Data sheet

Condensing pressure regulator, type KVR
Differential pressure valve, type NRD

Maintains a constant and sufficiently high condenser and receiver pressure

Description

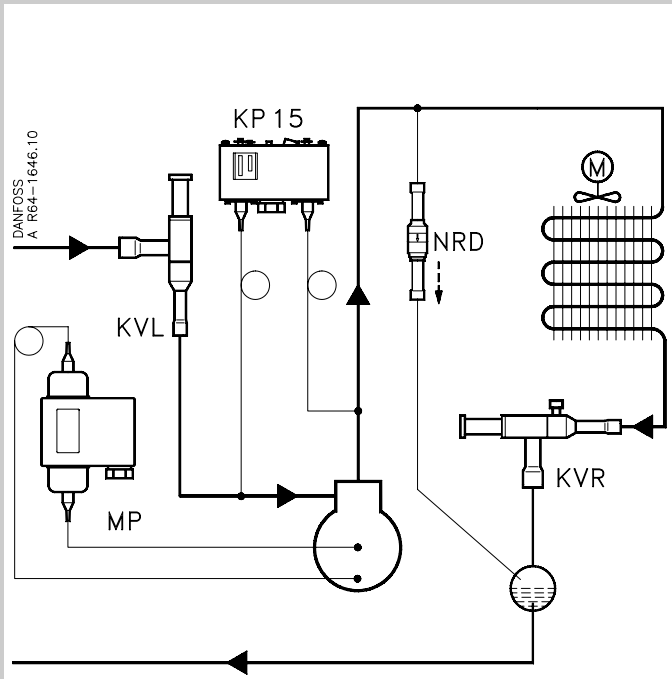
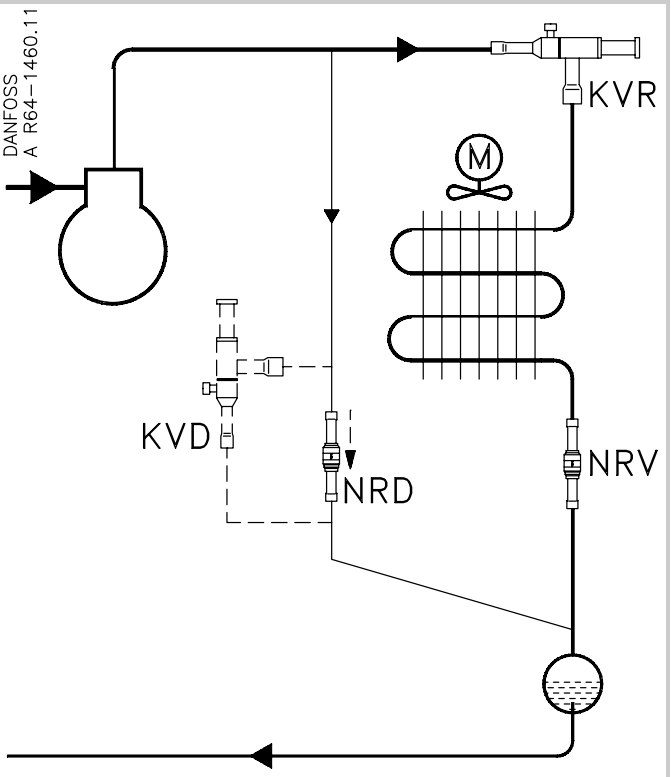
Regulating system KVR and NRD is used to maintain a constant and sufficiently high condenser and receiver pressure in refrigeration and air conditioning plant with air–cooled condensers.
KVR can also be used together with receiver pressure regulator, type KVD.

Features & benefits

- Accurate, adjustable pressure regulation
- Wide capacity and operating range
- Pulsation damping design
- Stainless steel bellows
- Compact angle design for easy installation in any position
- "Hermetic" brazed construction
- ¼ in. Schrader valve for pressure gauge connection
- Available with flare and ODF solder connections
- KVR 12 – KVR 22 and NRD: May be used in the following EX range: Category 3 (Zone 2)

Applications

Table: Application

Liquid capacity application	Hot gas capacity application
	

Ordering

Product code numbers

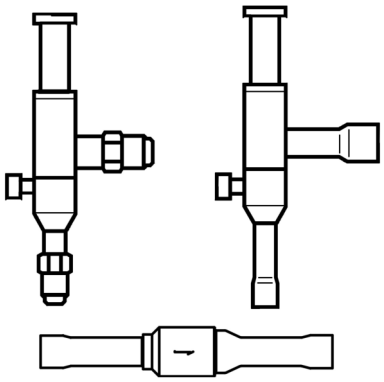


Table: KVR 12, KVR 15, KVR 22, KVR 28, KVR 35, NRD

Type	Rated liquid capacity [1] (Evaporator capacity) [kW]				Rated hot gas [1] (Evaporator capacity) [kW]				Flare connect. [2]		Code no.	Solder connect.		Code no.
	R22	R134a	R404A/ R507	R407C	R22	R134a	R404A/ R507	R407C	[in]	[mm]		[in]	[mm]	
KVR 12	50.4	47.3	36.6	54.4	13.2	11.6	12	14.3	1/2	12	034L0091	1/2	–	034L0093
	50.4	47.3	36.6	54.4	13.2	11.6	12	14.3	–	–	–	–	12	034L0096
KVR 15	50.4	47.3	36.6	54.4	13.2	11.6	12	14.3	5/8	16	034L0092	5/8	16	034L0097
KVR 22	50.4	47.3	36.6	54.4	13.2	11.6	12	14.3	–	–	–	7/8	22	034L0094
KVR 28	129	121	93.7	139.3	34.9	30.6	34.9	37.7	–	–	–	$1^{1/8}$	–	034L0095
	129	121	93.7	139.3	34.9	30.6	34.9	37.7	–	–	–	–	28	034L0099
KVR 35	129	121	93.7	139.3	34.9	30.6	34.9	37.7	–	–	–	$1^{3/8}$	35	034L0100
NRD	–	–	–	–	–	–	–	–	–	–	–	1/2	–	020B1132
	–	–	–	–	–	–	–	–	–	–	–	–	12	020B1136

[1] Rated liquid capacity (Evaporator capacity)[kW]

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

Rated capacity is based on:

- evaporating temperature t_e = -10 °C
- condensing temperature t_c = 30 °C
- pressure drop across the valve
  - Δp = 0.2 bar for liquid capacity
  - Δp = 0.4 bar for hot gas capacity
- offset = 3 bar

[2] Flare connect.

KVR are delivered without flare nuts. Separate flare nuts can be delivered:

- ½ in / 12 mm, code no. 011L1103
- ⅝ in / 16 mm, code no. 011L1167

Product details

General data

Table: Technical data

Refrigerants	R22, R32**, R134a, R290*, R404A, R407A, R407C, R407F, R407H, R410A**, R448A, R449A, R449B, R450A, R452A, R452B**, R454A*, R454B**, R454C*, R455A*, R507, R513A, R515B, R516A, R600*, R600a*, R1233zd(E)**, R1234ze(E)*, R1234yf*, R1270* *KVR 12 – KVR 22 only; see more details in the note below the table **NRD only
Adjustment range	5 – 17.5 bar
	Factory setting = 10 bar
Maximum working pressure	KVR: PS/MWP = 28 bar
	NRD: PS/MWP = 49 bar
Maximum test pressure	KVR: Pe = 31 bar
	NRD: Pe = 81 bar
Medium temperature range	KVR: -45 – 130 °C,
	NRD: -50 – 155 °C
P-band	KVR 12 – 22 = 6.2 bar
	KVR 28 – 35 = 5 bar
Minimum opening pressure differential for NRD	Start opening: Δp = 1.4 bar

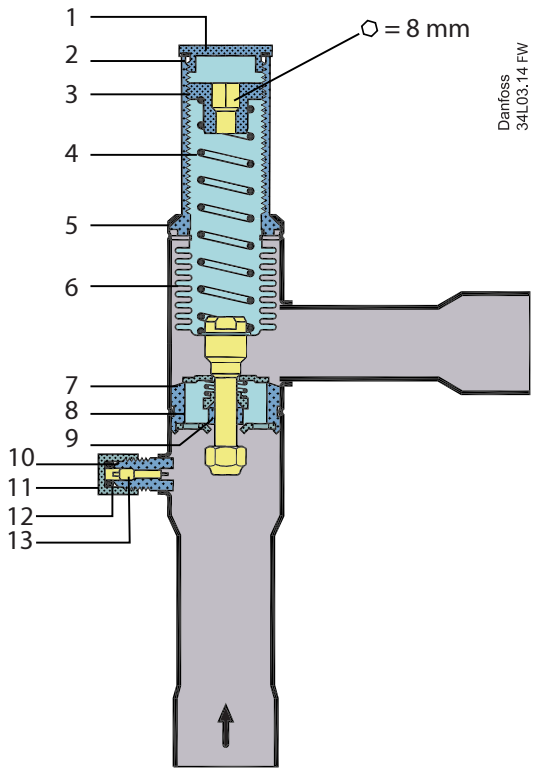
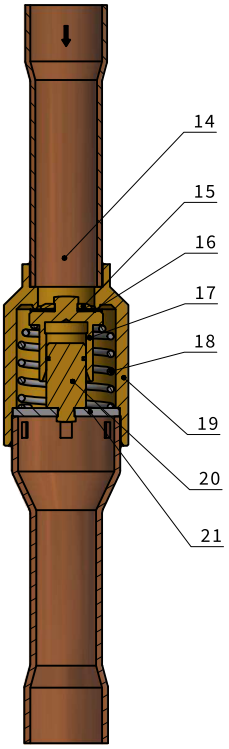
This product (KVR 12 – KVR 22) is evaluated for R290, R454A, R454C, R455A, R600, R600a, R1234ze(E), R1234yf, R1270 by ignition source assessment in accordance with standard EN ISO80079-36. Flare connections are only approved for A1 and A2L refrigerants.

NRD is evaluated for R32, R1270, R290, R452B, R454A, R454B, R454C R455A, R600, R600a, R1233zd(E), R1234ze(E), R1234yf, R1270 by ignition source assessment in accordance with standard EN ISO80079–36.

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

Design

Table: Design / Function

KVR	NRD
	

1	Seal cap
2	Gasket
3	Setting screw
4	Main spring
5	Valve body
6	Equalizing bellows
7	Valve plate

8	Valve seat
9	Damping device
10	Pressure gauge connection
11	Cap
12	Gasket
13	Insert
14	Copper tube

15	Washer
16	Teflon disk
17	Piston
18	Spring
19	Valve body
20	Guide
21	Stop face

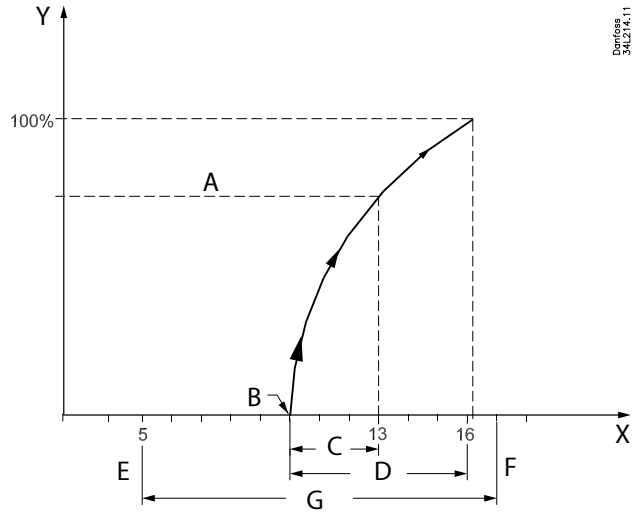
Condensing pressure regulator, type KVR opens upon a rise in pressure on the inlet side, i.e. when the pressure in the condenser reaches the set value. KVR regulation is dependent only on the inlet pressure. Pressure variations on the outlet side of the regulator do not affect the degree of opening, since type KVR has an equalizing bellows (6). The effective area of this bellows corresponds to that of the valve seat.

In addition, the regulator is equipped with an effective damping device (9) to safe–guard against pulsations which can normally occur in refrigeration plant.

The damping device contributes to ensuring a long working life for the regulator without impairing regulation accuracy.

Differential valve type NRD begins to open when the pressure drop in the valve is 1.4 bar.

Figure: P-band and Offset (Principle diagram)



A	Rated capacity
B	Set point
C	Offset
D	P-band
E	Min. setting point
F	Max. setting point
G	Adjustment range
X	Pressure
Y	Capacity

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

Example
If the valve is set to open at 10 bar and the valve P-band is 6.2, the valve will give maximum capacity when the inlet pressure reaches 16.2 bar.

Offset
The offset is defined as the amount of pressure required to move the valve plate from closed position (set point) to the necessary opening degree for the actual load. The offset is always a part of the P-band.

Example with R22
A working temperature of 36 °C ~ 13 bar is required, and the temperature must not drop below 27 °C ~ 10 bar (set point). The offset will then be 3 bar.

Capacity

Sizing

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

The following data must be used when sizing a KVR valve:
- Refrigerant: HCFC, HFC and HC: KVR 12 – KVR 22, HCFC and non-flammable HFC: KVR 28 – KVR 35
- Evaporator capacity Q_e (plant capacity)
- Evaporating temperature t_e in [°C]
- Condensing temperature t_e in [°C]
- Connection type: flare or solder
- Connection size in [in]

Valve selection

Example

When selecting the appropriate valve it may be necessary to convert the actual evaporator capacity using a correction factors.

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.

KVR in a liquid capacity application

- Refrigerant: R22 example
- Evaporator capacity: Q_e = 100 kW (plant capacity)
- Evaporating temperature: t_e = -40 °C
- Condensing temperature: t_c = 30 °C
- Connection type: Solder
- Connection size: ⅝ in

Step 1

Determine the correction factor for evaporating temperature t_e.
From the correction factors table an evaporating temperature of -40 °C, R22 corresponds to a factor of 1.09.

t_e / [°C]	-40	-30	-20	-10	0	10
R22	1.09	1.05	1.02	1	0.98	0.96
R134a	1.14	1.09	1.04	1	0.96	0.93
R404A, R507	1.18	1.11	1.05	1	0.95	0.92
R407C	1.12	1.08	1.04	1	0.97	0.93

Plant capacity x correction factor = table capacity

Step 2
Corrected evaporator capacity is Qe = 100 x 1.09 = 109.0 kW

Step 3
Now select the appropriate capacity table and choose the line for a condensing temperature t_c = 30 °C.

Using the corrected evaporator capacity, select a valve that provides an equivalent or greater capacity at an acceptable pressure drop.

KVR 12, KVR 15, KVR 22 delivers 142.9 kW at 1.6 bar pressure drop across the valve. Based on the required connection size of ⅝ in. ODF, the KVR 15 is the proper selection for this example.

Step 4

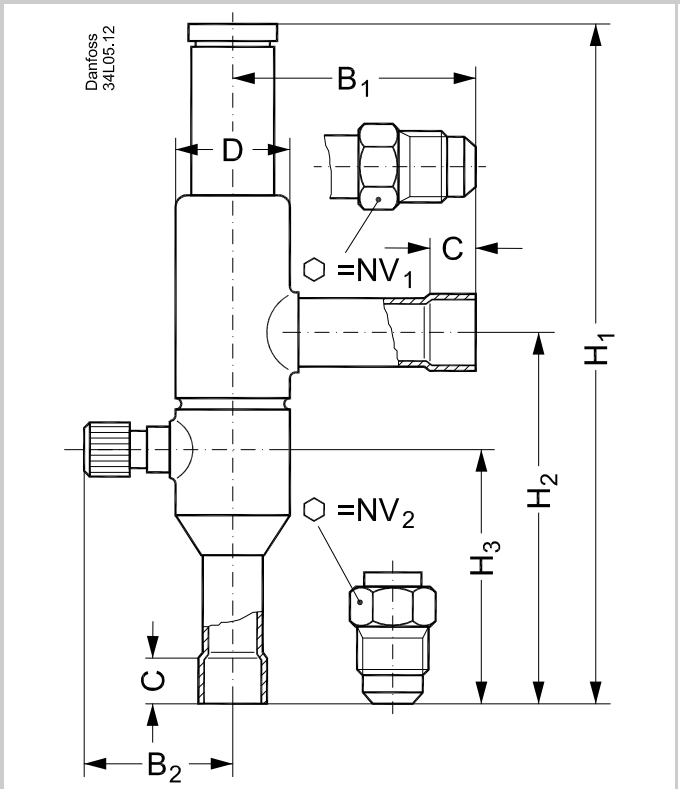
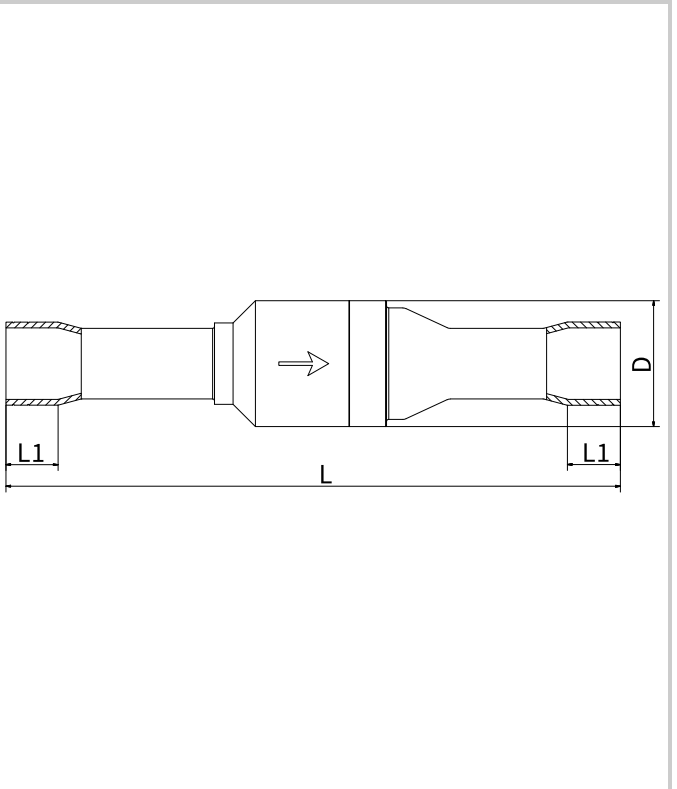
KVR 15, ⅝ in. solder connection: code no. 034L0097 (see ordering list)

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

Table: Dimensions

KVR	NRD
	

Type	Connection				NV_1	NV_2	H_1	H_2	H_3	L	L1	B_1	B_2	C solder	øD	Net weight
	Flare		Solder ODF													
	[in.]	[mm]	[in.]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[Kg]
KVR 12	1/2	12	1/2	12	19	19	179	99	66	–	–	64	41	10	30	0.4
KVR 15	5/8	16	5/8	16	24	24	179	99	66	–	–	64	41	12	30	0.4
KVR 22	–	–	7/8	22	–	–	179	99	66	–	–	64	41	17	30	0.4
KVR 28	–	–	1 1⁄8	28	–	–	259	151	103	–	–	105	48	20	43	1
KVR 35	–	–	1 3⁄8	35	–	–	259	151	103	–	–	105	48	25	43	1
NRD	–	–	½	12	–	–	–	–	–	131	10	–	–	–	22	0.1

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
EU Declaration	EU-declaration 034L9600.AA	Danfoss	PED, EAEU RoHS, Pressure, EU 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
Manufacturer's Declaration	Danfoss MD 034R9541.AA	Danfoss	China RoHS
Manufacturer's Declaration	Danfoss MD 032F9268.AD	Danfoss	
Statement of Compliance	Certificate UL-US-L7200-15-20114002-1	UL - Underwriters Laboratories inc.	Compliance misc. Standards
Export Control Declaration	Check valve, Shut-off diaphragm valve, shut-off ball valve and differential pressure valve	Danfoss	
Manufacturer's Declaration	Danfoss MD 033F4010	Danfoss	EU RoHS
Manufacturer's Declaration	Danfoss MD 033F4017.AF	Danfoss	
Manufacturer's Declaration	Danfoss MD 033F4001.AL	Danfoss	PED, Pressure
Manufacturer's Declaration	Danfoss MD 033F4006 AC	Danfoss	China RoHS

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