi, $f_{\Delta p} = 0.87$

Correction factor for circulation rate $f_{rec} = 0.9$

$$Q_n = Q_o \times f_{\Delta p} \times f_{rec} = 8 \times 0.87 \times 0.9 = 6.3\text{ TR}$$

From the capacity table a ICS 25-20 with Q_n capacity 6.8 TR is selected.

The capacity table is based on nominal condition (pressure drop $\Delta p = 3\text{ psi}$, circulation rate = 4)

Therefore the actual capacity must be corrected to nominal condition by means of correction factors.

Nominal capacities

Wet suction line

R 717

Capacity table for nominal conditions, Q_N [Tons of Refrigeration], circulation rate = 4, $\Delta P = 3$ psi

Type	Valve body size	C_v (USgal/min)	Evaporating temperature [°F]							
			-60°F	-40°F	-20°F	0°F	20°F	40°F	60°F	80°F
ICS25-5	25	2	0.6	1.1	1.4	1.8	2.2	2.6	3.0	3.5
ICS25-10		4.1	1.3	2.2	3.0	3.7	4.5	5.4	6.2	7.1
ICS25-15		7	2.3	3.7	5.1	6.4	7.8	9.2	10.7	12.2
ICS25-20		9.3	3.0	5.0	6.8	8.5	10.3	12.3	14.2	16.2
ICS25-25		13.3	4.4	7.1	9.7	12.2	14.9	17.6	20.4	23.3
ICS32	32	20	6.5	10.5	14.3	18.1	22.0	26.0	30.0	34.5
ICS40	40	31	10.3	16.8	22.8	28.8	35.0	41.4	48.0	55.0
ICS50	50	51	16.8	27.3	37.0	47.0	57.0	67.0	78.0	89.0
ICS65	65	81	26.8	43.5	59.0	75.0	91.0	107	124	142
ICS80	80	98	32	53	71	90	109	129	149	171
ICS100	100	165	53	88	120	151	184	217	251	288
ICS125	125	240	78	129	174	219	267	316	366	419
ICS150	150	410	133	220	297	375	456	540	625	716

Correction factor for ΔP ($f_{\Delta P}$)

ΔP (psi)	Correction factor
3	1.00
4	0.87
5	0.79
6	0.72
7	0.66
8	0.62

Correction factor for circulation rate (f_{rec})

Circulation rate	Correction factor
2	0.77
3	0.90
4	1
6	1.13
8	1.20
10	1.25

R 744

Capacity table for nominal conditions, Q_N [Tons of Refrigeration], circulation rate = 4, $\Delta P = 3$ psi

Type	Valve body size	C_v (USgal/min)	Evaporating temperature [°F]							
			-60°F	-40°F	-20°F	0°F	20°F	40°F	60°F	80°F
ICS25-5	25	2	1.5	1.7	2.0	2.2	2.3	2.4	2.4	1.8
ICS25-10		4.1	3.0	3.5	4.0	4.5	4.8	5.0	4.8	3.7
ICS25-15		7	5.2	6.0	6.9	7.7	8.2	8.6	8.3	6.4
ICS25-20		9.3	6.9	8.1	9.2	10.2	11.0	11.4	11.1	8.5
ICS25-25		13.3	10.0	11.6	13.2	14.7	15.8	16.4	15.9	12.3
ICS32	32	20	14.7	17.2	19.4	21.7	23.3	24.2	23.5	18.2
ICS40	40	31	23.3	27.3	31.0	34.5	37.0	38.5	37.3	28.8
ICS50	50	51	38.0	44.5	50.5	56.0	60.5	62.7	60.8	47.0
ICS65	65	81	60.5	71.0	80.0	89.0	96.0	100	96.7	75.0
ICS80	80	98	73	85	97	108	115	120	117	90
ICS100	100	165	123	143	163	181	194	202	196	151
ICS125	125	240	179	208	237	264	282	294	286	220
ICS150	150	410	305	355	405	451	483	502	488	375

Correction factor for ΔP ($f_{\Delta P}$)

ΔP (psi)	Correction factor
3	1.00
4	0.87
5	0.79
6	0.72
7	0.66
8	0.62

Correction factor for circulation rate (f_{rec})

Circulation rate	Correction factor
2	0.77
3	0.90
4	1
6	1.13
8	1.20
10	1.25

Nominal capacities

Wet suction line

R 134a

Capacity table for nominal conditions, Q_N [Tons of Refrigeration], circulation rate = 4, $\Delta P = 3$ psi

Type	Valve body size	C_v (USgal/min)	Evaporating temperature [°F]						
			-40°F	-20°F	0°F	20°F	40°F	60°F	80°F
ICS25-5	25	2	0.3	0.5	0.6	0.7	0.8	1.0	1.1
ICS25-10		4.1	0.6	1.0	1.2	1.5	1.7	2.0	2.2
ICS25-15		7	1.0	1.6	2.1	2.5	2.9	3.4	3.8
ICS25-20		9.3	1.4	2.2	2.8	3.3	3.9	4.5	5.1
ICS25-25		13.3	2.0	3.1	3.9	4.8	5.6	6.4	7.2
ICS32	32	20	3.0	4.7	5.9	7.2	8.4	9.7	10.9
ICS40	40	31	4.6	7.2	9.2	11.1	13.1	15.0	16.8
ICS50	50	51	7.6	11.9	15.1	18.3	21.5	24.6	27.7
ICS65	65	81	12.1	18.9	24.1	29.1	34.1	39.1	44.0
ICS80	80	98	15	23	29	35	41	48	53
ICS100	100	165	25	39	49	59	69	80	90
ICS125	125	240	36	57	71	86	100	117	130
ICS150	150	410	61	97	122	147	171	199	223

Correction factor for ΔP ($f_{\Delta P}$)

ΔP (psi)	Correction factor
3	1.00
4	0.87
5	0.79
6	0.72
7	0.66
8	0.62

Correction factor for circulation rate (f_{rec})

Circulation rate	Correction factor
2	0.77
3	0.90
4	1
6	1.13
8	1.20
10	1.25

R 404A

Capacity table for nominal conditions, Q_N [Tons of Refrigeration], circulation rate = 4, $\Delta P = 3$ psi

Type	Valve body size	C_v (USgal/min)	Evaporating temperature [°F]							
			-60°F	-40°F	-20°F	0°F	20°F	40°F	60°F	80°F
ICS25-5	25	2	0.4	0.5	0.7	0.8	0.9	1.0	1.1	1.2
ICS25-10		4.1	0.8	1.1	1.3	1.6	1.8	2.1	2.3	2.3
ICS25-15		7	1.4	1.9	2.3	2.7	3.2	3.6	3.9	2.5
ICS25-20		9.3	1.9	2.5	3.1	3.6	4.2	4.8	5.3	5.7
ICS25-25		13.3	2.8	3.6	4.4	5.2	6.0	6.8	7.5	8.1
ICS32	32	20	4.1	5.3	6.5	7.7	8.9	10.1	11.1	12.0
ICS40	40	31	6.5	8.5	10.3	12.2	14.2	16.0	17.7	19.1
ICS50	50	51	10.6	13.8	16.8	19.9	23.0	26.0	29.0	31.0
ICS65	65	81	16.9	22.0	26.7	31.7	36.7	41.5	46.0	49.5
ICS80	80	98	20	26	32	38	44	50	55	56
ICS100	100	165	34	44	55	64	74	84	93	95
ICS125	125	240	49	64	79	94	108	123	135	138
ICS150	150	410	84	110	136	160	185	209	231	236

Correction factor for ΔP ($f_{\Delta P}$)

ΔP (psi)	Correction factor
3	1.00
4	0.87
5	0.79
6	0.72
7	0.66
8	0.62

Correction factor for circulation rate (f_{rec})

Circulation rate	Correction factor
2	0.77
3	0.90
4	1
6	1.13
8	1.20
10	1.25

Nominal capacities

Wet suction line

R 22

Capacity table for nominal conditions, Q_N [Tons of Refrigeration], circulation rate = 4, $\Delta P = 3$ psi

Type	Valve body size	C_v (USgal/min)	Evaporating temperature [°F]							
			-60°F	-40°F	-20°F	0°F	20°F	40°F	60°F	80°F
ICS25-5	25	2	0.2	0.5	0.7	0.8	0.9	1.1	1.2	1.3
ICS25-10		4.1	0.5	1.1	1.3	1.6	1.9	2.2	2.4	2.7
ICS25-15		7	0.8	1.8	2.3	2.8	3.2	3.7	4.1	4.6
ICS25-20		9.3	1.1	2.4	3.0	3.7	4.3	4.9	5.5	6.1
ICS25-25		13.3	1.6	3.5	4.4	5.2	6.1	7.0	7.9	8.7
ICS32	32	20	2.4	5.2	6.5	7.9	9.2	10.5	11.9	13.1
ICS40	40	31	3.7	8.1	10.1	12.2	14.3	16.3	18.4	20.3
ICS50	50	51	6.1	13.3	16.7	20.1	23.5	26.9	30.2	33.4
ICS65	65	81	9.69	21.1	26.5	31.9	37.3	42.7	48.0	53.0
ICS80	80	98	11	25	32	39	45	52	58	64
ICS100	100	165	19	43	54	65	76	88	98	108
ICS125	125	240	28	62	79	95	110	127	142	157
ICS150	150	410	48	107	135	162	188	217	243	269

Correction factor for ΔP ($f_{\Delta P}$)

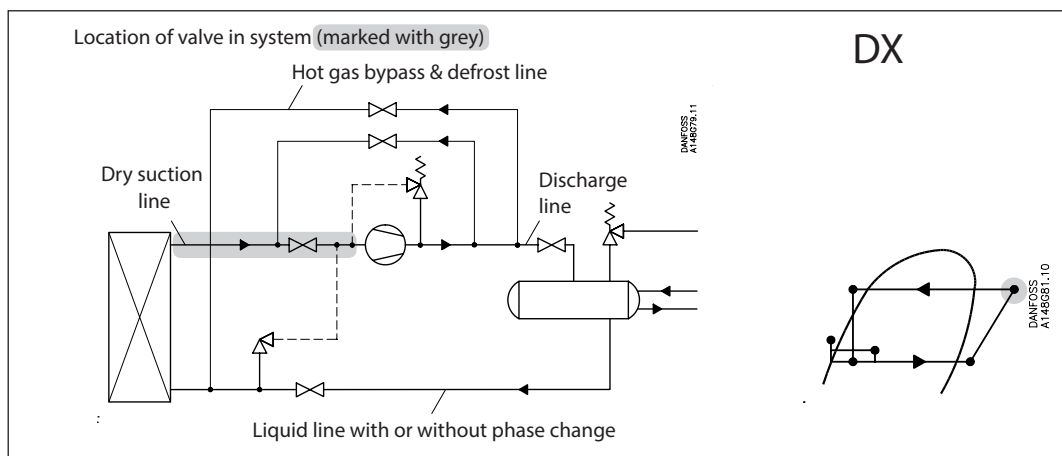
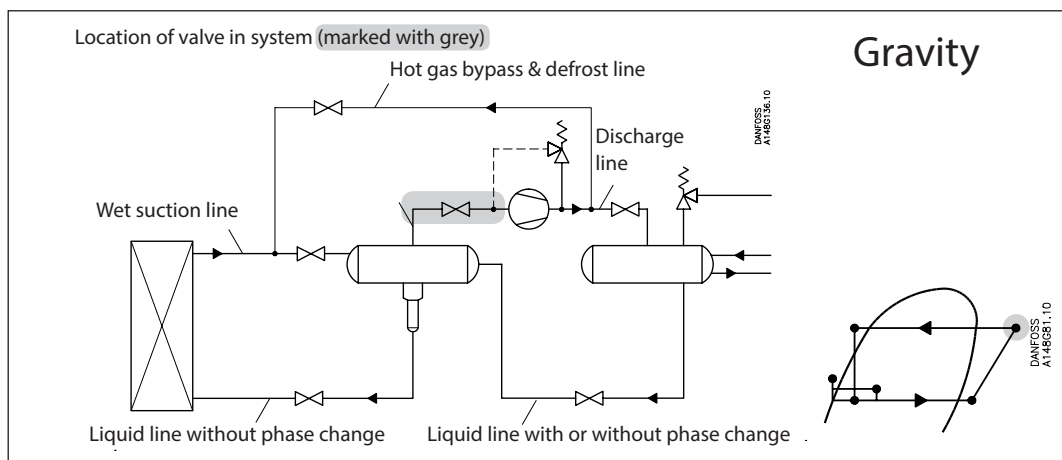
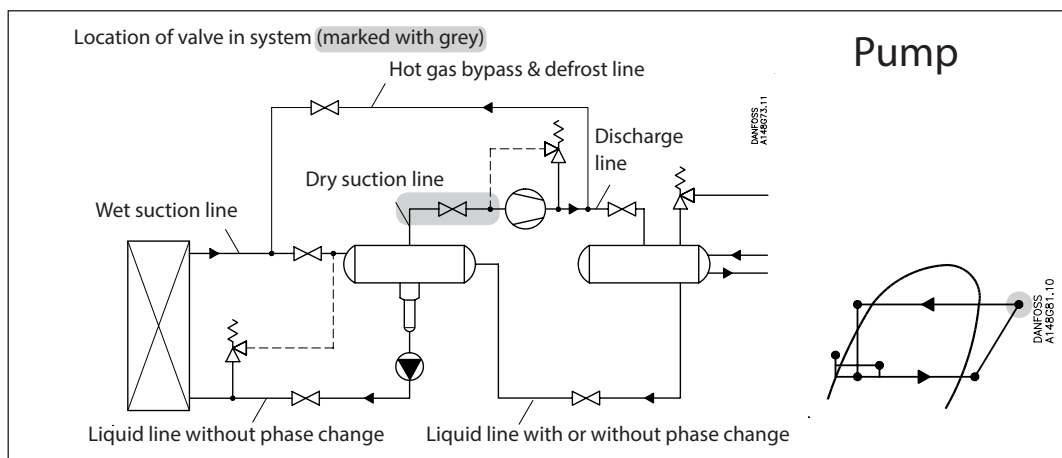
ΔP (psi)	Correction factor
3	1.00
4	0.87
5	0.79
6	0.72
7	0.66
8	0.62

Correction factor for circulation rate (f_{rec})

Circulation rate	Correction factor
2	0.77
3	0.90
4	1
6	1.13
8	1.20
10	1.25

Nominal capacities

Dry suction line



Nominal capacities

Calculation example (R 717 capacities):

An application has following running conditions:

$T_e = 0^\circ\text{F}$
 $Q_o = 20 \text{ TR}$
 $T_{liq} = 50^\circ\text{F}$
Max. $\Delta p = 4 \text{ psi}$

The capacity table is based on nominal condition
(pressure drop $\Delta p = 3 \text{ psi}$, $T_{liq} = 90^\circ\text{F}$)

Therefore the actual capacity must be corrected to
nominal condition by means of correction factors.

Dry suction line

Correction factor for Δp 4 psi, $T_{liq} = 0.87$

Correction factor for liquid temperature $f_{T_{liq}} = 0.92$

$$Q_n = Q_o \times f_{\Delta p} \times f_{T_{liq}} = 20 \times 0.87 \times 0.92 = 16 \text{ TR}$$

From the capacity table a ICS 25-25 with Q_n
capacity 18.7 TR is selected.

Nominal capacities

Dry suction line

R 717

Capacity table for nominal conditions, Q_N [Tons of Refrigeration],
 $T_{liq} = 90^\circ\text{F}$,
 $\Delta P = 3 \text{ psi}$
 Superheating = 12°F

Type	Valve body size	C_v (USgal/min)	Evaporating temperature [°F]							
			-60°F	-40°F	-20°F	0°F	20°F	40°F	60°F	80°F
ICS25-5	25	2	1.3	1.6	2.2	2.8	3.5	4.3	5.2	6.2
ICS25-10		4.1	2.5	3.4	4.4	5.7	7.2	8.9	10.7	12.8
ICS25-15		7	4.2	5.7	7.6	9.8	12.3	15.2	18.4	22.0
ICS25-20		9.3	5.6	7.6	10.1	13.0	16.4	20.2	24.5	29.3
ICS25-25		13.3	8.1	11.0	14.5	18.7	23.6	29.0	35.3	42.0
ICS32	32	20	12.0	16.2	21.5	27.7	35.0	43.0	52.0	62.0
ICS40	40	31	19.0	25.8	34.2	44.0	55.5	68.0	83.0	99.0
ICS50	50	51	30.9	42.0	55.7	72.0	90.0	111	135	161
ICS65	65	81	48.2	67.0	89.0	114	144	177	215	256
ICS80	80	98	60	80	107	137	173	213	258	308
ICS100	100	165	101	135	180	231	291	358	435	519
ICS125	125	240	146	197	261	336	424	521	632	754
ICS150	150	410	250	336	447	575	724	891	1080	1288

Correction factor for ΔP ($f_{\Delta P}$)

ΔP (psi)	Correction factor
3	1.00
4	0.87
5	0.79
6	0.72
7	0.66
8	0.62

Correction factor for liquid temperature (T_{liq})

Liquid temperature	Correction factor
-10°F	0.82
10°F	0.85
30°F	0.88
50°F	0.92
70°F	0.96
90°F	1.00
110°F	1.04
130°F	1.09

R 744

Capacity table at nominal conditions, Q_N [Tons of Refrigeration],
 $T_{liq} = 50^\circ\text{F}$,
 $\Delta p = 3 \text{ psi}$
 Superheating = 12°F

Type	Valve body size	C_v (USgal/min)	Evaporating temperature [°F]							
			-60°F	-40°F	-20°F	0°F	20°F	40°F	60°F	80°F
ICS25-5	25	2	1.7	2.1	2.6	3.1	3.7	4.2	4.9	5.4
ICS25-10		4.1	3.4	4.3	5.3	6.4	7.5	8.7	10.0	11.2
ICS25-15		7	5.9	7.4	9.1	10.9	12.9	15.0	17.0	19.2
ICS25-20		9.3	7.9	9.9	12.1	14.5	17.2	20.0	22.8	25.5
ICS25-25		13.3	11.3	14.2	17.4	21.0	24.7	28.6	32.8	36.7
ICS32	32	20	16.7	21.0	25.7	31.0	36.5	42.4	48.5	54.3
ICS40	40	31	26.6	33.3	41.0	49.0	58.0	67.0	77.0	86.0
ICS50	50	51	43.3	54.3	66.5	80.0	94.0	110	125	141
ICS65	65	81	69.0	86.5	106	127	150	174	199	223
ICS80	80	98	83	104	128	153	181	210	240	269
ICS100	100	165	140	175	215	258	305	353	404	453
ICS125	125	240	203	255	313	375	443	513	588	658
ICS150	150	410	347	435	534	641	757	877	1005	1124

Correction factor for ΔP ($f_{\Delta P}$)

ΔP (psi)	Correction factor
3	1.00
4	0.87
5	0.79
6	0.72
7	0.66
8	0.62

Correction factor for liquid temperature (T_{liq})

Liquid temperature	Correction factor
-10°F	0.48
10°F	0.64
30°F	0.88
50°F	1.00

Nominal capacities

Dry suction line

R 134a

Capacity table for nominal conditions, Q_N [Tons of Refrigeration],
 $T_{liq} = 90^\circ\text{F}$,
 $\Delta P = 3 \text{ psi}$
 Superheating = 12°F

Type	Valve body size	C_v (USgal/min)	Evaporating temperature [°F]						
			-40°F	-20°F	0°F	20°F	40°F	60°F	80°F
ICS25-5	25	2	0.5	0.6	0.8	1.0	1.3	1.6	1.9
ICS25-10		4.1	0.9	1.2	1.6	2.0	2.6	3.2	4.0
ICS25-15		7	1.5	2.0	2.7	3.5	4.4	5.5	6.8
ICS25-20		9.3	2.0	2.7	3.6	4.7	5.9	7.4	9.1
ICS25-25		13.3	2.9	3.9	5.2	6.7	8.5	10.6	13.0
ICS32	32	20	4.2	5.8	7.7	9.9	12.6	15.7	19.3
ICS40	40	31	6.7	9.2	12.2	15.7	20.0	25.0	30.6
ICS50	50	51	11.0	15.0	19.8	25.7	32.5	40.6	50.0
ICS65	65	81	17.4	23.7	31.5	40.8	52.0	64.6	79.0
ICS80	80	98	21	29	38	49	63	78	95
ICS100	100	165	36	48	64	83	105	131	161
ICS125	125	240	53	70	94	120	153	191	234
ICS150	150	410	90	120	160	205	262	325	399

Correction factor for liquid temperature (T_{liq})

Liquid temperature	Correction factor
-10°F	0.64
10°F	0.68
30°F	0.74
50°F	0.81
70°F	0.89
90°F	1.00
110°F	1.15
130°F	1.35

Correction factor for ΔP ($f_{\Delta P}$)

ΔP (psi)	Correction factor
3	1.00
4	0.87
5	0.79
6	0.72
7	0.66
8	0.62

R 404A

Capacity table for nominal conditions, Q_N [Tons of Refrigeration],
 $T_{liq} = 90^\circ\text{F}$,
 $\Delta P = 3 \text{ psi}$
 Superheat = 12°F

Type	Valve body size	C_v (USgal/min)	Evaporating temperature [°F]							
			-60°F	-40°F	-20°F	0°F	20°F	40°F	60°F	80°F
ICS25-5	25	2	0.4	0.5	0.7	0.9	1.1	1.4	1.8	2.1
ICS25-10		4.1	0.7	1.0	1.4	1.8	2.3	2.9	3.6	4.4
ICS25-15		7	1.3	1.8	2.4	3.1	4.0	5.0	6.2	7.5
ICS25-20		9.3	1.7	2.3	3.1	4.1	5.3	6.6	8.2	10.0
ICS25-25		13.3	2.4	3.4	4.5	5.9	7.6	9.6	11.8	14.4
ICS32	32	20	3.6	5.0	6.7	8.8	11.2	14.1	17.5	21.3
ICS40	40	31	5.7	7.9	10.6	13.9	17.8	22.4	27.7	34.0
ICS50	50	51	9.3	12.9	17.3	22.7	29.0	36.6	45.1	55.0
ICS65	65	81	14.8	20.5	27.5	36.0	46.2	58.0	72.0	88.0
ICS80	80	98	18	25	33	43	55	70	87	105
ICS100	100	165	30	42	56	73	93	118	146	177
ICS125	125	240	44	60	82	107	136	171	213	258
ICS150	150	410	75	103	139	182	232	292	363	441

Correction factor for liquid temperature (T_{liq})

Liquid temperature	Correction factor
-10°F	0.52
10°F	0.57
30°F	0.63
50°F	0.72
70°F	0.83
90°F	1.00
110°F	1.29
130°F	1.92

Correction factor for ΔP ($f_{\Delta P}$)

ΔP (psi)	Correction factor
3	1.00
4	0.87
5	0.79
6	0.72
7	0.66
8	0.62

Nominal capacities

Dry suction line

Capacity table for nominal conditions, Q_N [Tons of Refrigeration],
 $T_{liq} = 90^\circ\text{F}$,
 $\Delta P = 3 \text{ psi}$
 Superheat = 12°F

R 22

Type	Valve body size	C_v (USgal/min)	Evaporating temperature [°F]							
			-60°F	-40°F	-20°F	0°F	20°F	40°F	60°F	80°F
ICS25-5	25	2	0.5	0.7	0.8	1.1	1.3	1.6	2.0	2.3
ICS25-10		4.1	1.0	1.3	1.7	2.2	2.7	3.4	4.0	4.8
ICS25-15		7	1.7	2.3	3.0	3.8	4.7	5.7	6.9	8.2
ICS25-20		9.3	2.3	3.0	3.9	5.0	6.2	7.6	9.2	10.9
ICS25-25		13.3	3.2	4.3	5.6	7.2	8.9	10.9	13.1	15.6
ICS32	32	20	4.9	6.5	8.5	10.8	13.4	16.4	19.8	23.5
ICS40	40	31	7.5	10.1	13.1	16.7	20.8	25.4	30.6	36.4
ICS50	50	51	12.4	16.6	21.6	27.5	34.2	41.8	50.4	59.9
ICS65	65	81	19.7	26.4	34.3	43.6	54.3	66.4	80.0	95.1
ICS80	80	98	24	32	41	53	65	80	97	115
ICS100	100	165	40	54	69	89	110	135	163	193
ICS125	125	240	59	79	101	130	160	196	237	281
ICS150	150	410	100	134	172	222	273	335	405	480

Correction factor for ΔP ($f_{\Delta P}$)

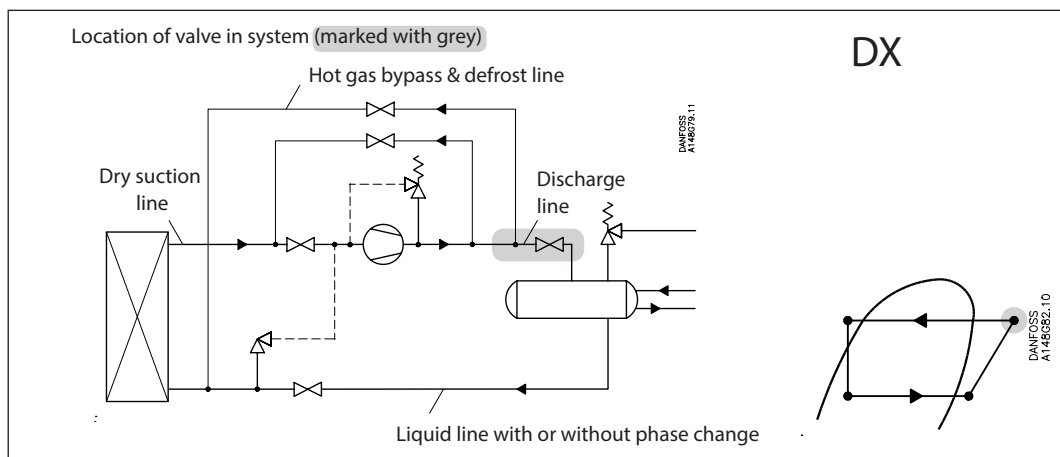
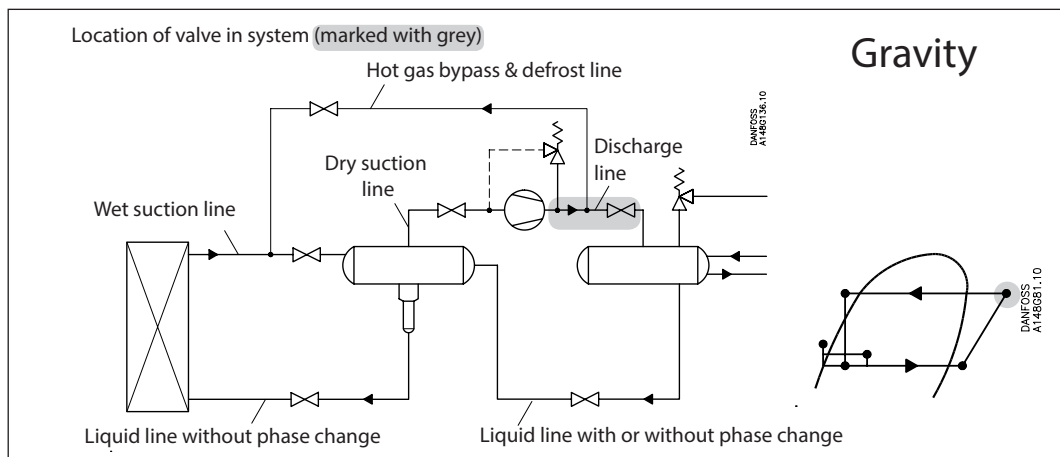
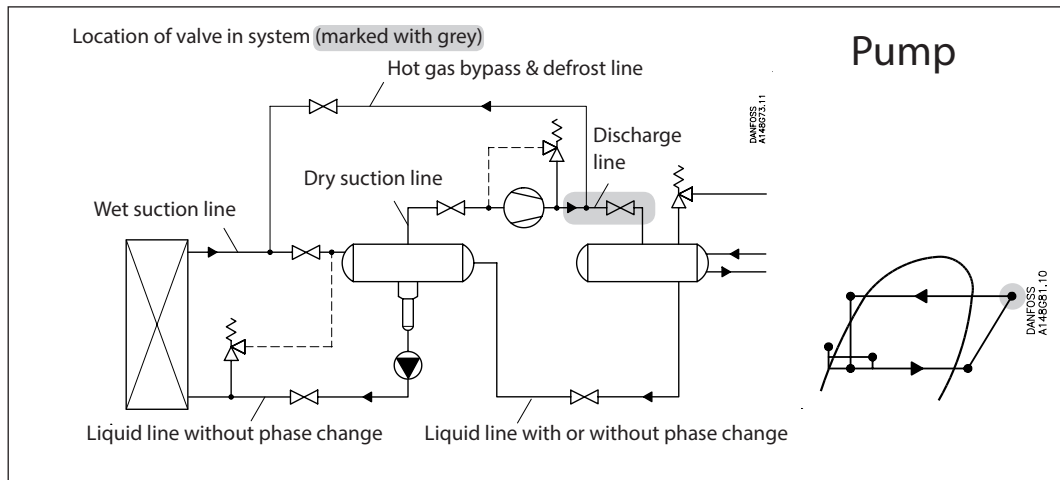
ΔP (psi)	Correction factor
3	1.00
4	0.87
5	0.79
6	0.72
7	0.66
8	0.62

Correction factor for liquid temperature (T_{liq})

Liquid temperature	Correction factor
-10°F	0.73
10°F	0.77
30°F	0.82
50°F	0.87
70°F	0.93
90°F	1.00
110°F	1.09
130°F	1.20

Nominal capacities

Discharge line



Nominal capacities

Discharge line

Calculation example (R 717 capacities):

An application has following running conditions:

$$\begin{aligned}T_e &= 0^\circ\text{F} \\ Q_o &= 18 \text{ TR} \\ T_{\text{liq}} &= 50^\circ\text{F} \\ \text{Max. } \Delta p &= 5.8 \text{ psi} \\ T_{\text{disch.}} &= 120^\circ\text{F}\end{aligned}$$

The capacity table is based on nominal conditions

$$\begin{aligned}(\Delta p &= 3 \text{ psi}, T_{\text{liq}} = 90^\circ\text{F}, \\ P_{\text{disch.}} &= 185 \text{ psi}, T_{\text{disch.}} = 180^\circ\text{F})\end{aligned}$$

Therefore the actual capacity must be corrected to nominal condition by means of correction factors.

Correction factor for Δp 5.8 psi, $f_{\Delta p} = 0.72$

Correction factor for liquid temperature $f_{T_{\text{liq}}} = 0.92$

Correction factor for $T_{\text{disch.}}$ 120°C, $f_{T_{\text{disch.}}} = 0.95$

$$\begin{aligned}Q_n &= Q_o \times f_{\Delta p} \times f_{T_{\text{liq}}} \times f_{T_{\text{disch.}}} = \\ 18 \times 0.72 \times 0.92 \times 0.95 &= 11.3 \text{ TR}\end{aligned}$$

From the capacity table a ICS 25-10 with Q_n capacity 12.0 TR is selected.

Nominal capacities

Discharge line

R 717

Capacity table for nominal conditions, Q_N [Tons of Refrigeration],
 $T_{liq} = 90^\circ\text{F}$,
 $\Delta P = 2.9 \text{ psi}$,
 $P_{disch.} = 185 \text{ psi}$,
 $T_{disch.} = 180^\circ\text{F}$
 Superheat = 12°F

Type	Valve body size	C_v (USgal/min)	Evaporating temperature [°F]							
			-60°F	-40°F	-20°F	0°F	20°F	40°F	60°F	80°F
ICS25-5	25	2	5.6	5.7	5.8	5.8	5.9	6.0	6.0	6.0
ICS25-10		4.1	11.4	11.6	11.8	12.0	12.1	12.3	12.3	12.4
ICS25-15		7	19.6	20.0	20.3	20.6	20.8	21.0	21.2	21.3
ICS25-20		9.3	26.2	26.6	27.0	27.4	27.8	28.0	28.2	28.3
ICS25-25		13.3	37.6	38.3	39.0	39.4	39.9	40.3	40.5	40.8
ICS32	32	20	55.5	56.5	57.5	58.3	59.0	59.5	60.0	60.3
ICS40	40	31	88.0	90.0	91.0	92.5	94.0	94.5	95.0	95.7
ICS50	50	51	144	146	149	151	153	154	155	156
ICS65	65	81	229	233	237	240	243	245	247	248
ICS80	80	98	275	280	285	289	292	295	297	298
ICS100	100	165	464	472	480	486	492	497	500	502
ICS125	125	240	674	687	698	707	716	723	727	731
ICS150	150	410	1152	1173	1192	1207	1223	1235	1242	1248

Correction factor for ΔP ($f_{\Delta P}$)

ΔP (psi)	Correction factor
3	1.00
4	0.87
5	0.79
6	0.72
7	0.66
8	0.62

Correction factor for discharge temperature ($T_{disch.}$).

Discharge temperature	Correction factor
120°F	0.95
140°F	0.97
180°F	1.00
200°F	1.02
210°F	1.02
230°F	1.04
250°F	1.06

Correction factor for liquid temperature (T_{liq}).

Liquid temperature	Correction factor
-10°F	0.82
10°F	0.85
30°F	0.88
50°F	0.92
70°F	0.96
90°F	1.00
110°F	1.04
130°F	1.09

R 744

Capacity table for nominal conditions, Q_N [Tons of Refrigeration],
 $T_{liq} = 90^\circ\text{F}$,
 $\Delta P = 3 \text{ psi}$,
 $P_{disch.} = 120 \text{ psi}$,
 $T_{disch.} = 180^\circ\text{F}$
 Superheat = 12°F

Type	Valve body size	C_v (USgal/min)	Evaporating temperature [°F]							
			-60°F	-40°F	-20°F	0°F	20°F	40°F	60°F	80°F
ICS25-5	25	2	3.4	3.4	3.5	3.5	3.4	3.3	3.2	3.1
ICS25-10		4.1	6.9	7.0	7.1	7.1	7.0	6.8	6.6	6.4
ICS25-15		7	11.9	12.1	12.2	12.2	12.0	11.7	11.3	11.0
ICS25-20		9.3	15.8	16.1	16.2	16.2	16.0	15.6	15.1	14.7
ICS25-25		13.3	22.8	23.1	23.3	23.3	23.0	22.4	21.8	21.1
ICS32	32	20	33.7	34.1	34.5	34.5	34.0	33.1	32.2	31.2
ICS40	40	31	53.4	54.3	54.7	54.7	54.0	52.5	51.0	49.6
ICS50	50	51	87.0	88.4	89.0	89.0	88.0	85.5	83.3	80.8
ICS65	65	81	138	141	142	142	140	136	132	129
ICS80	80	98	167	169	171	171	168	164	159	154
ICS100	100	165	281	285	288	288	284	276	268	260
ICS125	125	240	408	414	419	419	412	401	389	378
ICS150	150	410	698	708	715	715	705	685	665	646

Correction factor for ΔP ($f_{\Delta P}$)

ΔP (psi)	Correction factor
3	1.00
4	0.87
5	0.79
6	0.72
7	0.66
8	0.62

Correction factor for discharge temperature ($T_{disch.}$).

Discharge temperature	Correction factor
120°F	0.95
140°F	0.97
180°F	1.00
200°F	1.02
210°F	1.02
230°F	1.04
250°F	1.05

Correction factor for liquid temperature (T_{liq}).

Liquid temperature	Correction factor
-10°F	0.48
10°F	0.64
30°F	0.88
50°F	1.00

Nominal capacities

Discharge line

R 134a

Capacity table for nominal conditions, Q_N [Tons of Refrigeration],
 $T_{liq} = 90^\circ\text{F}$,
 $\Delta P = 3 \text{ psi}$,
 $P_{disch} = 120 \text{ psi}$,
 $T_{disch} = 180^\circ\text{F}$
 Superheat = 12°F

Type	Valve body size	C_v (USgal/min)	Evaporating temperature [$^\circ\text{F}$]						
			-40 $^\circ\text{F}$	-20 $^\circ\text{F}$	0 $^\circ\text{F}$	20 $^\circ\text{F}$	40 $^\circ\text{F}$	60 $^\circ\text{F}$	80 $^\circ\text{F}$
ICS25-5	25	2	1.4	1.5	1.5	1.6	1.7	1.7	1.8
ICS25-10		4.1	2.3	3.0	3.1	3.3	3.4	3.6	3.7
ICS25-15		7	4.9	5.1	5.4	5.6	5.9	6.1	6.3
ICS25-20		9.3	6.5	6.8	7.2	7.5	7.8	8.1	8.4
ICS25-25		13.3	9.3	9.8	10.3	10.8	11.3	11.7	12.1
ICS32	32	20	13.8	14.5	15.2	16.0	16.6	17.3	18.0
ICS40	40	31	21.9	23.0	24.2	25.3	26.5	27.5	28.5
ICS50	50	51	35.6	37.5	39.4	41.3	43.0	44.8	46.5
ICS65	65	81	56.7	59.7	62.9	65.7	68.5	71.3	74.0
ICS80	80	98	67	72	75	79	83	86	89
ICS100	100	165	113	121	127	133	139	144	150
ICS125	125	240	164	176	184	194	202	210	218
ICS150	150	410	280	301	315	331	345	358	372

Correction factor for ΔP ($f_{\Delta P}$)

ΔP (psi)	Correction factor
3	1.00
4	0.87
5	0.79
6	0.72
7	0.66
8	0.62

Correction factor for discharge temperature (T_{disch}).

Discharge temperature	Correction factor
120 $^\circ\text{F}$	0.95
140 $^\circ\text{F}$	0.97
180 $^\circ\text{F}$	1.00
200 $^\circ\text{F}$	1.02
210 $^\circ\text{F}$	1.02
230 $^\circ\text{F}$	1.04
250 $^\circ\text{F}$	1.05

Correction factor for liquid temperature (T_{liq}).

Liquid temperature	Correction factor
-10 $^\circ\text{F}$	0.64
10 $^\circ\text{F}$	0.68
30 $^\circ\text{F}$	0.74
50 $^\circ\text{F}$	0.81
70 $^\circ\text{F}$	0.89
90 $^\circ\text{F}$	1.00
110 $^\circ\text{F}$	1.15
130 $^\circ\text{F}$	1.35

R 404A

Capacity table for nominal conditions, Q_N [Tons of Refrigeration],
 $T_{liq} = 90^\circ\text{F}$,
 $\Delta P = 3 \text{ psi}$,
 $P_{disch} = 120 \text{ psi}$,
 $T_{disch} = 180^\circ\text{F}$
 Superheat = 12°F

Type	Valve body size	C_v (USgal/min)	Evaporating temperature [$^\circ\text{F}$]							
			-60 $^\circ\text{F}$	-40 $^\circ\text{F}$	-20 $^\circ\text{F}$	0 $^\circ\text{F}$	20 $^\circ\text{F}$	40 $^\circ\text{F}$	60 $^\circ\text{F}$	80 $^\circ\text{F}$
ICS25-5	25	2	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.8
ICS25-10		4.1	2.5	2.7	2.9	3.1	3.3	3.5	3.7	3.8
ICS25-15		7	4.4	4.7	5.0	5.4	5.7	6.0	6.3	6.5
ICS25-20		9.3	5.8	6.2	6.7	7.2	7.6	8.0	8.4	8.7
ICS25-25		13.3	8.4	8.9	9.6	10.3	10.9	11.5	12.0	12.5
ICS32	32	20	12.4	13.2	14.2	15.2	16.1	17.0	17.8	18.4
ICS40	40	31	19.6	21.0	22.6	24.1	25.6	27.0	28.2	29.3
ICS50	50	51	32.0	34.2	36.8	39.3	41.7	44.0	46.0	47.7
ICS65	65	81	51.0	54.3	58.5	62.5	66.3	70.0	73.0	76.0
ICS80	80	98	61	65	70	75	80	84	88	91
ICS100	100	165	103	110	118	127	134	142	149	153
ICS125	125	240	149	160	172	184	195	206	216	223
ICS150	150	410	255	273	294	315	334	352	369	381

Correction factor for ΔP ($f_{\Delta P}$)

ΔP (psi)	Correction factor
3	1.00
4	0.87
5	0.79
6	0.72
7	0.66
8	0.62

Correction factor for discharge temperature (T_{disch}).

Discharge temperature	Correction factor
120 $^\circ\text{F}$	0.95
140 $^\circ\text{F}$	0.97
180 $^\circ\text{F}$	1.00
200 $^\circ\text{F}$	1.02
210 $^\circ\text{F}$	1.02
230 $^\circ\text{F}$	1.04
250 $^\circ\text{F}$	1.05

Correction factor for liquid temperature (T_{liq}).

Liquid temperature	Correction factor
-10 $^\circ\text{F}$	0.52
10 $^\circ\text{F}$	0.57
30 $^\circ\text{F}$	0.63
50 $^\circ\text{F}$	0.72
70 $^\circ\text{F}$	0.83
90 $^\circ\text{F}$	1.00
110 $^\circ\text{F}$	1.29
130 $^\circ\text{F}$	1.92

Nominal capacities

Discharge line

R 22

Capacity table for nominal conditions, Q_N [Tons of Refrigeration],
 $T_{liq} = 90^\circ\text{F}$,
 $\Delta P = 3 \text{ psi}$,
 $P_{disch} = 120 \text{ psi}$,
 $T_{disch} = 180^\circ\text{F}$
 Superheat = 12°F

Type	Valve body size	C_v (USgal/min)	Evaporating temperature [°F]							
			-60°F	-40°F	-20°F	0°F	20°F	40°F	60°F	80°F
ICS25-5	25	2	1.8	1.9	2.0	2.0	2.1	2.1	2.2	2.2
ICS25-10		4.1	3.7	3.9	4.0	4.1	4.3	4.4	4.5	4.6
ICS25-15		7	6.4	6.6	6.8	7.1	7.3	7.4	7.6	7.8
ICS25-20		9.3	8.5	8.8	9.1	9.4	9.6	9.9	10.1	10.3
ICS25-25		13.3	12.1	12.6	13.0	13.4	13.8	14.2	14.5	14.8
ICS32	32	20	18.2	18.9	19.6	20.2	20.7	21.3	21.8	22.2
ICS40	40	31	28.3	29.3	30.3	31.3	32.1	33.0	33.8	34.4
ICS50	50	51	46.5	48.2	49.9	51.4	52.9	54.3	55.5	56.7
ICS65	65	81	73.9	76.6	79.2	81.7	84.0	86.2	88.2	90.0
ICS80	80	98	89	93	96	99	102	104	107	109
ICS100	100	165	150	156	162	166	172	175	180	183
ICS125	125	240	218	227	235	242	250	255	262	267
ICS150	150	410	373	388	402	413	426	436	447	456

Correction factor for ΔP ($f_{\Delta P}$)

ΔP (psi)	Correction factor
3	1.00
4	0.87
5	0.79
6	0.72
7	0.66
8	0.62

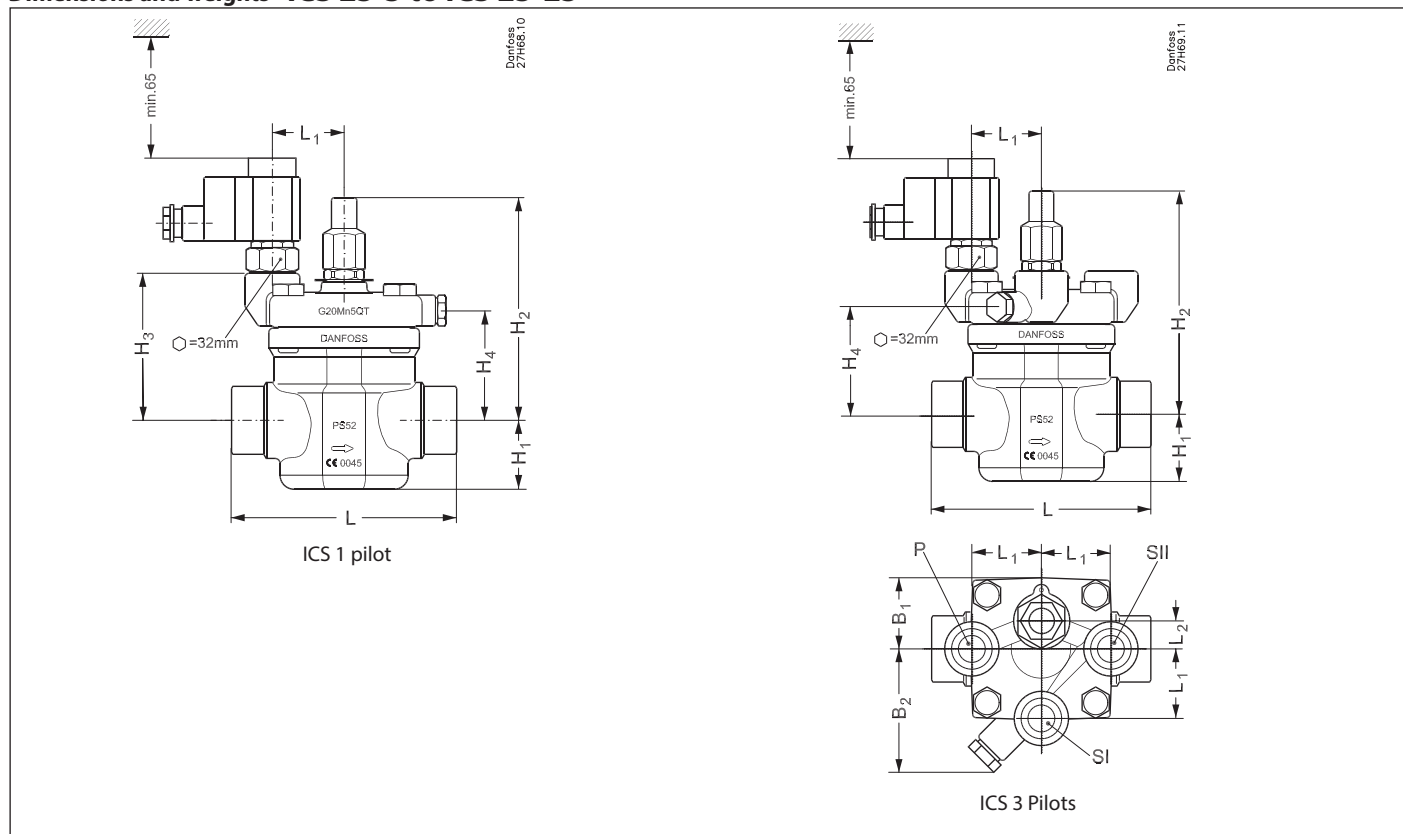
Correction factor for discharge temperature (T_{disch}).

Discharge temperature	Correction factor
120°F	0.95
140°F	0.97
180°F	1.00
200°F	1.02
210°F	1.02
230°F	1.04
250°F	1.05

Correction factor for liquid temperature (T_{liq}).

Liquid temperature	Correction factor
-10°F	0.73
10°F	0.77
30°F	0.82
50°F	0.87
70°F	0.93
90°F	1.00
110°F	1.09
130°F	1.20

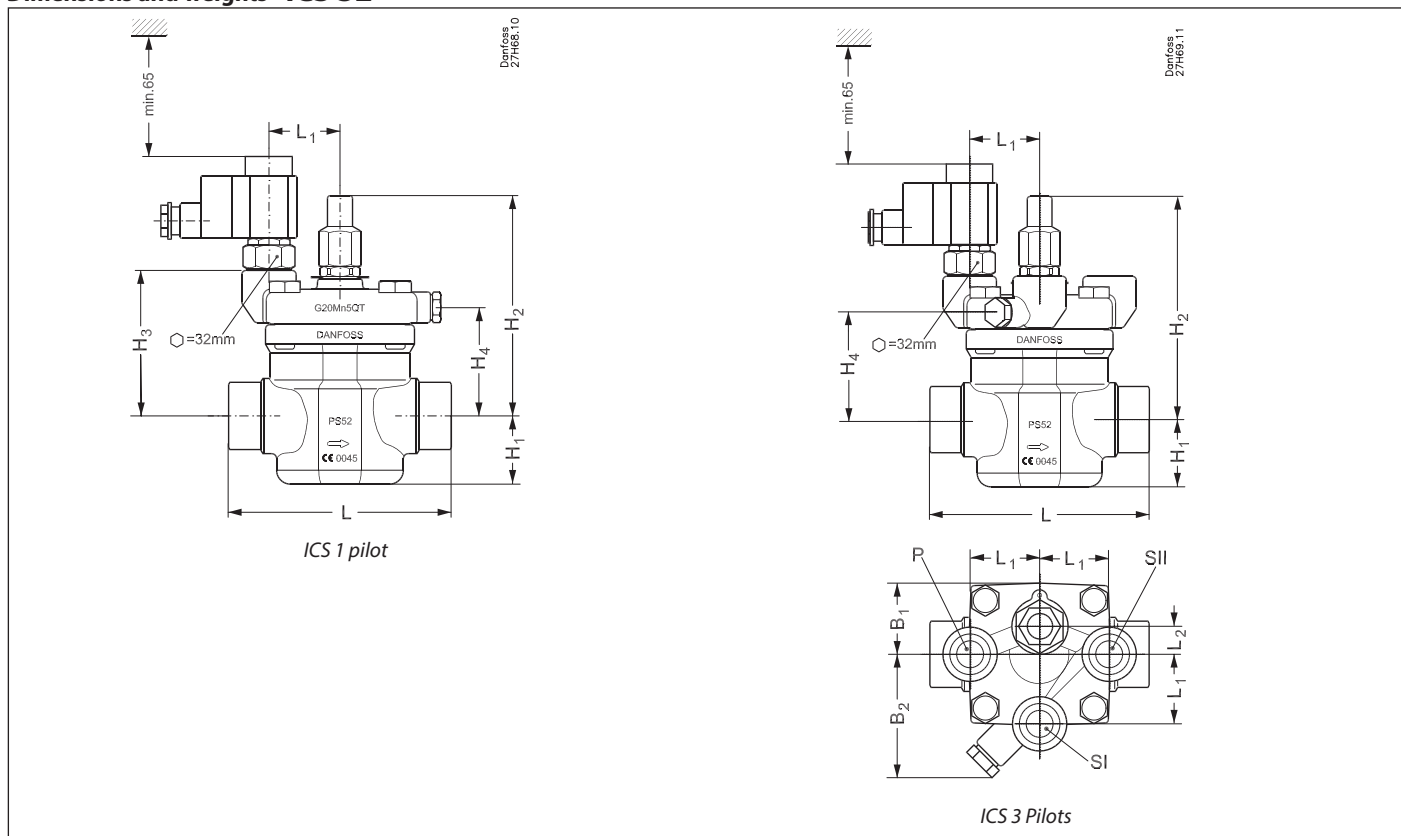
Dimensions and weights - ICS 25-5 to ICS 25-25



Connection		H ₁	H ₂	H ₃	H ₄	L	L ₁	L ₂	B ₁	B ₂	Weight ICS 1 Pilot	Weight ICS 3 Pilots
¼ in. BW	mm	37	138	86	60	135	51	15	42	87	3 kg	3.6 kg
	in.	1.46	5.43	3.39	2.36	5.31	2.00	0.59	1.65	3.43	6.6 lb.	7.92 lb.
1 in. BW	mm	37	138	86	60	135	51	15	42	87	3 kg	3.6 kg
	in.	1.46	5.43	3.39	2.36	5.31	2.00	0.59	1.65	3.43	6.6 lb.	7.92 lb.
1¼ in. BW	mm	37	138	86	60	135	51	15	42	87	3 kg	3.6 kg
	in.	1.46	5.43	3.39	2.36	5.31	2.00	0.59	1.65	3.43	6.6 lb.	7.92 lb.
¾ in. SOC	mm	37	138	86	60	135	51	15	42	87	3 kg	3.6 kg
	in.	1.46	5.43	3.39	2.36	5.31	2.00	0.59	1.65	3.43	6.6 lb.	7.92 lb.
1 in. SOC	mm	37	138	86	60	147	51	15	42	87	3 kg	3.6 kg
	in.	1.46	5.43	3.39	2.36	5.79	2.00	0.59	1.65	3.43	6.6 lb.	7.92 lb.
⅞ in. ODS	mm	37	138	86	60	135	51	15	42	87	3 kg	3.6 kg
	in.	1.46	5.43	3.39	2.36	5.31	2.00	0.59	1.65	3.43	6.6 lb.	7.92 lb.
1½ in. ODS	mm	37	138	86	60	147	51	15	42	87	3 kg	3.6 kg
	in.	1.46	5.43	3.39	2.36	5.78	2.00	0.59	1.65	3.43	6.6 lb.	7.92 lb.
1¾ in. ODS	mm	37	138	86	60	147	51	15	42	87	3 kg	3.6 kg
	in.	1.46	5.43	3.39	2.36	5.78	2.00	0.59	1.65	3.43	6.6 lb.	7.92 lb.
¾ in. FPT	mm	37	138	86	60	135	51	15	42	87	3 kg	3.6 kg
	in.	1.46	5.43	3.39	2.36	5.31	2.00	0.59	1.65	3.43	6.6 lb.	7.92 lb.
1 in. FPT	mm	37	138	86	60	135	51	15	42	87	3 kg	3.6 kg
	in.	1.46	5.43	3.39	2.36	5.31	2.00	0.59	1.65	3.43	6.6 lb.	7.92 lb.

BW = Butt-weld ANSI ; SOC = Socket weld ANSI ; ODS = Solder ANSI ; FPT = Female Pipe Thread

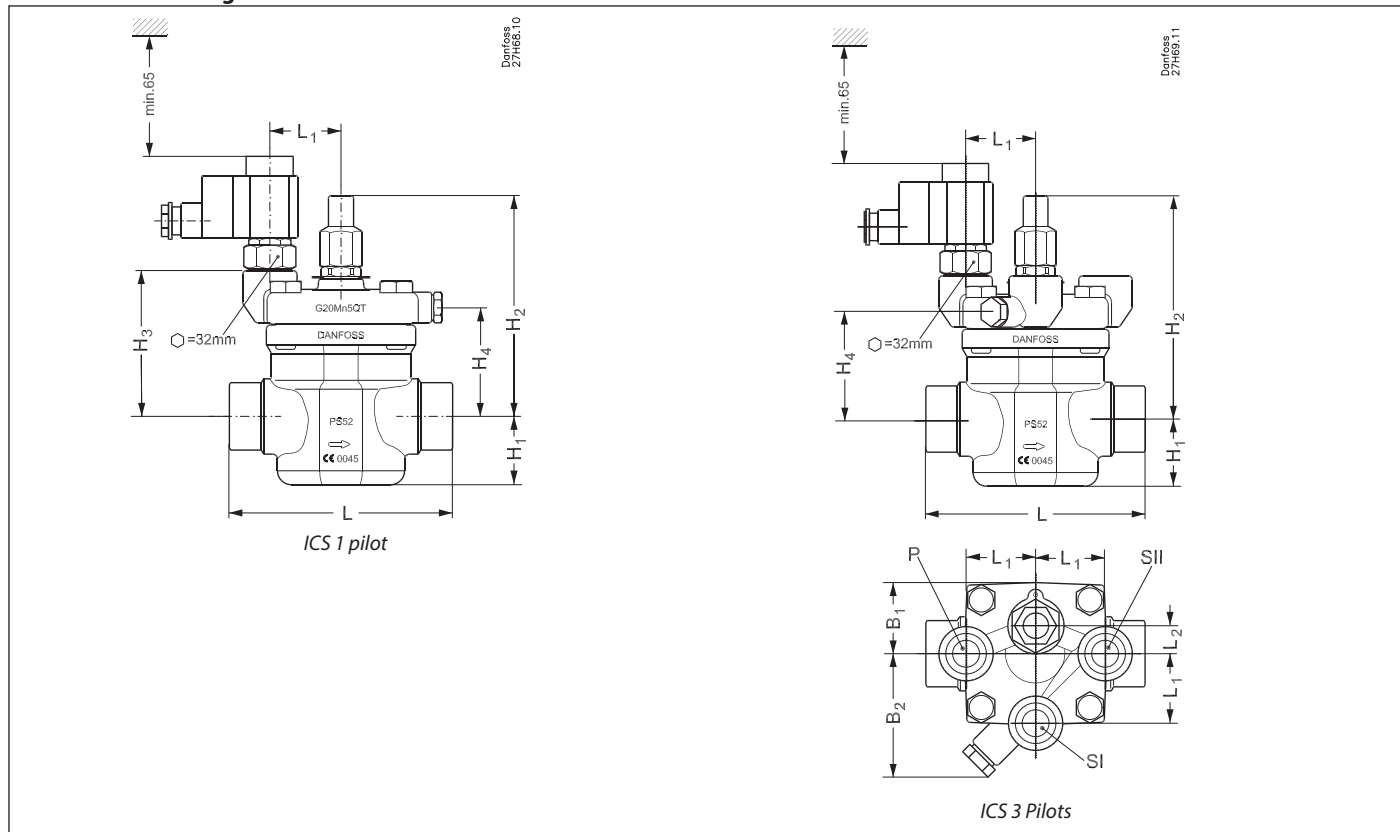
Dimensions and weights - ICS 32



Connection		H ₁	H ₂	H ₃	H ₄	L	L ₁	L ₂	B ₁	B ₂	Weight ICS 1 Pilot	Weight ICS 3 Pilots
32 BW (1¼ in.)	mm	40	153	100	74	145	51	15	51	87	4.5 kg	5 kg
	in.	1.57	6.02	3.93	2.91	5.71	2.00	0.59	2.00	3.43	9.9 lb.	11 lb.
40 BW (1½ in.)	mm	40	153	100	74	145	51	15	51	87	4.5 kg	5 kg
	in.	1.57	6.02	3.93	2.91	5.71	2.00	0.59	2.00	3.43	9.9 lb.	11 lb.
1¼ in. SOC	mm	40	153	100	74	148	51	15	51	87	4.5 kg	5 kg
	in.	1.57	6.02	3.93	2.91	5.83	2.00	0.59	2.00	3.43	9.9 lb.	11 lb.
1¾ in. ODS	mm	40	153	100	74	148	51	15	51	87	4.5 kg	5 kg
	in.	1.57	6.02	3.93	2.91	5.83	2.00	0.59	2.00	3.43	9.9 lb.	11 lb.
1¾ in. ODS	mm	40	153	100	74	148	51	15	51	87	4.5 kg	5 kg
	in.	1.57	6.02	3.93	2.91	5.83	2.00	0.59	2.00	3.43	9.9 lb.	11 lb.

BW = Butt-weld ANSI; SOC = Socket weld ANSI; ODS = Solder ANSI ; FPT = Female Pipe Thread

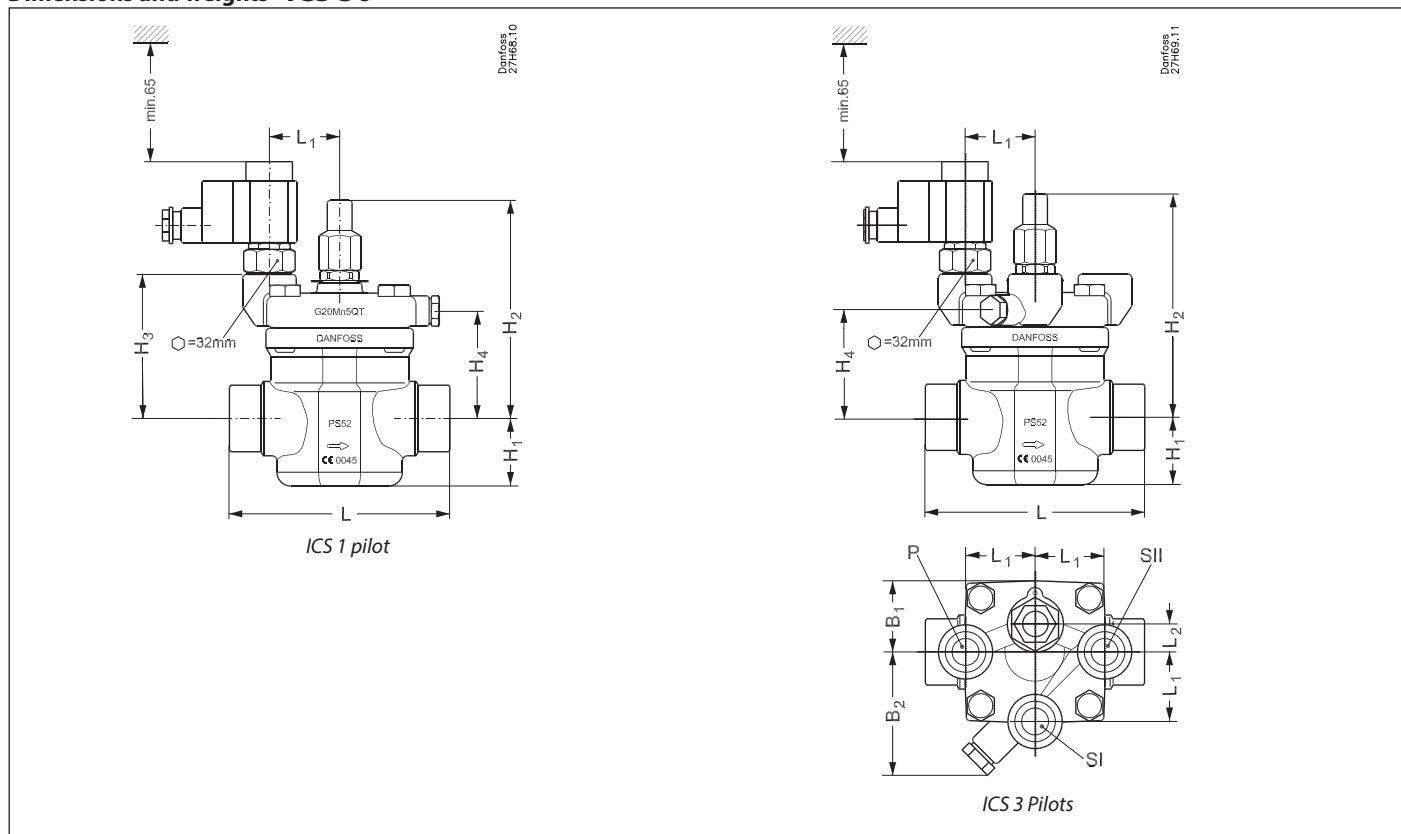
Dimensions and weights - ICS 40



Connection		H ₁	H ₂	H ₃	H ₄	L	L ₁	L ₂	B ₁	B ₂	Weight ICS 1 Pilot	Weight ICS 3 Pilots
1½ in. BW	mm	49	159	105	78	160	51	15	54	87	5.9 kg	6.3 kg
	in.	1.93	6.26	4.13	3.07	6.30	2.00	0.59	2.13	3.43	13.0 lb.	13.9 lb.
2 in. BW	mm	49	159	105	78	180	51	15	54	87	5.9 kg	6.3 kg
	in.	1.93	6.26	4.13	3.07	7.09	2.00	0.59	2.13	3.43	13.0 lb.	13.9 lb.
1½ in. SOC	mm	49	159	105	78	180	51	15	54	87	5.9 kg	6.3 kg
	in.	1.93	6.26	4.13	3.07	7.09	2.00	0.59	2.13	3.43	13.0 lb.	13.9 lb.
1¼ in. ODS	mm	49	159	105	78	180	51	15	54	87	5.9 kg	6.3 kg
	in.	1.93	6.26	4.13	3.07	7.09	2.00	0.59	2.13	3.43	13.0 lb.	13.9 lb.

BW = Butt-weld ANSI; SOC = Socket weld ANSI; ODS = Solder ANSI; FPT = Female Pipe Thread

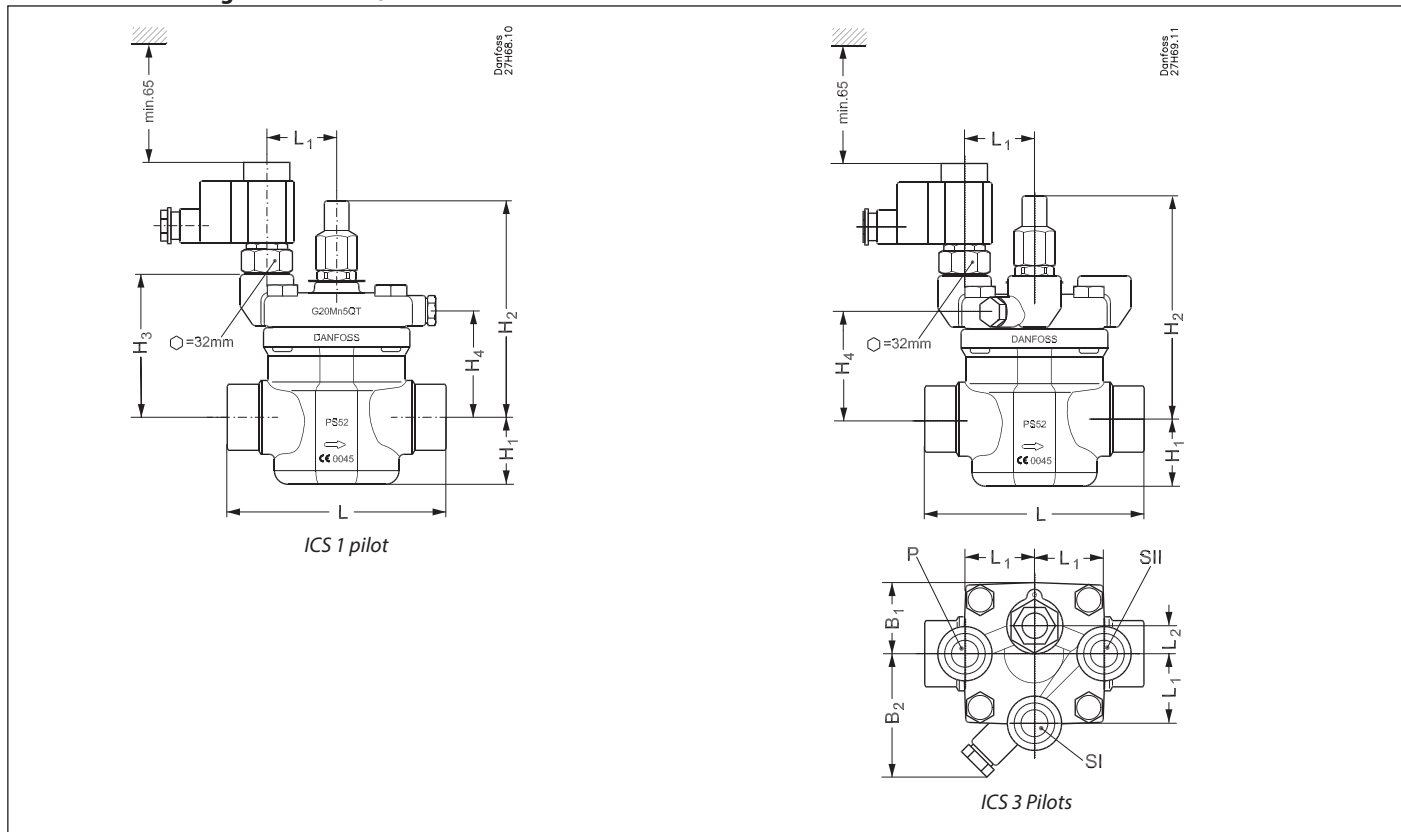
Dimensions and weights - ICS 50



Connection		H ₁	H ₂	H ₃	H ₄	L	L ₁	L ₂	B ₁	B ₂	Weight ICS 1 Pilot	Weight ICS 3 Pilots
2 in. BW	mm	59	174	120	93	200	51	15	63	91	8.9 kg	9.2 kg
	in.	2.32	6.85	4.72	3.66	7.87	2.00	0.59	2.48	3.58	19.6 lb.	20.2 lb.
2½ in. BW	mm	59	174	120	93	210	51	15	63	91	8.9 kg	9.2 kg
	in.	2.32	6.85	4.72	3.66	8.27	2.00	0.59	2.48	3.58	19.6 lb.	20.2 lb.
2 in. SOC	mm	59	174	120	93	216	51	15	63	91	8.9 kg	9.2 kg
	in.	2.32	6.85	4.72	3.66	8.50	2.00	0.59	2.48	3.58	19.6 lb.	20.2 lb.
2½ in. ODS	mm	59	174	120	93	216	51	15	63	91	8.9 kg	9.2 kg
	in.	2.32	6.85	4.72	3.66	8.50	2.00	0.59	2.48	3.58	19.6 lb.	20.2 lb.

BW = Butt-weld ANSI ; SOC = Socket weld ANSI ; ODS = Solder ANSI ; FPT = Female Pipe Thread

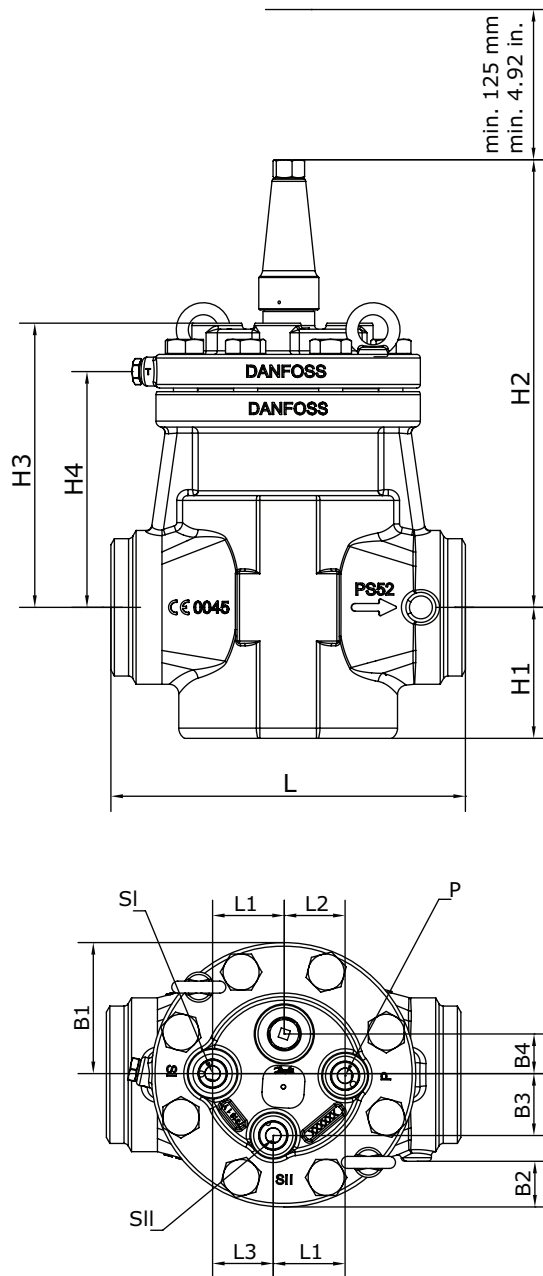
Dimensions and weights - ICS 65 / 80



Connection		H ₁	H ₂	H ₃	H ₄	L	L ₁	L ₂	B ₁	B ₂	Weight ICS 1 Pilot	Weight ICS 3 Pilots
2½ in. BW	mm	65	195	140	115	230	51	15	70	91	13.4 kg	13.5 kg
	in.	2.56	7.68	5.51	4.53	9.06	2.00	0.59	2.76	3.58	29.48 lb.	29.7 lb.
3 in. BW	mm	65	195	140	115	245	51	15	70	91	13.4 kg	13.5 kg
	in.	2.56	7.68	5.51	4.53	9.65	2.00	0.59	2.76	3.58	29.48 lb.	29.7 lb.
2½ in. SOC	mm	65	195	140	115	230	51	15	70	91	13.4 kg	13.5 kg
	in.	2.56	7.68	5.51	4.53	9.06	2.00	0.59	2.76	3.58	29.48 lb.	29.7 lb.
2¾ in. ODS	mm	65	195	140	115	245	51	15	70	91	13.4 kg	13.5 kg
	in.	2.56	7.68	5.51	4.53	9.65	2.00	0.59	2.76	3.58	29.48 lb.	29.7 lb.

BW = Butt-weld ANSI; SOC = Socket weld ANSI; ODS = Solder ANSI ; FPT = Female Pipe Thread

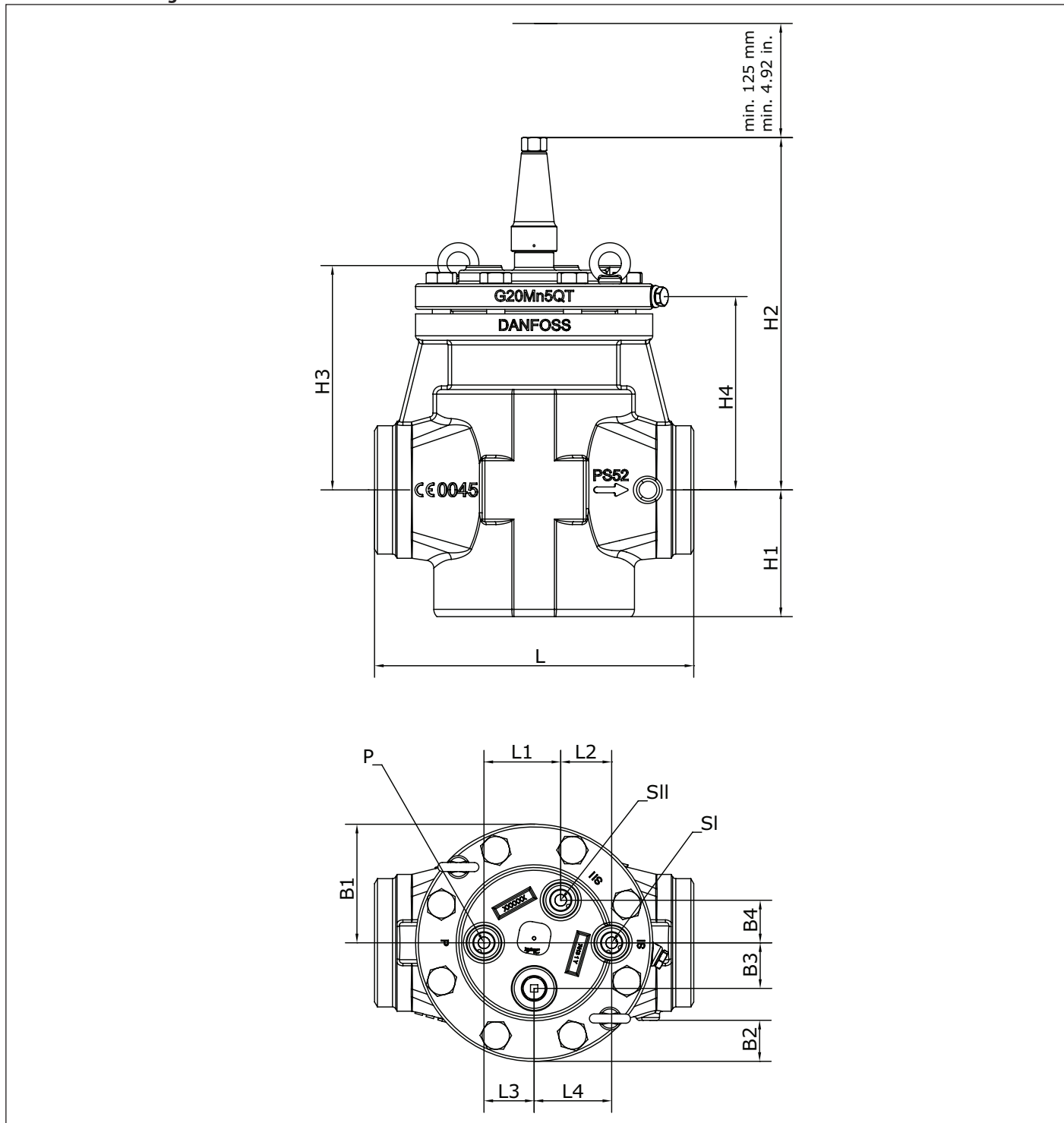
Dimensions and weights - ICS 100



ICS Size		H1	H2	H3	H4	L	L1	L2	L3	B1	B2	B3	B4	Weight
ICS 100 4 in. BW	mm	109	372	237	196	295	60	51	50	109	38	52	33	45 kg
	in.	4.3	14.7	9.3	7.7	11.6	2.4	2.0	2.0	4.3	1.5	2.1	1.3	99.2 lb.

BW = Butt-weld ANSI

Dimensions and weights - ICS 125-150



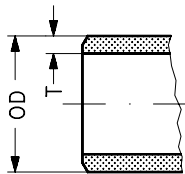
ICS size		H1	H2	H3	H4	L	L1	L2	L3	L4	B1	B2	B3	B4	Weight
ICS 125 5 in. BW	mm	139	386	246	212	350	84	56	55	85	130	45	50	47	68 kg
	in.	5.5	15.2	9.7	8.4	13.8	3.3	2.2	2.2	3.4	5.1	1.8	2.0	1.9	149.9 lb.
ICS 150, 6 in. BW	mm	168	425	297	256	445	107	58	69	96	150	48	52	50	115 kg
	in.	6.6	16.7	11.7	10.1	17.5	4.2	2.3	2.7	3.8	5.9	1.9	2.1	2.0	253.5 lb.

BW = Butt-weld ANSI

Data sheet | Pilot-operated servo valve, type ICS

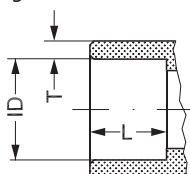
Connections

BW: Butt-weld ANSI (B 36.10)



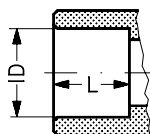
Size mm	Size in.	OD mm	T mm	OD in.	T in.	Schedule	
(20)	¾	26.9	4.0	1.059	0.158	80	
(25)	1	33.7	4.6	1.327	0.181	80	
(32)	1¼	42.4	4.9	1.669	0.193	80	
(40)	1½	48.3	5.1	1.902	0.201	80	
(50)	2	60.3	3.9	2.37	0.15	40	
(65)	2½	73.0	5.2	2.87	0.20	40	
(80)	3	88.9	5.5	3.50	0.22	40	
(100)	4	114.3	6	4.5	0.24		
(125)	5	140.7	6.5	5.5	0.26		
(150)	6	168.3	7.1	6.6	0.28		

SOC:
Socket welding ANSI (B 16.11)



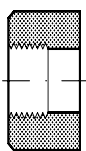
Size mm	Size in.	ID mm	T mm	ID in.	T in.	L mm	L in.
(20)	¾	27.2	4.6	1.071	0.181	13	0.51
(25)	1	33.9	7.2	1.335	0.284	13	0.51
(32)	1¼	42.7	6.1	1.743	0.240	13	0.51
(40)	1½	48.8	6.6	1.921	0.260	13	0.51
(50)	2	61.2	6.2	2.41	0.24	16	0.63
(65)	2½	74	8.8	2.91	0.344	16	0.63

ODS: Soldering (ANSI B 16.22)



	Size in.			ID in.			L in.
	⅞			0.875			0.650
	1⅛			1.125			1.024
	1⅜			1.375			0.984
	1⅝			1.625			1.102
	2⅛			2.125			1.300
	2⅝			2.625			1.300

FPT:
Female pipe thread,
(ANSI/ASME B 1.20.1)



Size mm	Size in.	Inside pipe thread		
(20)	¾	(¾ × 14 NPT)		
(25)	1	(1 × 11.5 NPT)		
(32)	1¼	(1¼ × 11.5 NPT)		

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