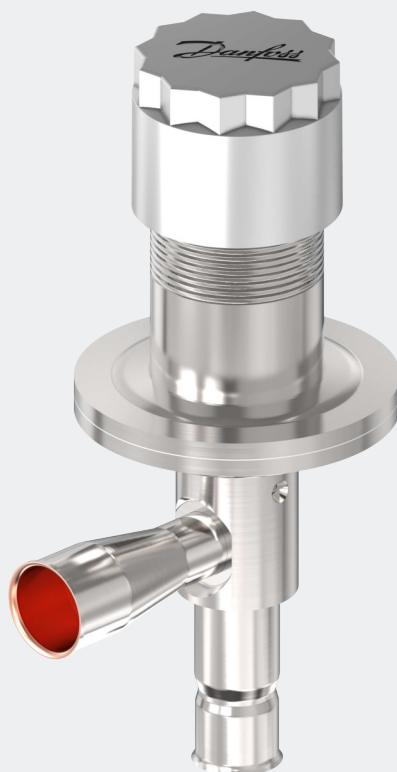




Automatic expansion valve

AXV

Hot gas bypass valve & expansion valve

Description

AXV I is a constant pressure regulator and it is designed to maintain a constant evaporating pressure during all running conditions. As the pressure in the evaporator changes, the valve opens or closes to control refrigerant flow into the evaporator. This function allows it to be used as either an injection or hot gas bypass valve.

AXV H capacity hot gas bypass valve adapts compressor capacity to actual evaporator load in applications operating at an evaporating temperature of around 0 °C. Fitted in a bypass between the high and low-pressure sides of the refrigeration system. AXV H maintain compressor suction pressure by injecting hot gas/cool gas from the high-pressure side.

AXV I as injection function that controls the refrigerant flow based on the evaporator pressure instead of amount of superheat at the outlet of the evaporator. This allows its bulbless design.

Features & Benefits

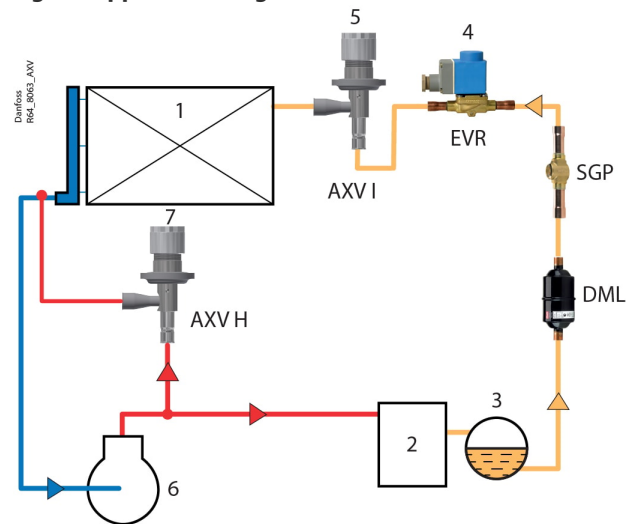
- Improved design with no bulb and capillary tube
- Bimetal connections for easy, waterless and fast brazing
 - Straightforward and fast soldering (no wet cloth required)
- Broad capacity range and wide range of pressures
 - Orifices no. 2, 3, 4 and 6 enable an easy changeover from TUH and TCHE
Replacement capacities up to 28.9 kW (8.3 TR) for R410A
- Double diaphragm for high pressure refrigerants. Wide adjustment range 1-7 bar (1-11 with R410A)
- Pressure setting cap for easy adjustment
 - Accurate setting, fine tuning possible
- Refrigerant independent. Broad media temp from -40 to 140 °C. Optional bleed function for soft start
- Stable regulation. Compact design
- Stainless steel, hermetically tight solder version
 - High connection strength
High corrosion resistance
- Laser-welded, stainless steel diaphragm element
 - Optimum function
Long diaphragm life
High pressure resistance
- Low hysteresis

Applications

The outlet of the AXV-H should be connected as close as possible to the suction pipe to minimize pressure losses across the piping after the hot gas bypass valve. Long pipe distance, number of bends, smaller size of pipe dimensions or any other pressure drops should be avoided as much as possible.

Figure: Application diagram

1	Evaporator
2	Condenser
3	Receiver
4	Solenoid valve
5	Injection valve
6	Compressor
7	Hot gas bypass valve



This type of cooling installation includes both valves AXV-H and AXV-I in the same application diagram. But it is not necessarily to use AXV-I for the injection function where a TXV can be used for the superheat regulation on the evaporator outlet.

Note: While utilizing this diagram above, pay attention to the compressor manufacturer recommendations in order to avoid overheating the compressor. Please take into consideration requirements from compressor manufacturer.

Above diagram shows the option to inject hot gas after the evaporator. But another option is to inject hot gas ahead of the evaporator as well. Please get in touch with your Danfoss representative for more information.

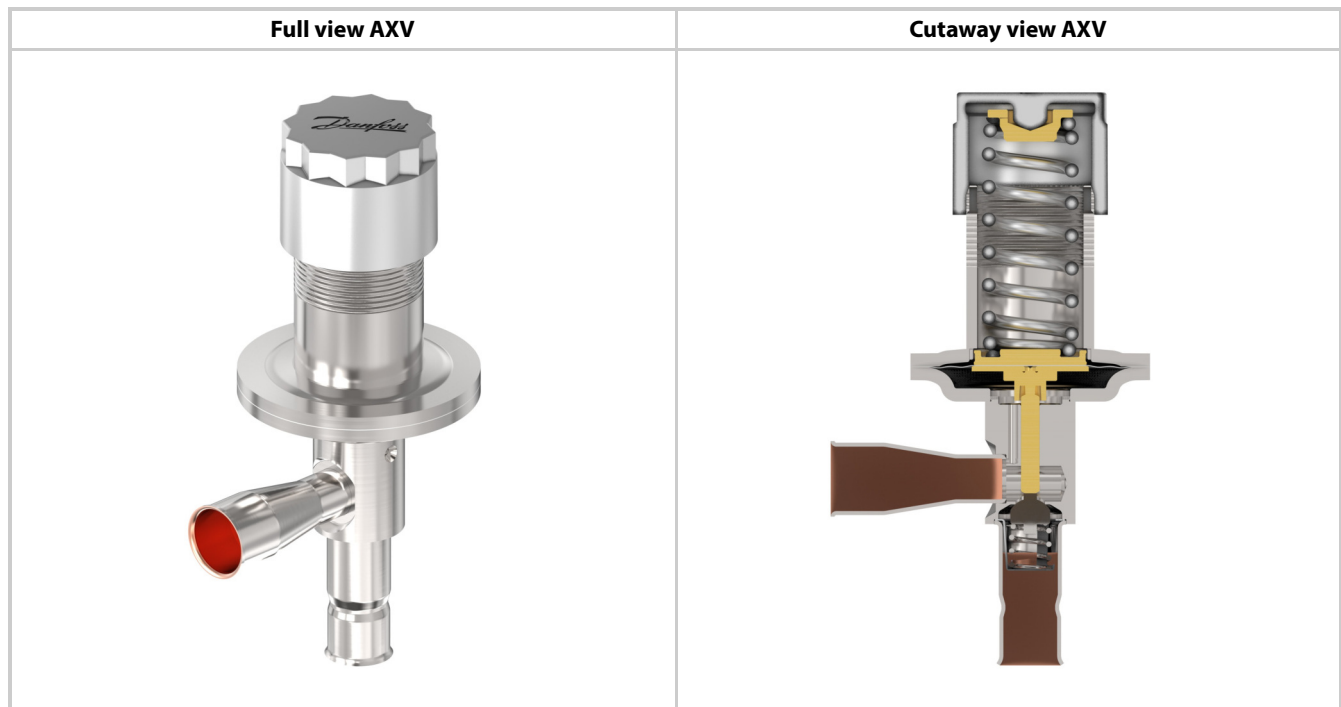
By this example AXV-I regulates the amount of refrigerant that is injected into the evaporator, and it keeps a constant pressure in the evaporator. If the evaporating pressure increases, the valve will reduce the flow into the evaporator which is the opposite what TXV does. The evaporator pressure will rise and then the closing force of the refrigerant in the evaporator, it will move to a more closed position. Therefore, strongly recommended as that AXV-I should only be used on systems with a constant or slightly constant heat load. Since it does not control superheat level at the outlet of the evaporator, it works well on systems not having significant heat load changes. It is necessary to make sure by system design the compressor will not get any liquid at the suction connector - gas only.

Typical applications for AXV H and AXV I:

- Air driers
- Ice cream machines
- Slush ice machines
- Air conditioners
- Vending machines

AXV stainless steel technology

Figure: Type AXV H / I. Full view and cutaway view



Benefits of stainless steel

The fact that the AXV is stainless steel body valve offers a number of benefits:

- Stainless steel is far more corrosion-resistant than traditional valve materials.
- Stainless steel valves require no surface treatment.
- Stainless steel has a greater strength-to-weight ratio, making AXV valves lighter and more compact.
- Stainless steel diaphragms have greater strength and corrosion resistance for a longer life.

Danfoss precision port design

The AXV valve introduces precision port design, incorporating four features that ensure superior repeatable performance over an extended valve life.

- Laser welding preserves the structural integrity of the diaphragm, assuring consistent operation.
- The precision-machined cone and orifice accurately meter refrigerant under all operating conditions.

High quality

The AXV is manufactured on fully automated, process-monitored production lines. Cellularized computer-monitored technology ensures uniform high quality and secures that, every valve meets Danfoss quality standards and customer specifications. Cellularized production also makes possible simultaneous production of large and small quantities of standard and custom version valves.

Advanced technology - fast and easy installation

The AXV stainless steel has significant installation advantages because it is a valve designed specifically for soldering. The AXV can be installed 5 times faster than a traditional brass body valve. The valve connections are made of copper and stainless steel bi-metal which makes installation easy, waterless, reliable, and fast.

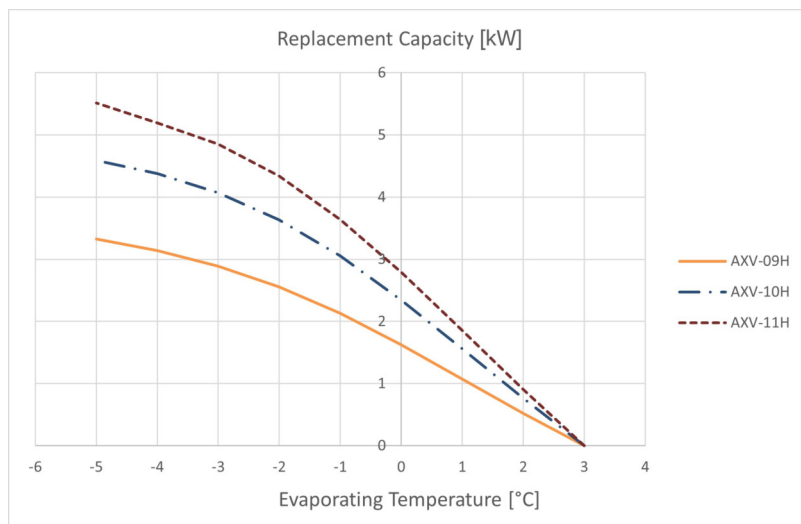
No need for a wet cloth

Bi-metal has a very low thermal conductivity, only 10% that of copper, so heat applied during soldering remains largely in the copper layer of the connection tube, instead of being conducted to the valve body. External cooling is unnecessary. The result is no need to cool the valve during soldering. This will help to avoid damages due to overheating of the valve during soldering and therefore better solder quality.

Sizing (AXV H)

For sizing the AXV H, please refer to the chart below and follow the selection instruction.

Figure: Sizing example for R134a



Conditions used in calculation: $t_c = +40\text{ °C}$, Start opening $t_e = +3\text{ °C}$

Correction for condensing temperature

The corrected replacement capacity can be obtained by dividing the replacement capacity with the correction factor given below.

Table: Correction factors for condensing temperature

Refrigerant	Condensing temperature		
	+30 °C	+40 °C	+50 °C
R134a	0.8	1.0	1.2

Example

Refrigerant: R134a

Compressor capacity: 6 kW at +3 / +50 °C

Min. load 50%: 3 kW

Replacement capacity: $6 - 3 = 3\text{ kW}$

Min. evaporating temperature t_e : -2.0 °C

Condensing temperature t_c : +50 °C

Correction factor (shown in above table)

The corrected replacement capacity thus becomes 3 kW divided by 1.2 = 2.5 kW. The AXV-09H gives 2.5 kW at -2.0/+40 °C (- -). The AXV-09H would be a suitable choice.

Sizing (AXV I)

For sizing the AXV I, please refer to the nominal capacity tables further below on the datasheet under given conditions.

For more detailed capacity calculations please refer to Coolselector®2.

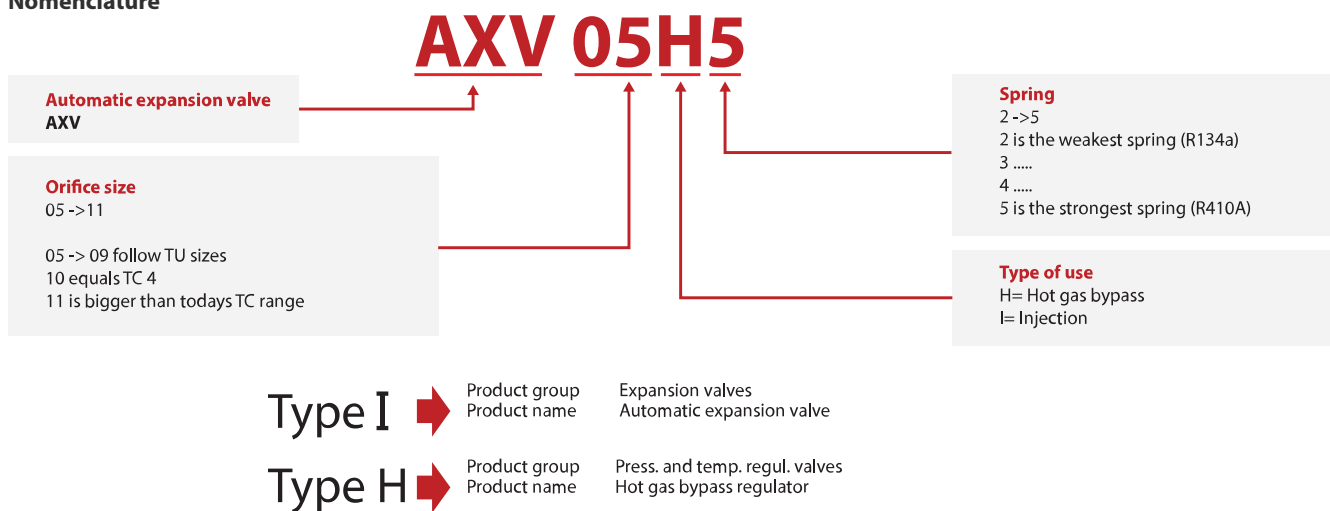
Ordering

Product code numbers

Type	Pressure range [bar] [max]	Flow direction	Orifice size	Bleed [%]	Inlet connection type	Outlet connection type	Code number
AXV 07I3	5.20	Single-flow	07	15	Solder, ODF	Solder, ODF	034L4803
AXV 08I3	5.20	Single-flow	08	15	Solder, ODF	Solder, ODF	034L4810

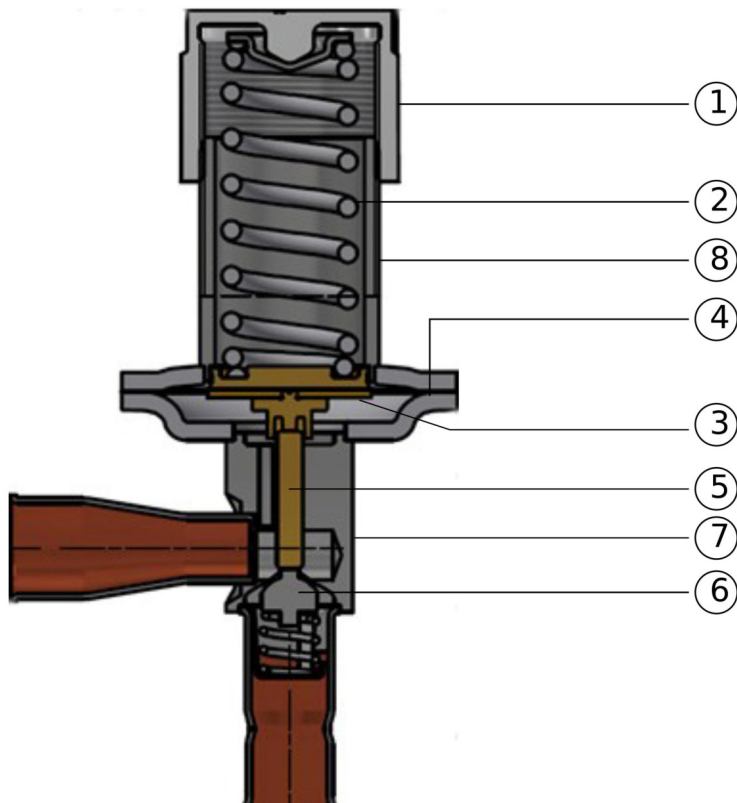
Note: Other code numbers are available on demand

Nomenclature



Functions

Figure: AXV Main internal parts



1	Adjustment top cap
2	Top spring
3	Thrust pad
4	Diaphragm element

5	Pushpin
6	Nozzle cone
7	Valve body
8	Spring tube

The valve is set to start opening at an evaporating temperature of +3 °C/+37.4 °F for pre-selected refrigerants * See Table: Factory setting based on spring number. The setting can be changed by turning the setting top cap. The temperature at which the valve starts opening is increased by turning the top cap clockwise and decreased by turning the top cap counter-clockwise.

This feature applies for both functions as hot gas bypass and direct injection applications.

AXV-H and AXV-I are two ranges available for applications using Hot gas and direct Injection. All valves react on to suction pressure variation.

Product details

General data

Table: Technical data

Features	Description	
Refrigerants	R1234yf/ze, R1270, R134a, R22, R22B/D, R290, R32, R404A, R407C/H, R410A, R438A, R444B, R448A, R449A/B, R450A, R452A, R452B, R454A/C, R454B, R455A, R507, R513A/B, R515B, R516A, R600a. AXV valves are continually evaluated for use with newer refrigerants. For further information please contact Danfoss.	
Max. valve body temperature	120 °C / 248 °F	
	Transient peak	150 °C / 302 °F
Max. permissible working pressure (PS)	49 barg / MWP = 711 psig	
Max. test pressure	54 bar / 755 psig	
Factory setting	+3 °C	
Ignition assessment	Positive. Zone 2 (Category 3, IIA)	
Complies with PED	Yes, fluid group 2, Article 4 paragraph 3, DN < 25 (inner bore)	
Connection type	Solder, ODF	
Connection sizes, Angleway	Inlet: ¼ in, 3/8 in, 6 mm, 10 mm	
	Outlet: 3/8 in, ½ in, 12 mm	
Orifices AXV H	4, 5, 6	
Orifices AXV I	2, 3, 4	
Bleed	15% (of nominal capacity) available.	
Biflow operation	N/A	
Environmental transport/storage temperature and humidity	Max. +65 °C / +150 °F, Humidity: <100% RH	
Material of product	Body: Stainless steel	
	Connector: Bimetal (stainless steel and copper)	
Serviceable	No	
Corrosion	Passed salt spray test (EN ISO 9227 NSS)	
	Both 700 hours	

Table: Adjustment range for start opening

Valve type	Spring	Factory Setting (bara)	Tolerance	Adjustment range for start opening	
				[Barg]	[Psig]
AXV H	2	3.5	± 0.1	0.5 – 3.2	7 – 46
	3	5.2	± 0.16	2 – 5.2	29 – 75
	4	6.0	± 0.16	2.2 – 7	32 – 102
	5	8.9	± 0.2	4 – 9	57 – 130
AXV I	2	3.5	± 0.1	0.5 – 3.2	7 – 46
	3	5.2	± 0.16	2 – 5.2	29 – 75
	4	6.0	± 0.16	2.2 – 7	32 – 102
	5	8.9	± 0.2	4 – 9	57 – 130

The factory setting comes with a set value of 3 °C opening temperature for Hot gas by-pass function. Based on the selected refrigerant, therefore pressure level, a specific spring is needed. R1234yf, R290, R454A and R32 have a specific level of pressure yet reach the same +3 °C factory setting. This factory set point might vary based on the refrigerant pressure level under certain value of temperature. See chart below for four different spring pressures and pressure groups.

The tolerances in the *Table: Adjustment range for start opening* is valid for the factory setting. Slightly higher tolerances should be expected after adjustment of the top cap in the field.

Note: The refrigerants are not limited to the following list. Please reach out to your local Danfoss representative for any other refrigerant apart from the list below.

Table: Factory setting based on spring number

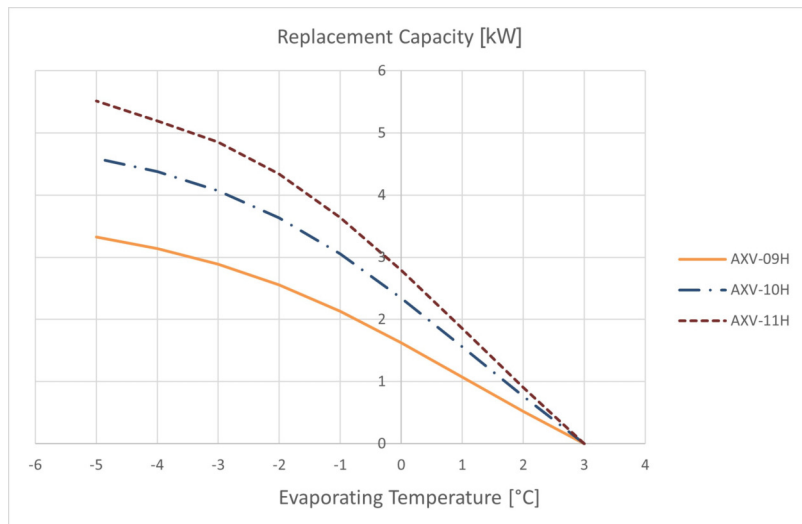
Factory Setting			
Spring	Refrigerant	Temperature °C	Setting (bara)
#2	R1234yf	3	3.5
	R134a	5	3.5
	R513A	2.1	3.5
#3	R290	3	5.2
	R455A	2.1	5.2
	R448A	0.2	5.2
#4	R454A	3	6.0
	R404A	0.1	6.0
	R407F	4.2	6.0
#5	R32	3	8.9
	R410A	3.5	8.9
	R454B	6.4	8.9

Note: It is not recommended to unscrew the top cap completely to avoid any contamination from outside and risk of forget to fix the top cap back. Additionally, this might lead to miss of oil in the top part which provide additional sealing in AXV Injection version while subzero applications and resulting with loose of functioning.

Capacity

Replacement capacity - R134a

Figure: AXV H – R134a



Conditions used in calculation: $t_c = +40\text{ °C}$, Start opening $t_e = +3\text{ °C}$

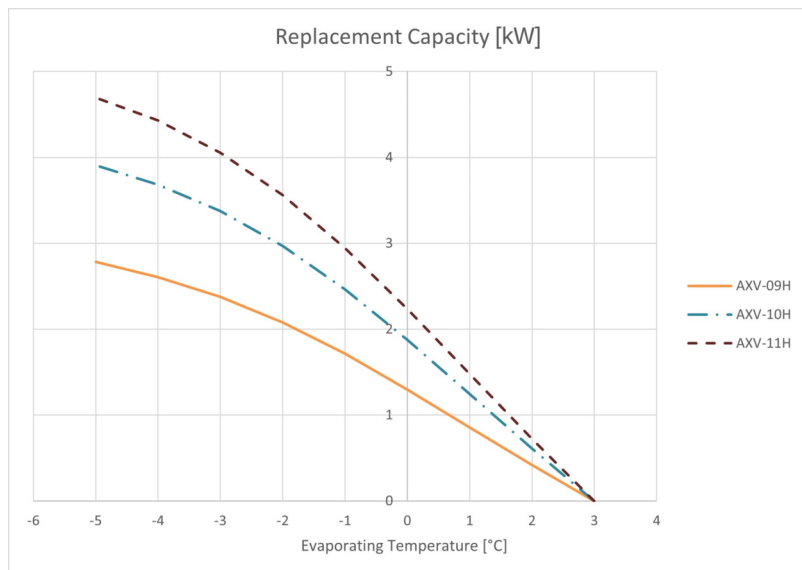
Table: Correction factors for condensing temperature

Refrigerant	Condensing temperature		
	+30°C	+40°C	+50°C
R134a	0.8	1.0	1.2

The correction factor can either be multiplied with the valve capacity or the replacement capacity can be divided with the correction factor.

Replacement capacity – R1234yf

Figure: AXV H – R1234yf

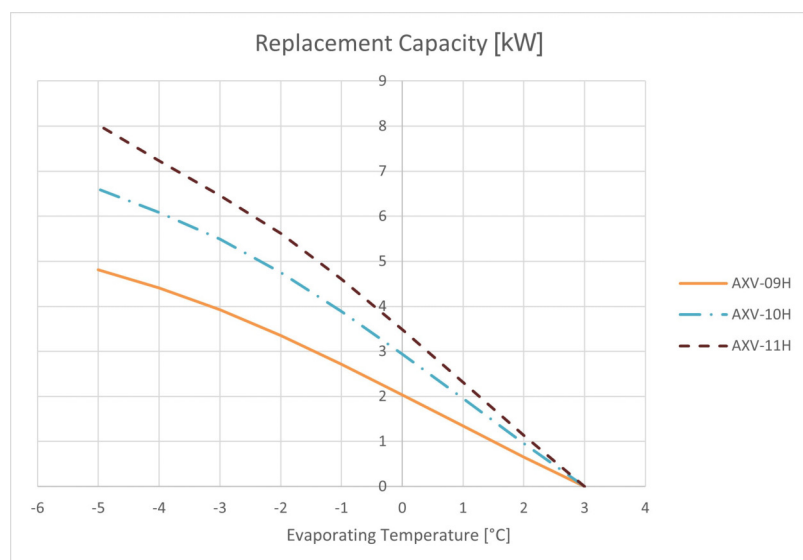


Conditions used in calculation: $t_c = +40\text{ °C}$, Start opening $t_e = +3\text{ °C}$

Table: Correction factors for condensing temperature

Refrigerant	Condensing temperature		
R1234yf	+30 °C	+40 °C	+50 °C
	0.87	1.0	1.11

The correction factor can either be multiplied with the valve capacity or the replacement capacity can be divided with the correction factor.

Replacement capacity – R407C**Figure: AXV H – R407C**

Conditions used in calculation: $t_c = +40\text{ °C}$, Start opening $t_e = +3\text{ °C}$

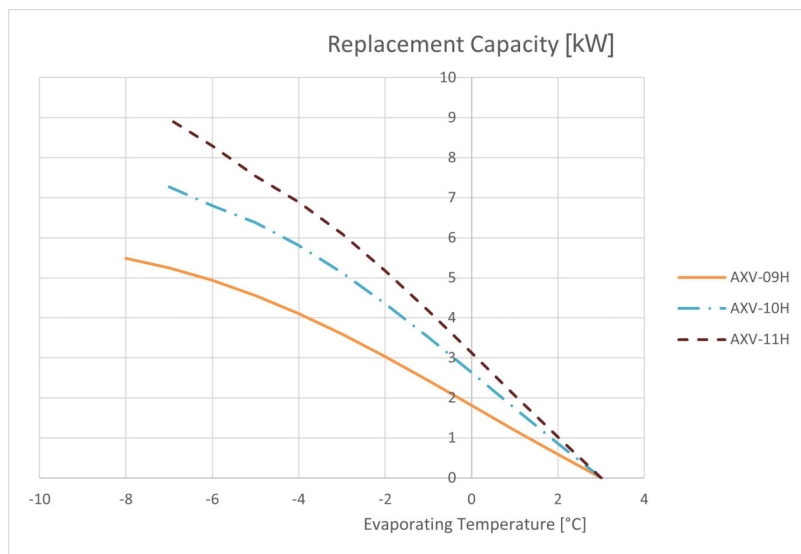
Table: Correction factors for condensing temperature

Refrigerant	Condensing temperature		
R407C	+30 °C	+40 °C	+50 °C
	0.7	1.0	1.4

The correction factor can either be multiplied with the valve capacity or the replacement capacity can be divided with the correction factor.

Replacement capacity – R290

Figure : AXV H – R290



Conditions used in calculation: $t_c = +40\text{ °C}$, Start opening $t_e = +3\text{ °C}$

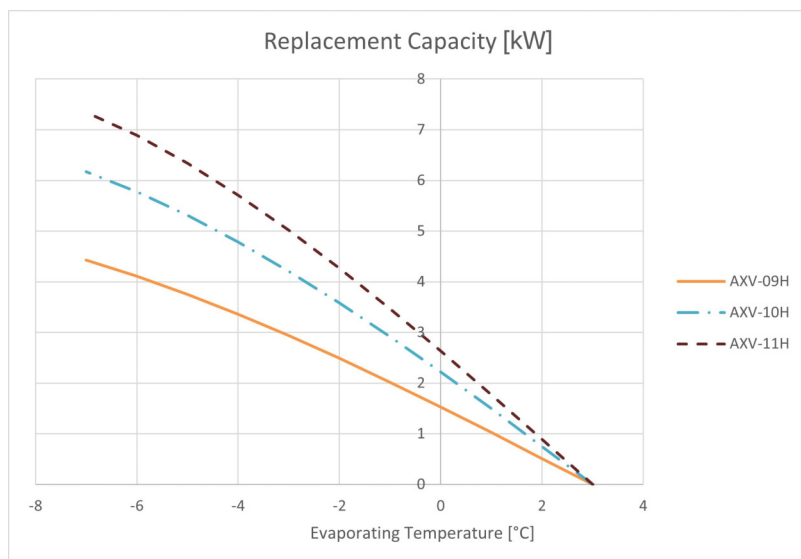
Table: Correction factors for condensing temperature

Refrigerant	Condensing temperature		
	+30 °C	+40 °C	+50 °C
R290	0.88	1.0	1.11

The correction factor can either be multiplied with the valve capacity or the replacement capacity can be divided with the correction factor.

Replacement capacity – R404A/R507

Figure: AXV H – R404A/R507

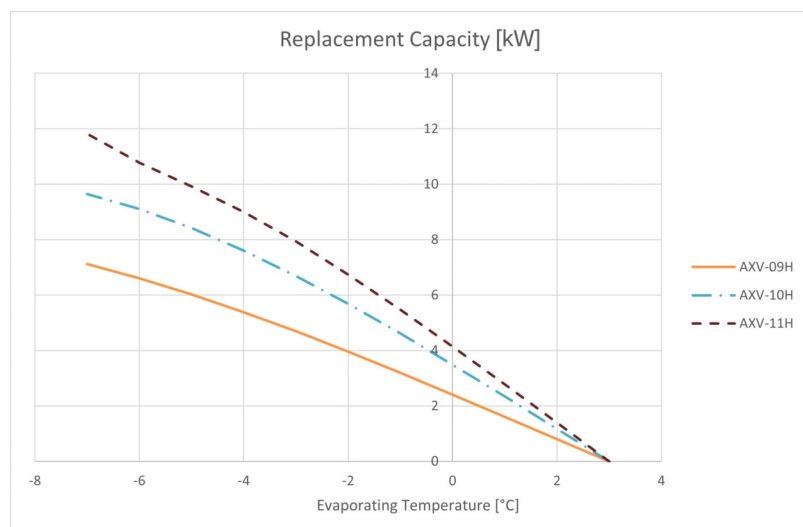


Conditions used in calculation: $t_c = +40\text{ °C}$, Start opening $t_e = +3\text{ °C}$

Table: Correction factors for condensing temperature

Refrigerant	Condensing temperature		
	+30 °C	+40 °C	+50 °C
R404A/R507	0.8	1.0	1.2

The correction factor can either be multiplied with the valve capacity or the replacement capacity can be divided with the correction factor.

Replacement capacity – R410A**Figure: AXV H – R410A**

Conditions used in calculation: $t_c = +40\text{ °C}$, Start opening $t_e = +3\text{ °C}$

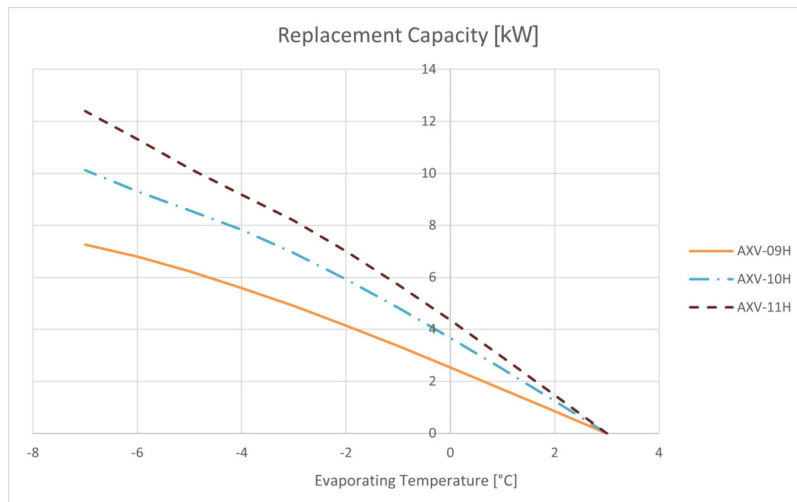
Table: Correction factors for condensing temperature

Refrigerant	Condensing temperature		
	+30 °C	+40 °C	+50 °C
R410A	0.8	1.0	1.2

The correction factor can either be multiplied with the valve capacity or the replacement capacity can be divided with the correction factor.

Replacement capacity – R454B

Figure: AXV H – R454B



Conditions used in calculation: $t_c = +40\text{ °C}$, Start opening $t_e = +3\text{ °C}$

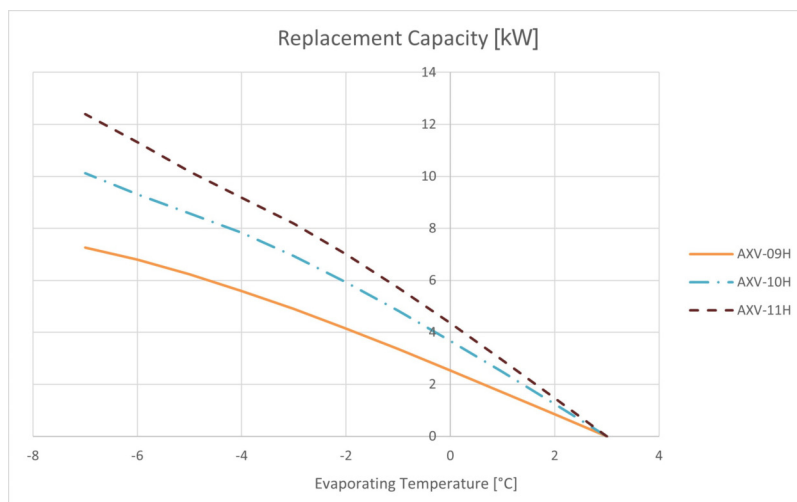
Table: Correction factors for condensing temperature

Refrigerant	Condensing temperature		
	+30 °C	+40 °C	+50 °C
R454B	0.87	1.0	1.11

The correction factor can either be multiplied with the valve capacity or the replacement capacity can be divided with the correction factor.

Replacement capacity – R32

Figure: AXV H – R32



Conditions used in calculation: $t_c = +40\text{ °C}$, Start opening $t_e = +3\text{ °C}$

Table: Correction factors for condensing temperature

Refrigerant	Condensing temperature		
	+30 °C	+40 °C	+50 °C
R32	0.87	1.0	1.12

The correction factor can either be multiplied with the valve capacity or the replacement capacity can be divided with the correction factor.

Nominal Capacity (Expansion function)**Table: Type AXV I**

Model	R134a		R1234yf		R513A		R407C	
	kW	TR	kW	TR	kW	TR	kW	TR
AXV-04I	2.13	0.61	1.46	0.42	1.74	0.49	2.19	0.62
AXV-05I	2.83	0.8	1.94	0.55	2.3	0.65	2.93	0.83
AXV-06I	4.49	1.28	3.07	0.87	3.65	1.04	4.61	1.31
AXV-07I	5.9	1.68	4.05	1.15	4.81	1.37	6.1	1.73
AXV-08I	8.58	2.44	5.9	1.68	7	1.99	9.04	2.57
AXV-09I	12.41	3.53	8.47	2.41	10.07	2.86	12.66	3.6

The rated capacity is based on:

Evaporating temperature $T_e = 0\text{ °C} / 32\text{ °F}$

Liquid temperature $T_l = 36\text{ °C} / 96.8\text{ °F}$

Condensing temperature $T_c = 40\text{ °C} / 104\text{ °F}$

Table: Type AXV I

Model	R290		R22		R404A		R454a	
	kW	TR	kW	TR	kW	TR	kW	TR
AXV-04I	1.91	0.54	1.96	0.56	1.32	0.38	2	0.57
AXV-05I	2.56	0.73	2.62	0.74	1.76	0.5	2.69	0.76
AXV-06I	4.01	1.14	4.11	1.17	2.77	0.79	4	1.13
AXV-07I	5.32	1.51	5.44	1.55	3.67	1.04	5.56	1.58
AXV-08I	7.94	2.26	8.58	2.44	5.47	1.56	8.27	2.35
AXV-09I	10.99	3.12	11.25	3.2	7.58	2.16	11.52	3.28

The rated capacity is based on:

Evaporating temperature $T_e = 0\text{ °C} / 32\text{ °F}$

Liquid temperature $T_l = 36\text{ °C} / 96.8\text{ °F}$

Condensing temperature $T_c = 40\text{ °C} / 104\text{ °F}$

Table: Type AXV I

Model	R448A		R407F		R455A		R410A	
	kW	TR	kW	TR	kW	TR	kW	TR
AXV-04I	1.94	0.55	2.19	0.62	1.81	0.51	2	0.57
AXV-05I	2.6	0.74	2.93	0.83	2.43	0.69	2.69	0.76
AXV-06I	4.07	1.16	4.59	1.31	3.8	1.08	4	1.13
AXV-07I	5.39	1.53	6.07	1.73	5.04	1.43	5.56	1.58
AXV-08I	8.02	2.28	9.03	2.57	7.51	2.13	8.27	2.35
AXV-09I	11.16	3.17	12.58	3.58	10.44	2.97	11.52	3.28

The rated capacity is based on:

Evaporating temperature $T_e = 0\text{ °C} / 32\text{ °F}$

Liquid temperature $T_l = 36\text{ °C} / 96.8\text{ °F}$

Condensing temperature $T_c = 40\text{ °C} / 104\text{ °F}$

Table: Type AXV I

Model	R454B		R32	
	kW	TR	kW	TR
AXV-04I	2.51	0.71	3.21	0.91
AXV-05I	3.36	0.96	4.29	1.22
AXV-06I	5.26	1.5	6.72	1.91
AXV-07I	6.98	1.98	8.92	2.54
AXV-08I	10.42	2.96	13.3	3.78
AXV-09I	14.4	4.09	18.39	5.23

The rated capacity is based on:

Evaporating temperature $T_e = 0\text{ °C} / 32\text{ °F}$

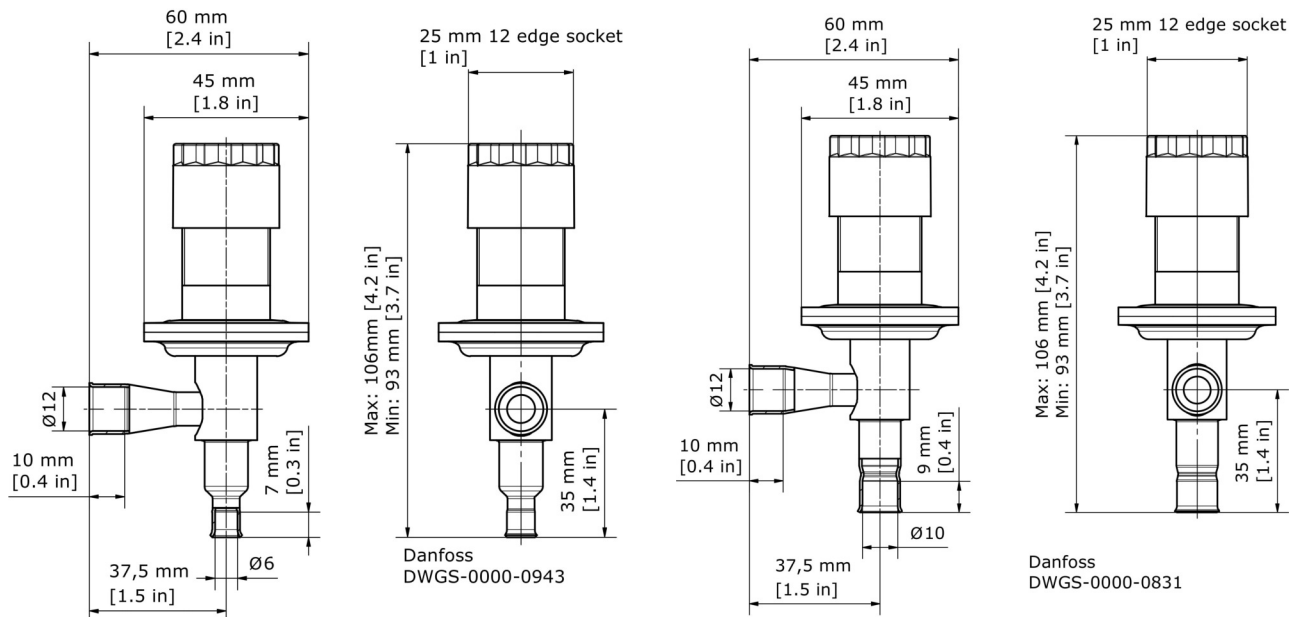
Liquid temperature $T_l = 36\text{ °C} / 96.8\text{ °F}$

Condensing temperature $T_c = 40\text{ °C} / 104\text{ °F}$

The capacities not limited with the tables above. It will be provided based on request.

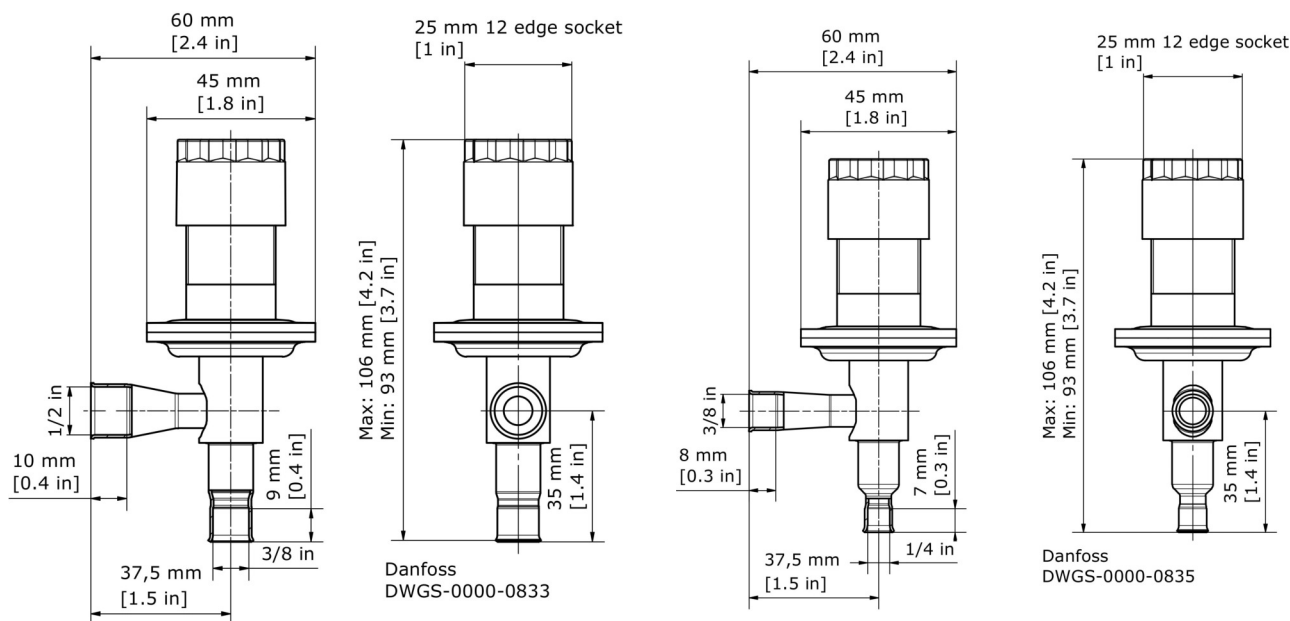
Dimensions & weights

Figure: AXV dimensional drawing connections in mm



All connector dimensions in mm. AXV weight is 0.2 kg.

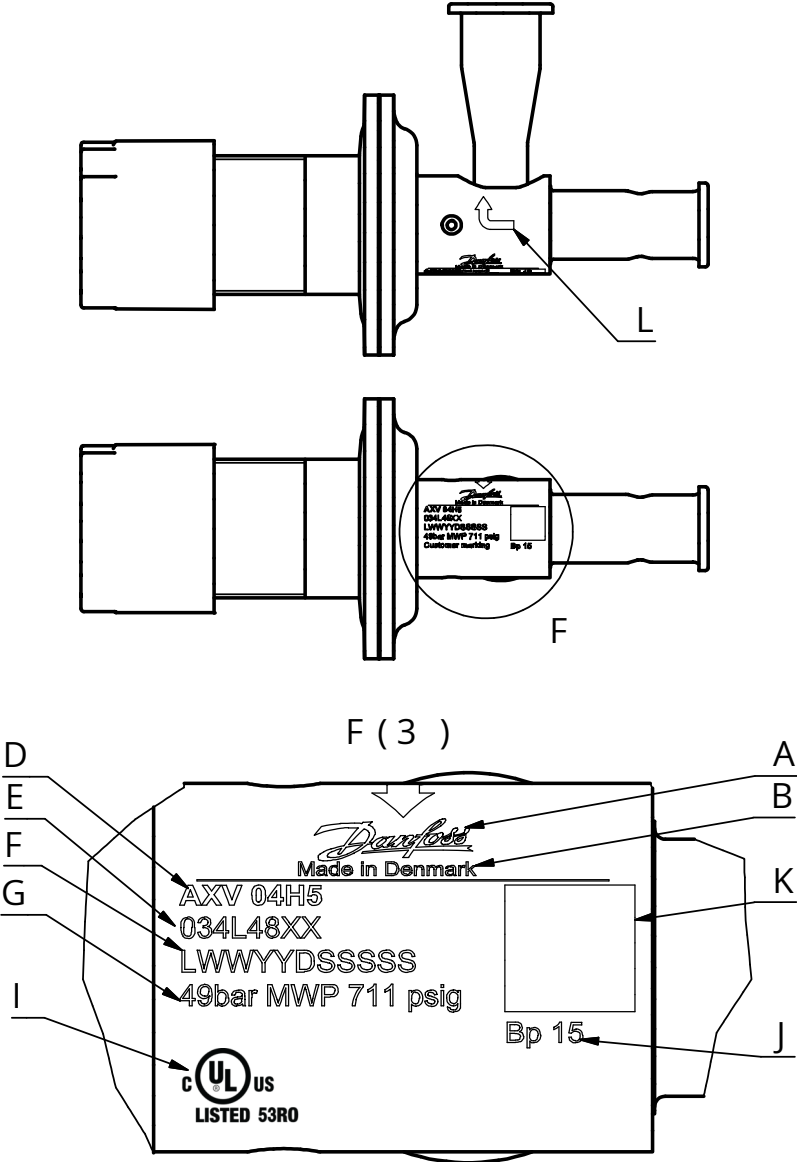
Figure: AXV dimensional drawing connections in inches



All connector dimensions in inches. AXV weight is 0.2 kg



Identification



N°	Description
A	Danfoss logo
B	Country of origin
D	Product combination
E	Danfoss part number
F	Serial number
G	MWP
I	UL marking
K	QR
J	Bleed (if any)
L	Flow Direction

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.

When you click on the link you will be directed to the latest version of the 'Declaration of Conformity'. Products developed and sold before this date of issue conform to the directives/standards in force at the time of their sale.

Approval type	Title	Certification body	Approval topic
Export Control Declaration	AXV - commercial expansion valves & hot gas regulator	Danfoss	
Export Control Declaration	AXV - commercial expansion valves & hot gas regulator	Danfoss	

Contact details

Online support

Danfoss offers a wide range of support along with our products, including digital information, software, mobile apps and expert guidance. See the possibilities below.



The Danfoss Design center

Discover the Design Center, our advanced digital platform that streamlines product selection. With integrated tools and enhanced type pages, it's simpler than ever to access product information and documentation, and to select the right products. Check the availability of Danfoss products at partner locations and enjoy seamless transitions from selection to purchase with our basket-to-basket functionality. Whether you're buying from our distributors or directly from the Product Store, the Design Center simplifies your experience. Learn more at: designcenter.danfoss.com.



The Danfoss product store

The Danfoss Products Store is a one-stop shop available 24/7 for our customers, no matter where you are in the world or what area of industry you work in. Browse our catalog, check product details and documentation, view your prices and product availability, and quickly finalize your purchase. Start browsing at: store.danfoss.com.



Danfoss Partner Portal/Product Data tool

Designed to support you with easy access to product data extracts, essential resources, tools, and information. The Partner Portal provides a centralized hub for product documentation, training materials, marketing assets, and technical support, ensuring you have everything you need to succeed and grow your business with Danfoss. The Partner Portal is available 24/7 at: partner.danfoss.com and is ready to support your business.



Find technical documentation

Find technical documentation you need to get your project up running. Get direct access to our official collection of data sheets, certificates and declarations, manuals and guides, 3D models and drawings, case stories, brochures, and much more. Start searching now at: documentation.danfoss.com.



Danfoss Learning

Danfoss Learning is a free online learning platform. It features courses and materials specifically designed to help engineers, installers, service technicians, and wholesalers better understand the products, applications industry topics, and trends that will help you do your job better. Find your local Danfoss website here: learning.danfoss.com.



Get local information and support

Local Danfoss websites are the main sources for help and information about our company and products. Find product availability, get the latest regional news, or connect with a nearby expert - all in your own language. Find your local Danfoss website here: danfoss.com.

Danfoss A/S

Climate Solutions . danfoss.com . +45 7488 2222

Any information, including, but not limited to information on selection of product, its application or use, product design, weight, dimensions, capacity or any other technical data in product manuals, catalogues description, advertisements, etc. and whether made available in writing, orally, electronically, online or via download, shall be considered informative, and is only binding if and to the extent, explicit reference is made in a quotation or order confirmation. Danfoss cannot accept any responsibility for possible errors in catalogues, brochures, videos and other material. Danfoss reserves the right to alter its products without notice. This also applies to products ordered but not delivered provided that such alterations can be made without changes to form, fit or function of the products. All trademarks in this material are property of Danfoss A/S or Danfoss group companies. Danfoss and the Danfoss logo are trademarks of Danfoss A/S. All rights reserved.