Data sheet

Crankcase pressure regulator

KVL

Ensures safe compressor operation

Description

Crankcase pressure regulator type KVL is fitted in the suction line ahead of the compressor. KVL protects the compressor motor against overload during start-up after long standstill periods or after defrost periods (high pressure in evaporator).

Features & benefits

- Accurate, adjustable pressure regulation
- Wide capacity and operating ranges
- Pulsation damping design
- Stainless steel bellows
- Compact angle design for easy installation in any position
- "Hermetic" brazed construction
- Available in a wide size range of flare and ODF solder types
- KVL 12 – KVL 22: may be used in the following EX range: category 3 (zone 2)

Ordering

Product code numbers

Figure: Flare connection

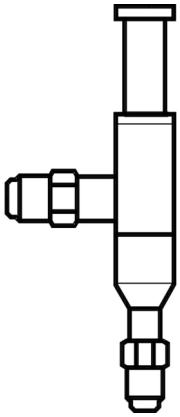


Figure: Solder connection

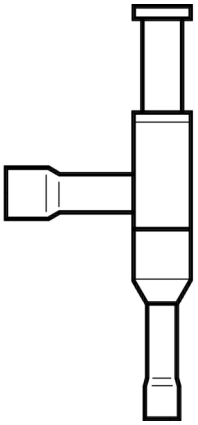


Table: Ordering for type KVL

Type	Rated capacity [1] [kW]				Flare connection [2]		Code no.	Solder connection		Code no.
	R22	R134a	R404A/R507	R407C	[in]	[mm]		[in]	[mm]	
KVL 12	7.1	5.3	6.3	6.4	½	12	034L0041	½	–	034L0043
	7.1	5.3	6.3	6.4	–	–	–	–	12	034L0048
KVL 15	7.1	5.3	6.3	6.4	⅝	16	034L0042	⅝	16	034L0049
KVL 22	7.1	5.3	6.3	6.4	–	–	–	⅞	22	034L0045
KVL 28	17.8	13.2	15.9	16.4	–	–	–	1 ⅛	–	034L0046
	17.8	13.2	15.9	16.4	–	–	–	–	28	034L0051
KVL 35	17.8	13.2	15.9	16.4	–	–	–	1 ⅜	35	034L0052

Note:

[1] Rated capacity is the regulator capacity at
- suction temperature t_s = -10 °C
- condensing temperature t_c = 25 °C
- pressure drop in regulator Δp = 0.2 bar, offset = 0.6 bar

To select the product for other conditions or refrigerants, use Danfoss Coolselector®2

[2] KVL 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, as gas velocities in excess of 40 m/s at the inlet of the regulator can result in flow noise.

Spare parts code numbers

034L0006

Spare part, KVP; KVD 15; KVR; KVD 12, Schrader valve

Product Type: Spare part, Used for product: KVP; KVD 15; KVR; KVD 12, Type designation: Schrader valve, Schrader valve

Related products

034L0043 034L0045 034L0046 034L0049 034L0052

034L2000

Spare part, KV , CPCE, Cap, gasket, screw, valve

Product Type: Spare part, Used for product: KV , CPCE, Type designation: Cap, gasket, screw, valve, Service kit

Related products

034L0043 034L0045 034L0046 034L0049 034L0052

034L0210

Spare part, KV 28; KV 35, Counter screw

Product Type: Spare part, Used for product: KV 28; KV 35, Type designation: Counter screw, Locking screw

Related products

034L0046 034L0052

034L0208

Spare part, KV 12; KV 22; KV 15, Counter screw

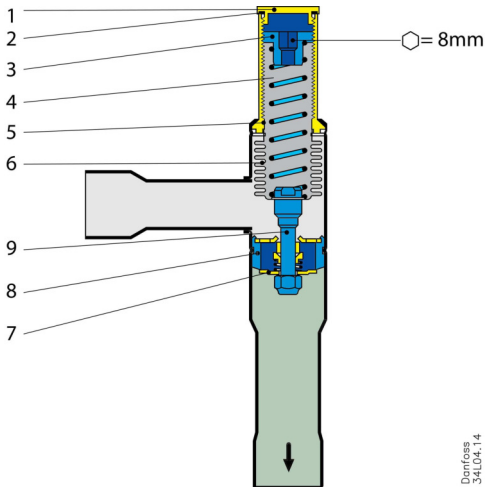
Product Type: Spare part, Used for product: KV 12; KV 22; KV 15, Type designation: Counter screw, Locking screw

Related products

034L0043 034L0045 034L0049

Functions

Figure: Design/function for KVL



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

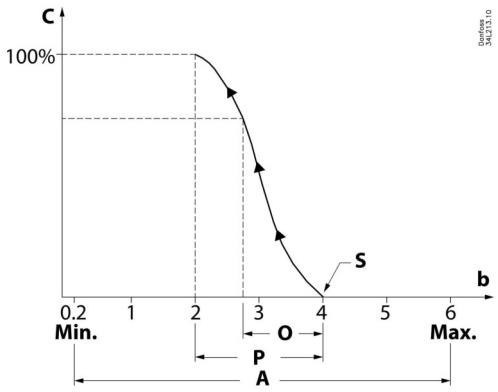
The crankcase pressure regulator type KVL opens at pressure fall on the outlet side, i.e. when the suction pressure ahead of the compressor drops below the set value.

The KVL only regulates based on the outlet pressure. Pressure variations on the inlet side of the regulator do not affect the degree of opening since the KVL 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 normally occur in a refrigeration plant.

The damping device helps to ensure long life of the regulator without impairing regulation accuracy.

Figure: P-band and offset



C	Capacity
b	Bar
S	Set point
O	Offset
P	P-band
A	Adjustment range
Min.	Min. setting point
Max.	Max. setting point

Proportional band
The P-band is defined as the difference between the pressure at which the valve plate starts to open (set point) and the pressure at which the valve is completely open.

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

Offset
The offset is defined as the difference between the pressure at which the valve plate starts to open (set point) and the pressure at which the valve reaches the necessary opening for the actual load.

The offset is always a part of the P-band
Because optimal function of a refrigeration plant is best reached with fully open KVL, the term offset is normally not used in connection with the KVL valve

Product details

General data

Table: Technical data for KVL

Features	Description
Refrigerants	R22, R134a, R290[(1)], R404A, R407A, R407C, R407F, R407H, R448A, R449A, R449B, R450A, R452A, R454A[(1)], R454C[(1)], R455A[(1)], R507, R513A, R515B, R516A, R600[(1)], R600a[(1)], R1234ze(E)[(1)], R1234yf[(1)], R1270[(1)]
Regulating range	0.2 – 6.0 bar
	Factory setting = 2 bar
Max. working pressure	PS/MWP PS = 18 bar
Max. test pressure	Pe = 19.8 bar
Medium temperature range	-60 – 130 °C
Maximum P-band	KVL 12 – 22 = 2 bar
	KVL 28 – 35 = 1.5 bar
K_v-value[(2)] with maximum P-band	KVL 12 – 22 = 3.2 m^3/h
	KVL 28 – 35 = 8.0 m^3/h

[(1)] KVL 12 – KVL 22 only.

[(2)] 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.

This product (KVL 12 – KVL 22) is evaluated for R290, R454A, R454C, R455A, R600, R600a, R1234ze(E), R1234yf, R2170 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.

Sizing

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

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

- Refrigerant
- Evaporator capacity: Q_e in [kW]
- Liquid temperature ahead of expansion valve: t_l in [°C]
- Suction temperature ahead of compressor: t_s in [°C]
- Maximum suction pressure after the regulator: PS in [bar]
- Connection type: flare or solder
- Connection size in [in] or [mm]

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 dependant on the acceptable pressure drop across the valve.

The following example illustrates how this is done:

- Refrigerant: R404A
- Evaporator capacity: Q_e = 4.0 kW
- Liquid temperature ahead of expansion valve: 35 °C
- Suction temperature ahead of compressor: -25 °C
- Maximum suction pressure after the regulator: 3.8 bar ~ -7 °C
- Connection type: Solder
- Connection size: $^5/_8$ in.

Step 1

Determine the correction factor for liquid temperature t_l ahead of expansion valve.

From the Table: Correction factors for liquid temperature t_l (see below) the correction factor for a liquid temperature at 35 °C (R404A) corresponds to a factor of 1.16.

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

Corrected evaporator capacity is: $Q_e = 4.0 \times 1.16 = 4.64$ kW

Step 3

Now select the capacity table for R404A and choose the column with a suction temperature of -25 °C.
Using the corrected replacement capacity, select a valve that provides an equivalent or greater capacity than required.
KVL 12 / KVL 15 / KVL 22 delivers a capacity of 4.6 kW at a pressure drop of 0.2 bar across the valve and 5.6 kW at a pressure drop of 0.3 bar across the valve.
Based on the required connection size of ⅝ in. the KVL 15 valve is the proper selection for this example.

Step 4

KVL 15, $^5/_8$ inch solder connection: code no. 034L0049, see Table: Ordering for type KVL.

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.

Dimensions

Figure: Dimensions for KVL

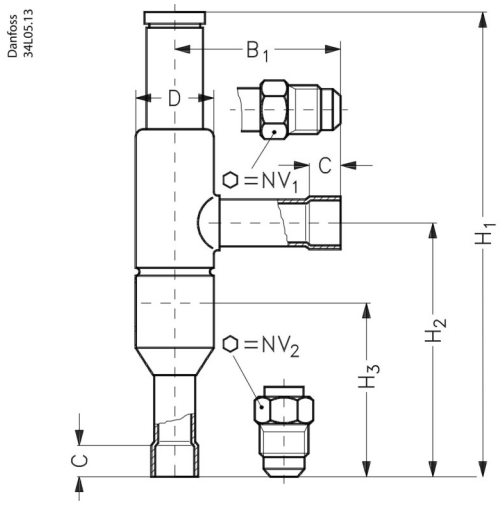


Table: Dimensions and weight for KVL

Type	Connection				H_1	H_2	B_1	C	øD	Net weight
	Flare		Solder ODF							
	[inch]	[mm]	[inch]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[kg]
KVL 12	1/2	12	1/2	12	179	99	64	10	30	0.4
KVL 15	5/8	16	5/8	16	179	99	64	12	30	0.4
KVL 22	–	–	7/8	22	179	99	64	17	30	0.4
KVL 28	–	–	1 1/8	28	259	151	105	20	43	1.0
KVL 35	–	–	1 3/8	35	259	151	105	25	43	1.0

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.AC	Danfoss	
EU Declaration	EU-declaration 034L9600.AA	Danfoss	PED, EAEU RoHS, Pressure, EU RoHS
Manufacturer's Declaration	Danfoss MD 034R9541.AA	Danfoss	China RoHS
Pressure Safety Certificate	LLC CDC EURO-TYSK UA.TR.089.1015.02-22	LLC CDC EURO TYSK - Ukraine	PED, Pressure
UA Declaration	Danfoss UA 2023-01-10 Valves PL01 PL40	Danfoss	PED, Pressure

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