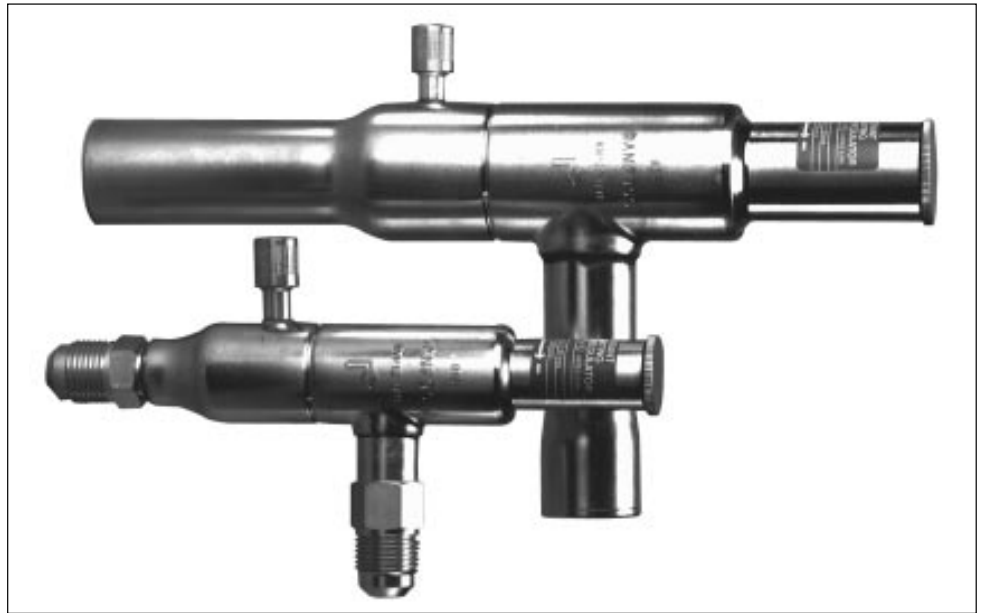


Evaporating pressure regulator type KVP

Introduction



The KVP is mounted in the suction line after the evaporator. It is used to:

1. Maintain a constant evaporating pressure and thereby a constant surface temperature on the evaporator. The regulation is modulating. By throttling in the suction line, the amount of refrigerant gas is matched to the evaporator load.
2. Protect against too low an evaporating pressure (e.g. as protection against freezing in a water chiller). The regulator closes when the pressure in the evaporator falls below the set value.

Features

- Accurate, adjustable pressure regulation
- Wide capacity and operating ranges
- Pulsation damping design
- Compact angle design for easy installation in any position
- "Hermetic" brazed construction
- Available in a wide size range of flare and ODF solder types
- For R 22, R 134a, R 404A, R 12, R 502 and other fluorinated refrigerants

Approval

DSRK, Deutsche Schiffs-Revision und -Klassifikation, Germany

Technical data

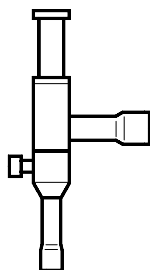
Type	Refrigerants	Regulating range bar	Max. medium temperature °C	Max. working pressure PB bar	Max. test pressure p' bar	k _v value with offset 0.6 bar m ³ /h ¹)	k _v value with max. P-band m ³ /h ¹) ²)
KVP 12 → 22	R 22, R 134a, R 404A, R 12, R 502	0 → 5.5	+60	14	28.0	1.7	2.5
KVR 28, 35		0 → 5.5	+60	14	25.6	2.8	8.0

¹) The k_v value is the flow of water in m³/h at a pressure drop across valve of 1 bar, ρ = 1000 kg/m³.

²) Max. P-band for KVP 12 → 22 = 1.7 bar. Max. P-band for KVP 28 → 35 = 2.8 bar.

Evaporating pressure regulator, type KVP

Ordering



Type	Rated capacity 1)					Flare-connection 2)		Code no.	Solder-connection		Code no.
	kW					in.	mm		in.	mm	
	R 22	R 134a	R 404A	R 12	R 502						
KVP 12	4.0	2.8	3.6	2.6	3.3	1/2	12	34L0021	1/2		34L0023
										12	
KVP 15	4.0	2.8	3.6	2.6	3.3	5/8	16	34L0022	5/8	16	34L0029
KVP 22	4.0	2.8	3.6	2.6	3.3				7/8	22	34L0025
KVP 28	8.5	6.1	7.7	5.6	7.0				1 1/8		34L0026
										28	34L0031
KVP 35	8.5	6.1	7.7	5.6	7.0				1 3/8	35	34L0032

1) Rated capacity is the capacity of the regulator at evaporating temperature $t_e = -10^\circ\text{C}$, condensing temperature $t_c = +25^\circ\text{C}$, pressure drop in regulator $\Delta p = 0.2$ bar, offset = 0.6 bar.

2) KVP supplied without flare nuts. Separate flare nuts can be supplied:
1/2 in./12 mm, code no. **11L1103**, 5/8 in./16 mm, code no. **11L1167**.

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.

Capacity

Type	Pressure drop in regulator Δp bar	Evaporating temperature t_e °C											
		-35	-30	-25	-20	-15	-10	-5	0	+5	+10	+15	+20

Regulator capacity Q_e kW with off-set = 0.3 bar

R 22

KVP 12 KVP 15 KVP 22	0.1		1.0	1.2	1.3	1.5	1.6	1.8	1.9	2.1			
	0.2		1.4	1.6	1.8	2.0	2.2	2.5	2.7	3.0			
	0.3		1.7	1.9	2.2	2.4	2.7	3.0	3.3	3.6			
	0.4		1.8	2.1	2.4	2.7	3.1	3.4	3.8	4.1			
	0.5		1.9	2.3	2.6	3.0	3.3	3.7	4.1	4.6			
	0.6		2.0	2.4	2.8	3.2	3.6	4.0	4.5	4.9			
KVP 28 KVP 35	0.1		2.2	2.5	2.8	3.1	3.5	3.8	4.2	4.5			
	0.2		3.0	3.4	3.9	4.3	4.8	5.3	5.8	6.4			
	0.3		3.5	4.1	4.6	5.2	5.8	6.4	7.0	7.7			
	0.4		3.9	4.5	5.2	5.8	6.5	7.3	8.0	8.8			
	0.5		4.1	4.8	5.6	6.4	7.2	8.0	8.9	9.8			
	0.6		4.2	5.1	5.9	6.8	7.7	8.6	9.6	10.6			

Regulator capacity Q_e kW with off-set = 0.6 bar

KVP 12 KVP 15 KVP 22	0.1		1.9	2.1	2.3	2.6	2.9	3.2	3.5	3.8			
	0.2		2.5	2.9	3.2	3.6	4.0	4.4	4.9	5.3			
	0.3		3.0	3.4	3.8	4.3	4.8	5.3	5.9	6.5			
	0.4		3.3	3.8	4.3	4.9	5.5	6.1	6.7	7.4			
	0.5		3.4	4.1	4.7	5.3	6.0	6.7	7.4	8.2			
	0.6		3.6	4.2	5.0	5.7	6.4	7.2	8.0	8.8			
KVP 28 KVP 35	0.1		4.0	4.5	5.0	5.6	6.2	6.8	7.5	8.2			
	0.2		5.4	6.2	6.9	7.7	8.6	9.5	10.4	11.4			
	0.3		6.3	7.3	8.2	9.3	10.3	11.5	12.6	13.9			
	0.4		7.0	8.1	9.2	10.4	11.7	13.0	14.4	15.8			
	0.5		7.4	8.7	10.0	11.4	12.8	14.3	15.9	17.5			
	0.6		7.6	9.1	10.6	12.2	13.8	15.4	17.1	18.9			

Correction factors t_l

t_l °C	15	20	25	30	35	40
R 22	0.93	0.96	1.0	1.04	1.09	1.15

Correction factors offset

Offset bar	0.2	0.4	0.6	0.8	1.0	1.2
KVP	2.5	1.4	1.0	0.77	0.67	0.59

The values in the capacity table refer to the evaporator capacity and are based on liquid temperature $t_l = +25^\circ\text{C}$ ahead of the thermostatic expansion valve, pressure drop Δp in the regulator and the regulator offset = 0.6 bar. Capacities are based on dry, saturated vapour ahead of the regulator.

When dimensioning the evaporator capacity is multiplied by a correction factor dependent on the liquid temperature t_l ahead of the thermostatic expansion valve and the permissible offset on the regulator. The corrected capacity can then be found in the capacity table.

Evaporating pressure regulator, type KVP

Capacity (continued)

Type	Pressure drop in regulator Δp bar	Evaporating temperature t_e °C											
		-35	-30	-25	-20	-15	-10	-5	0	+5	+10	+15	+20

Regulator capacity Q_e kW with off-set = 0.3 bar

R 134a

KVP 12 KVP 15 KVP 22	0.1				0.9	1.0	1.2	1.3	1.5	1.6	1.8	2.0	2.2
	0.2				1.2	1.4	1.6	1.8	2.0	2.3	2.5	2.8	3.1
	0.3				1.4	1.6	1.9	2.1	2.4	2.7	3.0	3.4	3.7
	0.4				1.5	1.8	2.1	2.4	2.7	3.1	3.4	3.8	4.2
	0.5				1.6	1.9	2.2	2.6	3.0	3.4	3.8	4.2	4.7
	0.6				1.6	2.0	2.3	2.7	3.2	3.6	4.1	4.5	5.0
KVP 28 KVP 35	0.1				1.9	2.2	2.5	2.8	3.1	3.5	3.9	4.2	4.7
	0.2				2.6	3.0	3.4	3.9	4.3	4.8	5.4	5.9	6.5
	0.3				3.0	3.5	4.0	4.6	5.2	5.8	6.5	7.2	7.9
	0.4				3.2	3.8	4.5	5.1	5.8	6.6	7.4	8.2	9.0
	0.5				3.3	4.0	4.8	5.6	6.4	7.2	8.1	9.0	10.0
	0.6				3.4	4.2	5.0	5.9	6.8	7.7	8.7	9.7	10.8

Regulator capacity Q_e kW with off-set = 0.6 bar

KVP 12 KVP 15 KVP 22	0.1					1.8	2.1	2.3	2.6	2.9	3.2	3.6	3.9
	0.2					2.5	2.8	3.2	3.6	4.0	4.5	5.0	5.5
	0.3					2.9	3.4	3.8	4.3	4.9	5.4	6.0	6.6
	0.4					3.2	3.7	4.3	4.9	5.5	6.1	6.8	7.6
	0.5					3.4	4.0	4.6	5.3	6.0	6.8	7.5	8.3
	0.6					3.5	4.2	4.9	5.7	6.4	7.3	8.1	9.0
KVP 28 KVP 35	0.1					3.9	4.5	5.0	5.6	6.2	6.9	7.6	8.4
	0.2					5.3	6.1	6.9	7.8	8.7	9.6	10.6	11.7
	0.3					6.3	7.2	8.2	9.3	10.4	11.6	12.9	14.2
	0.4					6.9	8.0	9.2	10.5	11.8	13.2	14.6	16.2
	0.5					7.3	8.6	10.0	11.4	12.9	14.5	16.1	17.9
	0.6					7.5	9.0	10.5	12.1	13.8	15.6	17.4	19.3

Correction factors t_l

t_l °C	15	20	25	30	35	40
R 134a	0.94	0.94	1.0	1.06	1.14	1.14

Correction factors offset

Offset bar	0.2	0.4	0.6	0.8	1.0	1.2
KVP	2.5	1.4	1.0	0.77	0.67	0.59

The values in the capacity table refer to the evaporator capacity and are based on liquid temperature $t_l = +25^\circ\text{C}$ ahead of the thermostatic expansion valve, pressure drop Δp in the regulator and the regulator offset = 0.6 bar. Capacities are based on dry, saturated vapour ahead of the regulator.

When dimensioning the evaporator capacity is multiplied by a correction factor dependent on the liquid temperature t_l ahead of the thermostatic expansion valve and the permissible offset on the regulator. The corrected capacity can then be found in the capacity table.

Example

The evaporating pressure in an R 134a evaporator is to be kept at an operating pressure of 2.5 bar corresponding to an evaporating temperature of $+5^\circ\text{C}$ and a suction pressure ahead of the compressor of 1.9 bar. Since it is wished to avoid frost on the evaporator, the regulator is set to close (open) at an evaporator pressure of 2.0 bar $\sim +0.5^\circ\text{C}$.
Evaporator capacity $Q_e = 4.5$ kW.
Evaporating temperature $t_e = +5^\circ\text{C}$.
Liquid temperature ahead of expansion valve $t_l = +30^\circ\text{C}$.
Correction factor for $t_l = +30^\circ\text{C} = 1.06$.
Offset = $2.5 - 2.0 = 0.5$ bar.
Correction factor for offset of 0.5 bar = 1.2.
Corrected capacity $Q_e = 4.5 \times 1.06 \times 1.2 = 5.7$ kW.
Pressure drop in regulator $\Delta p = 2.5 - 1.9 = 0.6$ bar.
From the capacity table for R 134a at $\Delta p = 0.6$

bar and $Q_e = 5.7$ kW we find that KVP 12, KVP 15 or KVP 22 can be used since these regulators have, in the mentioned conditions, a max. capacity of 6.4 kW. The regulator whose connection has the same dimension as the suction line should be chosen.

Evaporating pressure regulator, type KVP

Capacity (continued)

Type	Pressure drop in regulator Δp bar	Evaporating temperature t_e °C							
		-35	-30	-25	-20	-15	-10	-5	0

Regulator capacity Q_e kW with off-set = 0.3 bar

R 404A

KVP 12 KVP 15 KVP 22	0.1	0.7	0.8	1.0	1.2	1.3	1.4	1.6	1.8
	0.2	1.1	1.2	1.4	1.6	1.8	2.0	2.2	2.5
	0.3	1.3	1.5	1.7	1.9	2.2	2.4	2.7	3.0
	0.4	1.4	1.6	1.8	2.2	2.5	2.7	3.1	3.4
	0.5	1.5	1.7	2.0	2.4	2.7	3.1	3.4	3.9
	0.6	1.5	1.8	2.1	2.5	2.8	3.3	3.7	4.1
KVP 28 KVP 35	0.1	1.7	1.9	2.1	2.5	2.7	3.1	3.3	3.7
	0.2	2.2	2.7	3.0	3.5	3.8	4.2	4.8	5.3
	0.3	2.6	3.1	3.5	4.1	4.6	5.2	5.7	6.5
	0.4	2.9	3.4	4.0	4.6	5.2	5.8	6.5	7.4
	0.5	3.0	3.7	4.3	5.0	5.7	6.4	7.1	8.1
	0.6	3.2	3.8	4.6	5.3	6.2	6.9	7.8	8.8

Regulator capacity Q_e kW with off-set = 0.6 bar

KVP 12 KVP 15 KVP 22	0.1	1.4	1.6	1.8	2.1	2.3	2.6	2.8	3.2
	0.2	1.9	2.2	2.5	2.8	3.2	3.6	4.0	4.4
	0.3	2.2	2.5	3.0	3.5	3.9	4.4	4.8	5.4
	0.4	2.4	2.9	3.3	3.9	4.3	4.9	5.5	6.2
	0.5	2.5	3.1	3.6	4.2	4.8	5.5	6.1	6.8
	0.6	2.6	3.2	3.9	4.4	5.1	5.8	6.5	7.4
KVP 28 KVP 35	0.1	2.9	3.4	3.9	4.4	5.0	5.5	6.0	6.8
	0.2	4.0	4.7	5.4	6.2	6.8	7.7	8.4	9.6
	0.3	4.7	5.5	6.4	7.3	8.2	9.2	10.3	11.6
	0.4	5.1	6.1	7.2	8.2	9.3	10.5	11.7	13.2
	0.5	5.5	6.6	7.7	9.0	10.2	11.4	12.9	14.5
	0.6	5.7	6.9	8.2	9.6	10.9	12.4	13.8	15.7

t_l °C	15	20	25	30	35	40
R 404A	0.9	0.95	1.0	1.06	1.12	1.19

Offset bar	0.2	0.4	0.6	0.8	1.0	1.2
KVP	2.5	1.4	1.0	0.77	0.67	0.59

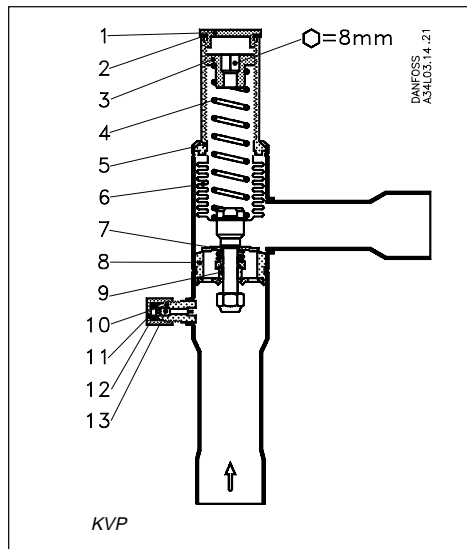
The values in the capacity table refer to the evaporator capacity and are based on liquid temperature $t_l = +25^\circ\text{C}$ ahead of the thermostatic expansion valve, pressure drop Δp in the regulator and the regulator offset = 0.6 bar. Capacities are based on dry, saturated vapour ahead of the regulator.

When dimensioning the evaporator capacity is multiplied by a correction factor dependent on the liquid temperature t_l ahead of the thermostatic expansion valve and the permissible offset on the regulator. The corrected capacity can then be found in the capacity table.

Evaporating pressure regulator, type KVP

Design Function

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
10. Pressure gauge connection
11. Cap
12. Gasket
13. Insert



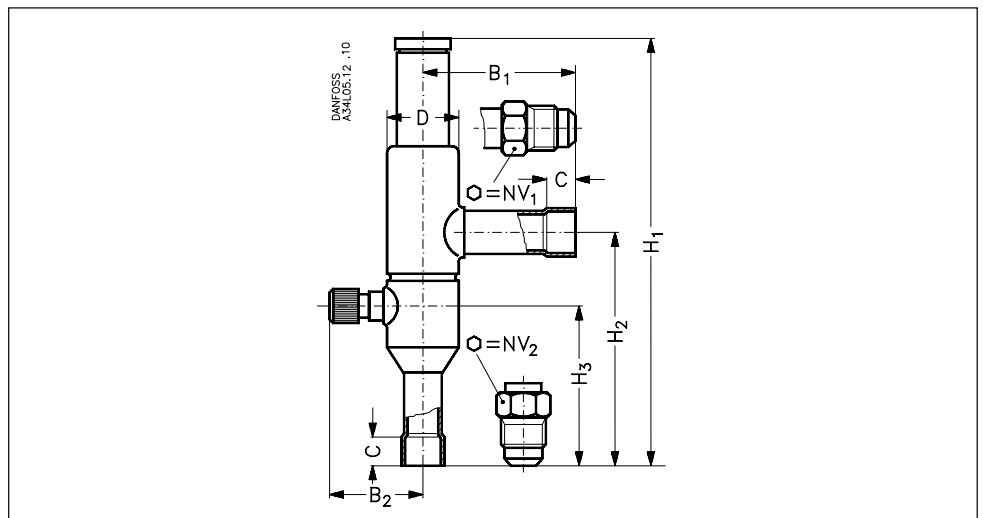
Evaporating pressure regulator type KVP opens at a rise in pressure on the inlet side, i.e. when the pressure in the evaporator exceeds the set value.

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

The 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.

Dimensions and weights



Type	Connection				NV ₁	NV ₂	H ₁	H ₂	H ₃	B ₁	B ₂	C	∅ D	Weight
	Flare		Solder ODF											
	in.	mm	in.	mm										
KVP 12	1/2	12	1/2	12	19	24	179	99	66	64	41	10	30	0.4
KVP 15	5/8	16	5/8	16	19	24	179	99	66	64	41	12	30	0.4
KVP 22			7/8	22	24	24	179	99	66	64	41	17	30	0.4
KVP 28			1 1/8	28	24	24	259	151	103	105	48	20	43	1.0
KVP 35			1 3/8	35			259	151	103	105	48	25	43	1.0