Data sheet



Hot gas bypass regulator
KVC

Adapts compressor capacity to actual evaporator load

Description

KVC is a hot gas bypass regulator applied for the adaption of the compressor capacity to the actual evaporator load.
Placed in a bypass between high and low pressure sides of the refrigeration system, KVC imposes a lower limit on the compressor suction pressure by supplying the low pressure side with replacement capacity in the form of hot gas/cool gas from the high pressure side.

Features & benefits

- Accurate, adjustable pressure regulation
- Wide capacity and operating range
- Pulsation damping design
- Stainless steel bellows
- Compact angle design for easy installation
- "Hermetic" brazed construction
- Available with flare or ODF solder connections
- May be used in the following EX range: category 3 (zone 2)

Ordering

Product code numbers

Figure: Flare connection

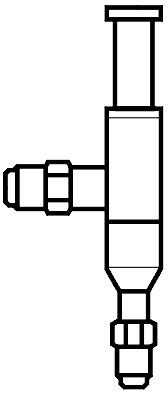
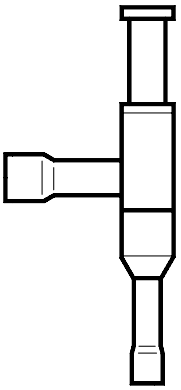


Figure: Solder connection



Type	Rated capacity R22 [kW]	Rated capacity R134a [kW]	Rated cap. R404A/R507A [kW]	Rated capacity R407C [kW]	Inlet size [in]	Inlet size [mm]	Outlet size [in]	Outlet size [mm]	Inlet connection type	Outlet connection type	Code number
KVC 12	7.60	4.80	6.90	8.40	1/2 in	12.00	1/2 in	12.00	Flare	Flare	034L0141
KVC 15	14.90	9.40	13.60	16.40	5/8 in	16.00	5/8 in	16.00	Flare	Flare	034L0142
KVC 12	7.60	4.80	6.90	8.40	1/2 in		1/2 in		Solder, ODF	Solder, ODF	034L0143
KVC 22	19.10	12.00	17.40	21.00	7/8 in	22.00	7/8 in	22.00	Solder, ODF	Solder, ODF	034L0144
KVC 12	7.60	4.80	6.90	8.40		12.00		12.00	Solder, ODF	Solder, ODF	034L0146
KVC 15	14.90	9.40	13.60	16.40	5/8 in	16.00	5/8 in	16.00	Solder, ODF	Solder, ODF	034L0147
KVC 10	4.00	2.80	3.60	3.70	3/8 in		3/8 in		Solder, ODF	Solder, ODF	034L0151
KVC 12	7.60	4.80	6.90	8.40	1/2 in		1/2 in		Solder, ODF	Solder, ODF	034L0152
KVC 15	14.90	9.40	13.60	16.40	5/8 in	16.00	5/8 in	16.00	Solder, ODF	Solder, ODF	034L0153
KVC 15	14.90	9.40	13.60	16.40	5/8 in	16.00	5/8 in	16.00	Solder, ODF	Solder, ODF	034L0154
KVC 12	7.60	4.80	6.90	8.40	1/2 in		1/2 in		Solder, ODF	Solder, ODF	034L0157
KVC 12	7.60	4.80	6.90	8.40	1/2 in		1/2 in		Solder, ODF	Solder, ODF	034L1043
KVC 22	7.10	5.30	6.30	6.50	7/8 in	22.00	7/8 in	22.00	Solder, ODF	Solder, ODF	034L1044
KVC 12	7.60	4.80	6.90	8.40		12.00		12.00	Solder, ODF	Solder, ODF	034L1046
KVC 15	14.90	9.40	13.60	16.40	5/8 in	16.00	5/8 in	16.00	Solder, ODF	Solder, ODF	034L1047
KVC 12	7.60	4.80	6.90	8.40	1/2 in		1/2 in		Solder, ODF	Solder, ODF	034L1053
KVC 15	14.90	9.40	13.60	16.40	5/8 in	16.00	5/8 in	16.00	Solder, ODF	Solder, ODF	034L1054

(1) Rated capacity is the regulator capacity at
- evaporating temperature t_e = -10 °C
- condensing temperature t_c = 25 °C
- offset = 0.7 bar

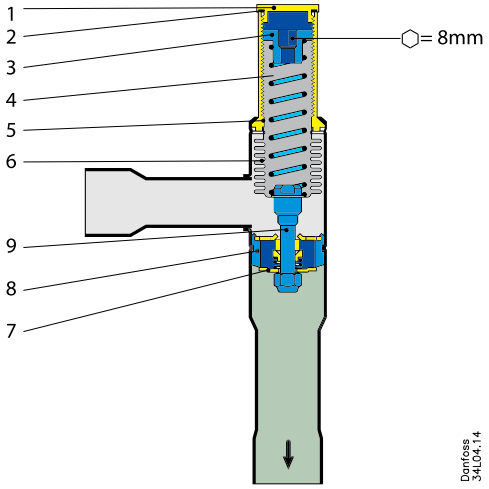
(2) Inlet/outlet - KVC supplied without flare nuts. Separate flare nuts can be supplied:
- ½ in / 12 mm, code no. 011L1103
- ⅝ in / 16 mm, code no. 011L1167

The connection dimensions chosen must not be too small, since gas velocities in excess of 40 m/s at the inlet of the regulator can give flow noise.

If the discharge tube temperature becomes too high in relation to the compressor specification, the installation of an injection valve in a bypass between liquid line and compressor suction line is recommended.

Functions

Figure: Design/function for KVC



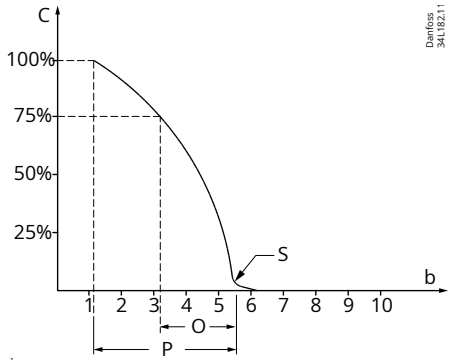
1	Protective cap
2	Gasket
3	Setting screw
4	Main spring
5	Valve body
6	Equalization bellows
7	Valve plate
8	Valve seat
9	Damping device

The hot gas bypass regulator KVC opens at a fall in pressure on the outlet side, i.e. when the pressure in the evaporator is beyond the set value.

KVC regulates only in dependence on the outlet pressure. Pressure variations on the inlet side of the regulator do not affect the degree of opening since KVC is equipped with an equalization bellows (6). This bellows has an effective area corresponding to that of the valve seat.

The hot gas bypass regulator is also equipped with an effective damping device (9) against pulsations which can normally arise in a refrigeration plant. The damping device helps to ensure long life for the regulator without impairing regulation accuracy.

Figure: P-band and Offset



C	Capacity
b	bar
S	Set point
O	offset
P	P-band

Proportional band
The proportional band or P-band is defined as the amount of pressure required to move the valve plate from closed to fully open position.

Example
If the valve is set to open at 4 bar and the valve P-band is 2, the valve will give maximum capacity when the discharge pressure reaches 2 bar.

Offset
The offset is defined as the permissible pressure variation in suction line pressure (temperature). It is calculated as the difference between the required working pressure and the minimum allowable pressure. The offset is always a part of the P-band.

Example with R404A
A suction temperature ahead of the compressor of 5 °C ~ 6 bar is required, and the temperature must not drop below 0 °C ~ 5 bar. The offset will then be 1 bar.

Media

Refrigerants

Features	Description
Refrigerants	R22, R134a, R290, R404A, R407A, R407C, R407F, R407H, R448A, R449A, R449B, R450A, R452A, R454A, R454C, R455A, R507A, R513A, R515B, R516A, R600, R600a, R1234ze(E), R1234yf, R1270

This product is evaluated for R290, R454A, R454C, R455A, R600, R600a, R1234ze(E), R1234yf, R1270 by ignition source assessment in accordance with standard EN ISO80079-36. Flare connections are only approved for A1 and A2L refrigerants.

For complete list of approved refrigerants, visit store.danfoss.com and search for individual code numbers, where refrigerants are listed as part of technical data.

Product details

Capacity

Replacement capacity

Table: For R22

Type	Offset Δp	Q[(1)] [kW] suction gas temperature t_s after pressure / temperature reduction [°C]						
	[bar]	-45	-40	-30	-20	-10	0	10
KVC 12	0.10	–	2.3	2.4	2.5	2.5	2.6	2.6
	0.15	–	3.5	3.6	3.7	3.8	3.9	4.0
	0.20	–	4.5	4.7	4.8	4.9	5.0	5.1
	0.30	–	5.9	6.1	6.3	6.4	6.5	6.7
	0.50	–	6.6	6.8	7.1	7.2	7.3	7.5
	0.70	–	7.0	7.2	7.4	7.6	7.8	7.9
	1.00	–	7.6	7.9	8.1	8.3	8.5	8.6
	1.20	–	8.2	8.5	8.7	8.9	9.1	9.3
KVC 15	0.10	–	3.5	3.6	3.7	3.8	3.9	4.0
	0.15	–	4.5	4.7	4.8	4.9	5.0	5.1
	0.20	–	5.9	6.1	6.3	6.4	6.5	6.7
	0.30	–	8.2	8.5	8.7	8.9	9.1	9.3
	0.50	–	11.7	12.1	12.4	12.7	13	13.2
	0.70	–	13.7	14.2	14.6	14.9	15.2	15.5
	1.00	–	15.6	16.2	16.7	17.0	17.3	17.7
	1.20	–	16.8	17.4	17.9	18.3	18.7	19.0
KVC 22	0.10	–	3.7	3.8	3.9	4.0	4.1	4.2
	0.15	–	5.1	5.2	5.4	5.5	5.6	5.7
	0.20	–	6.8	7.0	7.3	7.4	7.5	7.7
	0.30	–	8.4	8.6	8.9	9.1	9.3	9.5
	0.50	–	14.1	14.5	15.0	15.3	15.6	15.9
	0.70	–	17.6	18.1	18.7	19.1	19.5	19.9
	1.00	–	21.4	22.4	23.1	23.6	24.1	24.5
	1.20	–	23.8	24.6	25.4	25.9	26.4	26.9

(1) The capacities are based on: condensing temperature t_l = 25 °C.

Table: For R134a

Type	Offset Δp	Q[1] [kW] suction gas temperature t_s after pressure / temperature reduction [°C]						
	[bar]	-45	-40	-30	-20	-10	0	10
KVC 12	0.10	–	–	1.4	1.4	1.5	1.7	1.7
	0.15	–	–	2.1	2.3	2.4	2.5	2.6
	0.20	–	–	2.9	3	3.1	3.2	3.4
	0.30	–	–	3.7	3.9	4.1	4.3	4.5
	0.50	–	–	4.2	4.3	4.5	4.8	4.9
	0.70	–	–	4.4	4.5	4.8	5	5.2
	1.00	–	–	4.8	5	5.2	5.5	5.8
	1.20	–	–	5.1	5.4	5.6	5.8	6.1
KVC 15	0.10	–	–	2.1	2.3	2.4	2.5	2.6
	0.15	–	–	2.9	3	3.1	3.2	3.4
	0.20	–	–	3.7	3.9	4.1	4.3	4.5
	0.30	–	–	5.1	5.4	5.6	5.8	6.1
	0.50	–	–	7.4	7.7	8	8.4	8.7
	0.70	–	–	8.7	9.1	9.4	9.9	10.2
	1.00	–	–	9.9	10.2	10.7	11.3	11.7
	1.20	–	–	10.6	11.1	11.6	12.2	12.6
KVC 22	0.10	–	–	2.3	2.4	2.5	2.6	2.8
	0.15	–	–	3.2	3.3	3.5	3.6	3.7
	0.20	–	–	4.3	4.4	4.6	4.9	5.1
	0.30	–	–	5.2	5.5	5.7	6	6.3
	0.50	–	–	8.9	9.3	9.7	10.1	10.5
	0.70	–	–	11	11.6	12	12.6	13.1
	1.00	–	–	13.7	14.3	14.9	15.6	16.3
	1.20	–	–	15	15.7	16.3	17.2	17.8

[1] The capacities are based on: condensing temperature t_i = 25 °C.

Table: For R404A/R507

Type	Offset Δp	Q[1] [kW] suction gas temperature t_s after pressure / temperature reduction [°C]						
	[bar]	-45	-40	-30	-20	-10	0	10
KVC 12	0.10	–	1.9	2	2.1	2.2	2.3	2.4
	0.15	–	3	3.1	3.3	3.4	3.5	3.6
	0.20	–	3.9	4.1	4.2	4.5	4.7	4.7
	0.30	–	5.1	5.4	5.6	5.8	6	6.1
	0.50	–	5.7	6	6.4	6.6	6.8	7
	0.70	–	6	6.4	6.6	6.9	7.2	7.3
	1.00	–	6.6	6.9	7.2	7.5	7.8	8
	1.20	–	7	7.4	7.7	8	8.4	8.5
KVC 15	0.10	–	3	3.1	3.3	3.4	3.5	3.6
	0.15	–	3.9	4.1	4.2	4.5	4.7	4.7
	0.20	–	5.1	5.4	5.6	5.8	6	6.1
	0.30	–	7	7.4	7.7	8	8.4	8.5
	0.50	–	10.1	10.6	11.1	11.6	12	12.3
	0.70	–	11.8	12.5	13	13.6	14.1	14.4
	1.00	–	13.5	14.2	14.8	15.5	16.1	16.4
	1.20	–	14.5	15.3	16	16.6	17.3	17.7
KVC 22	0.10	–	3.2	3.3	3.5	3.6	3.7	3.8
	0.15	–	4.3	4.6	4.8	5	5.2	5.3
	0.20	–	5.8	6.1	6.4	6.7	7	7.1
	0.30	–	8.2	8.6	8.9	9.3	9.8	9.9
	0.50	–	12.1	12.8	13.4	13.9	14.4	14.7
	0.70	–	15.2	16	16.6	17.4	18.1	18.4
	1.00	–	18.8	19.8	20.7	21.5	22.4	22.8
	1.20	–	20.5	21.6	22.6	23.5	24.5	25

[1] The capacities are based on: condensing temperature t_i = 25 °C.

Table: For R407C

Type	Offset Δp	Q[1] [kW] suction gas temperature t_s after pressure / temperature reduction [°C]						
	[bar]	-45	-40	-30	-20	-10	0	10
KVC 12	0.10	–	2.4	2.6	2.7	2.8	2.9	3
	0.15	–	3.7	3.9	4	4.2	4.3	4.6
	0.20	–	4.8	5	5.2	5.4	5.6	5.8
	0.30	–	6.3	6.5	6.9	7	7.2	7.6
	0.50	–	7	7.3	7.7	7.9	8.1	8.6
	0.70	–	7.4	7.7	8.1	8.4	8.7	9
	1.0	–	8.1	8.5	8.8	9.1	9.4	9.8
	1.20	–	8.7	9.1	9.5	9.8	10.1	10.6
KVC 15	0.10	–	3.7	3.9	4	4.2	4.3	4.6
	0.15	–	4.8	5	5.2	5.4	5.6	5.8
	0.20	–	6.3	6.5	6.9	7	7.2	7.6
	0.30	–	8.7	9.1	9.5	9.8	10.1	10.6
	0.50	–	12.4	12.9	13.5	14	14.4	15
	0.70	–	14.5	15.2	15.9	16.4	16.9	17.7
	1.00	–	16.5	17.3	18.2	18.7	19.2	20.2
	1.20	–	17.8	18.6	19.5	20.1	20.8	21.7
KVC 22	0.10	–	3.9	4.1	4.3	4.4	4.6	4.8
	0.15	–	5.4	5.6	5.9	6.1	6.2	6.5
	0.20	–	7.2	7.5	8	8.1	8.3	8.8
	0.30	–	8.9	9.2	9.7	10	10.3	10.8
	0.50	–	14.9	15.5	16.4	16.8	17.3	18.1
	0.70	–	18.7	19.4	20.4	21	21.6	22.7
	1.00	–	22.7	24	25.2	26	26.8	27.9
	1.20	–	25.2	26.3	27.7	28.5	29.3	30.7

[1] The capacities are based on: condensing temperature t_i = 25 °C.

Correction factors

When selecting, the required regulator capacity is to be multiplied by a correction factor dependent on the condensing temperature.
System capacity × correction factor = table capacity
The corrected capacity can then be found from the table. Correction factors for condensing temperature can be found in section "selection".

Sizing

For optimum performance, it is important to select a KVC valve according to system conditions and application.

The following data must be used when sizing a KVC valve:

- Refrigerant
- Minimum suction temperature: T_s in [°C] / [bar]
- Condensing temperature: t_i in [°C]
- Compressor load in [kW]
- Evaporator load in [kW]
- Connection type: flare or solder
- Connection size in [inch]

Valve selection

Example

When selecting the appropriate valve it may be necessary to convert the actual evaporator capacity using a correction factor. This is required when your system conditions are different than the table conditions. The selection is also dependent on the acceptable pressure drop across the valve.

The following example illustrates how this is done:

- Refrigerant: R134a
- Minimum suction temperature: t_s = -12 °C ~ 0.9 bar
- Compressor capacity at -12 °C = 15.4 kW
- Evaporator load at -12 °C = 10.0 kW
- Condensing temperature: t_l = 35 °C
- Connection type: Solder
- Connection size: ⅝ inch

Step 1

Determine the correction factor for condensing temperature t_l.

Table: Correction factors for liquid temperature t_l

t_l [°C]	10	15	20	25	30	35	40	45	50
R134a	0.88	0.92	0.96	1.0	1.05	1.10	1.16	1.23	1.31
R22	0.9	0.93	0.96	1.0	1.05	1.10	1.13	1.18	1.24
R404A/R507	0.84	0.89	0.94	1.0	1.07	1.16	1.26	1.4	1.57
R407C	0.88	0.91	0.95	1.0	1.05	1.11	1.18	1.26	1.35

Step 2

The required replacement capacity is defined as the (compressor capacity – the evaporator load) divided by the correction factor = (15.4-10.0) / 1.10 = 4.9 kW

Step 3

Now select the appropriate capacity table and choose the column for minimum suction temperature t_s = -20 °C.

Using the corrected replacement capacity, select a valve that provides an equivalent or greater capacity than required.

KVC 15 delivers 5.4 kW at an offset of 0.3 bar. Based on the required connection size of ⅝ in. ODF, the KVC 15 is the proper selection for this example.

Step 4

KVC 15, ⅝ in. solder connection: code no. 034L0147

Valve selection based on capacity calculation

As for extended capacity calculations and valve selection based on capacities and refrigerants, please refer to Coolselector®2. Rated and extended capacities are calculated with the Coolselector®2 calculation engine to ARI standards with the ASEREP equations based on laboratory measurements of selected valves.

Pressure and temperature data

Features	Description
Regulating range	0.2 – 6.0 bar
	Factory setting = 2 bar
Maximum working pressure	PS/MWP PS = 28 bar
Maximum test pressure	P_e = 31 bar
Medium temperature range	-45 – 130 °C
Maximum P-band	2.0 bar
K_v-value[1] with maximum P-band	KVC 12 = 0.68 m^3/h
	KVC 15 = 1.25 m^3/h
	KVC 20 = 1.85 m^3/h

[1] The K_v value is the flow of water in [m^3/h] at a pressure drop across valve of 1 bar, ρ = 1000 kg/m^3.

Dimensions

Figure: For KVC

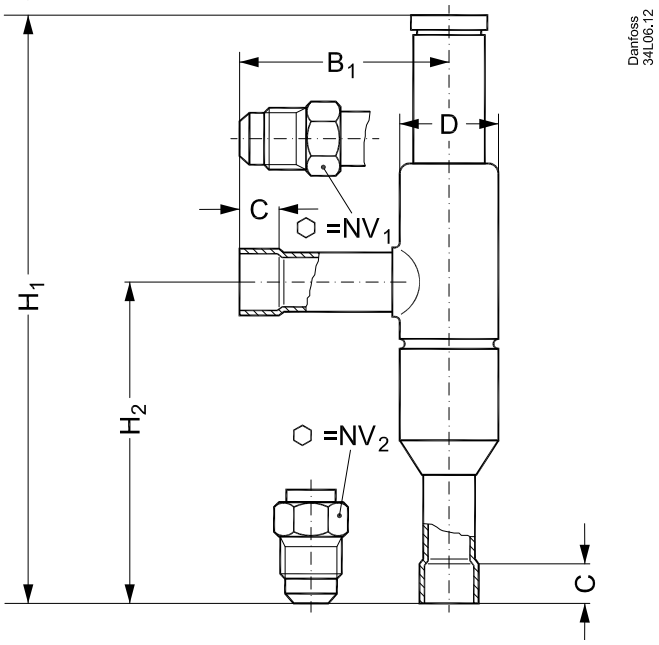


Table: Dimensions and weight for KVP

Type	Connection				NV_1	NV_2	H_1	H_2	B_1	C solder	øD	Net weight
	Flare		Solder ODF									
	[in]	[mm]	[in]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[kg]
KVC 12	½	12	½	12	19	24	179	99	64	10	30	0.4
KVC 15	⅝	16	⅝	16	24	24	179	99	64	12	30	0.4
KVC 22	–	–	⅞	22	–	–	179	99	64	17	30	0.4

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	Pressure and Temperature regulating valves	Danfoss	
Manufacturer's Declaration	Danfoss MD 034L9625.AF	Danfoss	PED, EAEU RoHS, Pressure, EU RoHS
Manufacturer's Declaration	Danfoss MD 032F9268.AD	Danfoss	
Pressure Safety Certificate	LLC CDC EURO-TYSK UA.TR.089.1015.02-22	LLC CDC EURO TYSK - Ukraine	PED, Pressure
Manufacturer's Declaration	Danfoss MD 034R9541.AA	Danfoss	China RoHS

Contact details

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