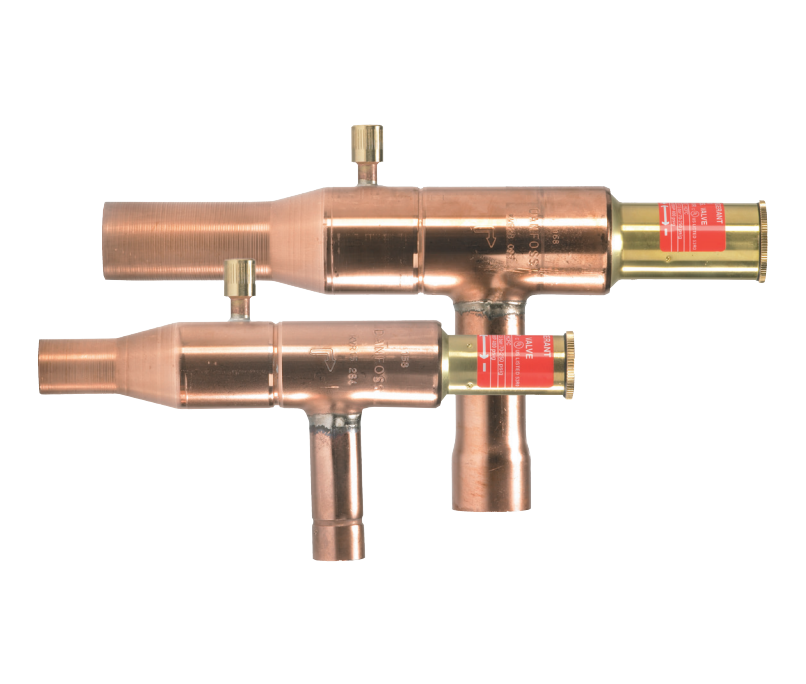
Data sheet

Evaporating pressure regulator Type KVP



KVP evaporator pressure regulators are mounted in the suction line of refrigeration and air conditioning systems.

They are used to maintain a constant pressure corresponding to a constant temperature on the evaporator.

They also protect against too low an evaporating pressure by throttling down when pressure falls below the set value.

They are also used to differentiate the evaporating pressures in two or more evaporators in systems with one compressor.

Features

- 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,
- $^{1}/_{4}$ in. Schrader valve for pressure testing,
- Available with flare and ODF solder connections,
- KVP 12-22: Compliant with ATEX hazard zone 2.

Approvals

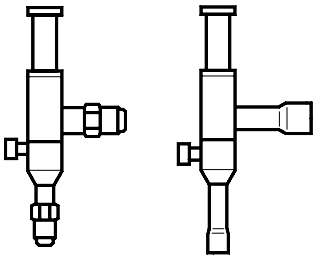
UL US LISTED, file SA7200
GOST AN30

Technical data

Refrigerants	HCFC, HFC and HC: KVP 12-22
	HCFC and non-flammable HFC: KVP 28-35
Regulating range	0 – 80 psig
	Factory setting = 29 psig
Maximum working pressure	PS/MWP = 260 psig
Maximum test pressure	Pe = PS × 1.1 = 286 psig
Medium temperature range [°F]	-50 – 265 °F
P-band (full valve stroke)	KVP 12 – 22: 25 psi
	KVP 28 – 35: 40 psi

Metric conversions
1 psi = 0.07 bar
$^5/_9$ (t_1 °F -32) = t_2 °C

Ordering



Type	Rated capacity [1] [TR]				Flare connection [2]	Code no.	Solder connection	Code no.
	R22	R134a	R404A/R507	R407C	[in.]		ODF [in.]	
KVP 12	1.3	0.9	1.2	1.2	$^1/_2$	**034L0021**	$^1/_2$	**034L0023**
KVP 15	1.3	0.9	1.2	1.2	$^5/_8$	**034L0022**	$^5/_8$	**034L0029**
KVP 22	1.3	0.9	1.2	1.2	—	—	$^7/_8$	**034L0025**
KVP 28	2.8	1.9	2.4	2.6	—	—	1 $^1/_8$	**034L0026**
KVP 35	2.8	1.9	2.4	2.6	—	—	1 $^3/_8$	**034L0032**

[1] Rated capacity is based on:
Evaporating temperature: t_e= 40 °F
Condensing temperature: t_c= 100 °F
Pressure drop across regulator: Δp = 2 psi
Offset (design evaporating pressure minus minimum allowable evaporator pressure): 9 psi.

[2] KVP supplied without flare nuts.
Separate flare nuts can be supplied:
$^1/_2$ in., code no **011L1103**
$^5/_8$ in., code no **011L1167**

Note:
The connection dimensions chosen must not be too small, as gas velocities in excess of 130 ft/s at the inlet of the regulator can result in flow noise.

Capacity

Maximum regulator capacity Q_e [1)]

Type	Pressure drop in regulator Δp [psi]	Capacity Q_e in tons at evaporating temperature t_e [°F]									
		-20	-10	0	10	20	30	40	50	60	70
R22											
KVP 12 KVP 15 KVP 22	2	0.6	0.7	0.8	0.9	1.0	1.2	1.3	1.4	1.5	1.7
	4	0.9	1.0	1.1	1.3	1.4	1.6	1.8	2.0	2.2	2.4
	6	1.0	1.2	1.3	1.5	1.7	1.9	2.2	2.4	2.6	2.9
	10	1.1	1.4	1.6	1.9	2.1	2.4	2.7	3.0	3.3	3.6
	20	1.1	1.4	1.8	2.2	2.6	3.0	3.5	3.9	4.4	4.9
KVP 28 KVP 35	2	1.4	1.6	1.8	2.0	2.3	2.5	2.8	3.1	3.4	3.7
	4	1.9	2.2	2.5	2.8	3.1	3.5	3.9	4.3	4.7	5.2
	6	2.1	2.5	2.9	3.3	3.8	4.2	4.7	5.2	5.7	6.3
	10	2.4	2.9	3.5	4.0	4.6	5.2	5.8	6.5	7.2	7.9
	20	2.4	3.0	3.8	4.7	5.6	6.6	7.5	8.5	9.6	10.6

Maximum regulator capacity Q_e [1)]

Type	Pressure drop in regulator Δp [psi]	Capacity Q_e in tons at evaporating temperature t_e [°F]						
		-15	-10	-5	0	5	10	15
R134a								
KVP 12 KVP 15 KVP 22	2	0.6	0.7	0.8	0.9	1.0	1.1	1.2
	4	0.8	0.9	1.0	1.2	1.3	1.5	1.7
	6	0.9	1.0	1.2	1.4	1.6	1.8	2.0
	10	1.0	1.2	1.5	1.7	2.0	2.2	2.5
	20	1.0	1.3	1.6	2.0	2.4	2.8	3.3
KVP 28 KVP 35	2	1.3	1.5	1.7	1.9	2.1	2.4	2.6
	4	1.7	2.0	2.3	2.6	2.9	3.3	3.6
	6	2.0	2.3	2.7	3.1	3.5	3.9	4.4
	10	2.2	2.7	3.2	3.7	4.3	4.9	5.5
	20	2.2	2.8	3.5	4.4	5.2	6.1	7.1

[1)] The capacities are based on:
Liquid temperature ahead of expansion valve t_l = 100 °F
Regulator offset Δp = 9 psi

Metric conversions
1 psi = 0.07 bar
$^5/_9$ (t_1 °F -32) = t_2 °C
1 TR = 3.5 kW
1 in. = 25.4 mm

Correction factors for liquid temperature t_l

t_f [°C]	50	60	70	80	90	100	110	120
R22	0.82	0.85	0.88	0.92	0.96	1.0	1.05	1.10
R134a	0.79	0.82	0.86	0.90	0.95	1.0	1.06	1.13

Correction factors for offset

Offset [psi]	3	6	9	12	15	18	21
KVP 12	2.5	1.4	1.0	0.77	0.67	0.59	—
KVP 15	2.5	1.4	1.0	0.77	0.67	0.59	—
KVP 22	2.5	1.4	1.0	0.77	0.67	0.59	—
KVP 28	—	1.4	1.0	0.77	0.67	0.59	0.53
KVP 35	—	1.4	1.0	0.77	0.67	0.59	0.53

Capacity
(continued)

Maximum regulator capacity Q_e [1)]

Type	Pressure drop in regulator Δp [psi]	Capacity Qe in tons at evaporating temperature te [°F]									
		-20	-10	0	10	20	30	40	50	60	70
R404A/R507											
KVP 12 KVP 15 KVP 22	2	0.5	0.6	0.7	0.8	0.9	1.1	1.2	1.3	1.4	1.5
	4	0.7	0.8	0.9	1.1	1.3	1.4	1.6	1.8	1.9	2.2
	6	0.8	1.0	1.1	1.3	1.5	1.7	1.9	2.1	2.4	2.6
	10	1.0	1.2	1.3	1.6	1.9	2.0	2.4	2.8	3.0	3.4
	20	1.0	1.3	1.6	1.9	2.3	2.7	3.2	3.6	4.1	4.5
KVP 28 KVP 35	2	1.1	1.3	1.5	1.8	2.0	2.2	2.4	2.8	3.0	3.4
	4	1.5	1.8	2.0	2.4	2.7	3.1	3.4	3.9	4.3	4.8
	6	1.8	2.1	2.4	2.9	3.2	3.7	4.1	4.7	5.1	5.7
	10	2.1	2.5	2.9	3.5	4.1	4.6	5.2	5.9	6.5	7.2
	20	2.1	2.7	3.4	4.3	5.2	5.9	6.8	7.8	8.8	9.8

Maximum regulator capacity Q_e [1)]

Type	Pressure drop in regulator Δp [psi]	Capacity Q_e in tons at evaporating temperature t_e [°F]									
		-20	-10	0	10	20	30	40	50	60	70
R407C											
KVP 12 KVP 15 KVP 22	2	0.5	0.6	0.7	0.8	0.9	1.0	1.2	1.3	1.4	1.7
	4	0.7	0.9	0.9	1.1	1.2	1.4	1.7	1.9	2.1	2.3
	6	0.8	1.0	1.1	1.3	1.5	1.7	2.0	2.3	2.5	2.8
	10	0.9	1.1	1.4	1.6	1.9	2.2	2.5	2.8	3.1	3.5
	20	0.9	1.1	1.5	1.9	2.3	2.7	3.2	3.7	4.2	4.8
KVP 28 KVP 35	2	1.1	1.3	1.5	1.7	2.0	2.3	2.6	2.9	3.2	3.6
	4	1.5	1.8	2.1	2.4	2.7	3.2	3.6	4.0	4.5	5.0
	6	1.7	2.1	2.5	2.8	3.3	3.8	4.3	4.9	5.4	6.1
	10	1.9	2.4	3.0	3.4	4.0	4.7	5.3	6.1	6.8	7.7
	20	1.9	2.5	3.2	4.0	4.9	5.9	6.9	8.0	9.1	10.3

1) The capacities are based on:
Liquid temperature ahead of expansion valve t_l = 100 °F
Regulator offset Δp = 9 psi

Metric conversions
1 psi = 0.07 bar
$^5/_9$ (t_1 °F -32) = t_2 °C
1 TR = 3.5 kW

Correction factors for liquid temperature t_l

t_f [°C]	50	60	70	80	90	100	110	120
R404A/R507	0.71	0.75	0.80	0.85	0.92	1.0	1.10	1.24
R407C	0.78	0.81	0.85	0.89	0.94	1.0	1.07	1.15

Correction factors for offset

Offset [psi]	3	6	9	12	15	18	21
KVP 12	2.5	1.4	1.0	0.77	0.67	0.59	—
KVP 15	2.5	1.4	1.0	0.77	0.67	0.59	—
KVP 22	2.5	1.4	1.0	0.77	0.67	0.59	—
KVP 28	—	1.4	1.0	0.77	0.67	0.59	0.53
KVP 35	—	1.4	1.0	0.77	0.67	0.59	0.53

Sizing

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

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

- Refrigerant: HCFC, HFC and HC: KVP 12-22, HCFC and non-flammable HFC: KVP 28-35
- Evaporator capacity Q_e in [TR]
- Evaporating temperature (required temperature) t_e in [°F]
- Minimum evaporating temperature t_e in [°F]
- Liquid temperature ahead of expansion valve t_l in [°F]
- Connection type: flare or solder
- Connection size in [in.]

Valve selection

Example
When selecting the appropiate 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: R134a
- Evaporator capacity: Q_e= 1.5 TR
- Evaporating temperature: t_e= 40 °F ~ 36 psig
- Minimum evaporating temperature: 35 °F ~ 30.5 psig
- Liquid temperature ahead of expansion valve: t_l= 80 °F
- Connection type: solder
- Connection size: $^5/_8$ in.

Step 1

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

From the correction factors table (see below) a liquid temperature of 80 °F, R134a corresponds to a factor of 0.90.

Correction factors for liquid temperature t_l

t_l [°C]	50	60	70	80	90	100	110	120
R22	0.82	0.85	0.88	0.92	0.96	1.0	1.05	1.10
R134a	0.79	0.82	0.86	0.90	0.95	1.0	1.06	1.13
R404A/R507	0.71	0.75	0.80	0.85	0.92	1.0	1.10	1.24
R407C	0.78	0.81	0.85	0.89	0.94	1.0	1.07	1.15

Step 2

Determine the correction factor for the valve offset.
The offset is defined as the difference between the design evaporating pressure and the minimum evaporating pressure.

From the offset correction factor table, an offset of 5.5 psi (36 – 30.5) corresponds to a factor of 1.4.

Correction factors for offset

Offset [psi]	3	6	9	12	15	18	21
KVP 12	2.5	1.4	1.0	0.77	0.67	0.59	—
KVP 15	2.5	1.4	1.0	0.77	0.67	0.59	—
KVP 22	2.5	1.4	1.0	0.77	0.67	0.59	—
KVP 28	—	1.4	1.0	0.77	0.67	0.59	0.53
KVP 35	—	1.4	1.0	0.77	0.67	0.59	0.53

Metric conversions
1 psi = 0.07 bar
$^5/_9$ (t_1 °F -32) = t_2 °C
1 TR = 3.5 kW
1 in. = 25.4 mm

Valve selection
(continued)

Step 3

Corrected evaporator capacity is
Q_e=0.90×1.4 × 1.5=1.89 TR

Step 4

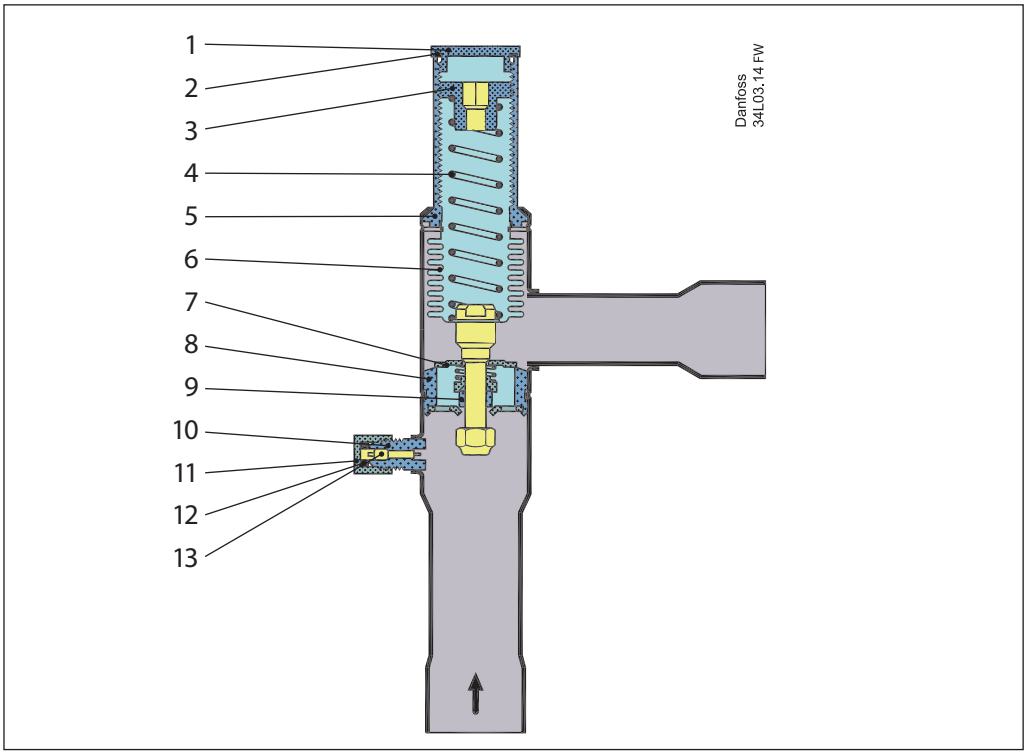
Now select the appropriate capacity table and choose the column for an evaporating temperature of t_e= 40 °F.
Using the corrected evaporator capacity, select a valve that provides an equivalent or greater capacity at an acceptable pressure drop.
KVP 12, KVP 15, KVP 22 delivers 2.0 TR at a 20 psi pressure drop across the valve.
KVP 28, KVP 35 delivers 1.9 TR at a 2 psi pressure drop across the valve.
Based on the required connection size of $^5/_8$ in., the KVP 15 is the proper selection for this example.

Metric conversions
1 psi = 0.07 bar
$^5/_9$ (t_1 °F -32) = t_2 °C
1 TR = 3.5 kW
1 in. = 25.4 mm

Step 5

KVP 15, $^5/_8$ in. solder connection:
code no. 034L0029.

Design / Function *KVP*

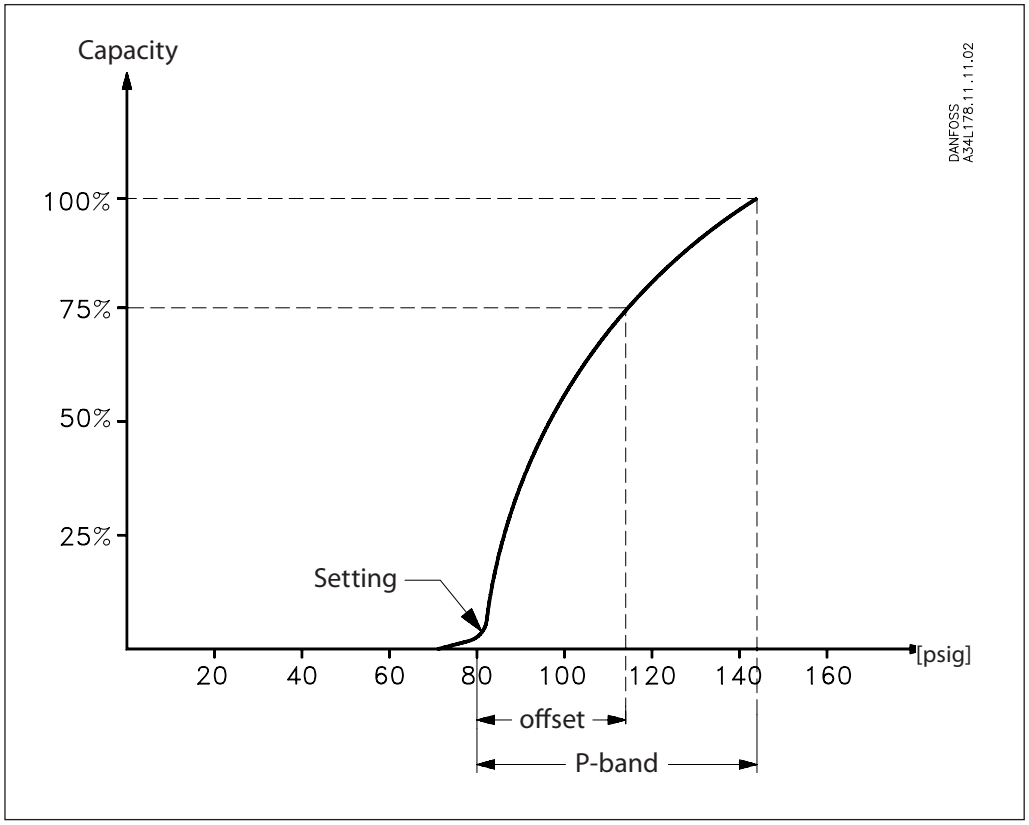


1. Protective cap
2. Gasket
3. Setting screw
4. Main spring
5. Valve body
6. Equalization bellows
7. Valve plate
8. Valve seat
9. Damping device
10. Pressure gauge connection
11. Cap
12. Gasket
13. Insert

Evaporator pressure regulator type KVP opens on a rise in pressure on the inlet side, i.e. when the pressure in the evaporator exceeds the set value.
Type KVP regulates on inlet pressure only. Pressure variations on the outlet side of the regulator do not affect the degree of opening as the valve is equipped with equalization bellows (6).

The bellows have an effective area corresponding to that of the valve seat neutralizing any affect to the setting. The regulator is also equipped with a damping device (9) providing protection against pulsations which can normally arise in a refrigeration system.
The damping device helps to ensure long life for the regulator without impairing regulation accuracy.

P-band and Offset



Metric conversions
1 psi = 0.07 bar
$^5/_9$ (t_1 °F -32) = t_2 °C

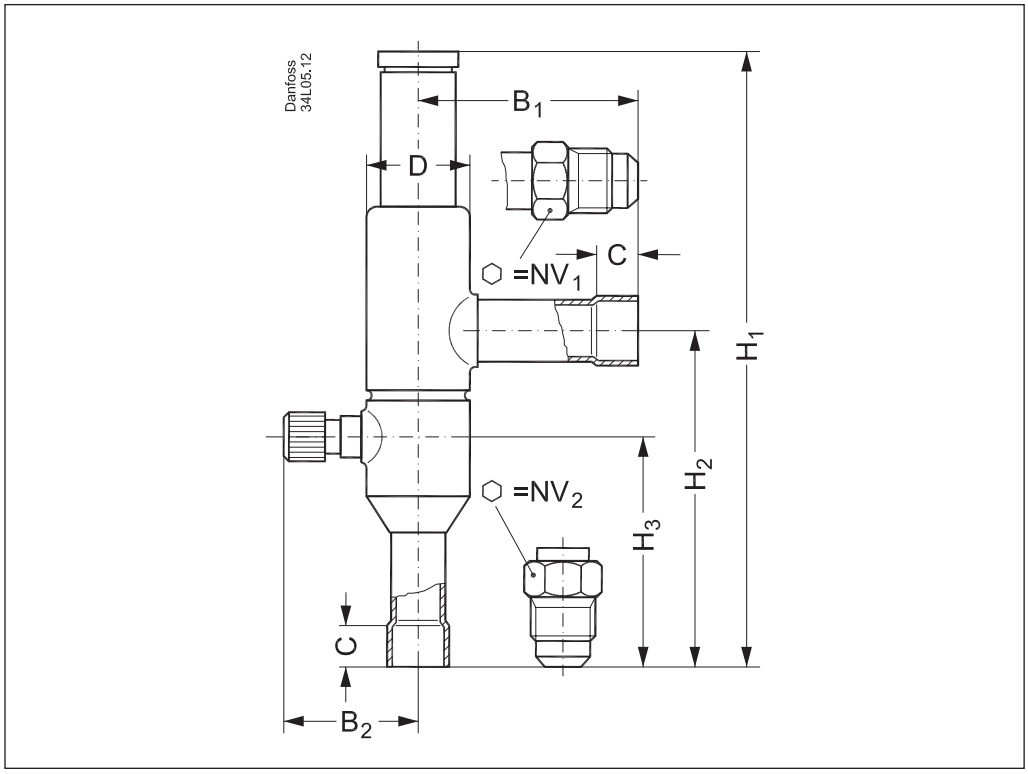
Proportional band
The proportional band or P-band is defined as the amount of pressure required to move the valve plate from closed to full open position.

Example:
If the valve is set to open at 58 psig and the valve p-band is 25 psi, the valve will give maximum capacity when the inlet pressure reaches 83 psig.

Offset
The offset is defined as the permissible pressure variation in evaporator 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 R22:
A working temperature of 40 °F ~ 70 psig is required, and the temperature must not drop below 33 °F ~ 60 psig.
The offset will then be 10 psi.
When selecting a valve, be sure to correct the evaporator capacity based on the required offset.

Dimensions [in.] and weights [lbs]



Type	Connection		NV1	NV2	H1	H2	H3	B1	B2	C	øD	Net weight
	Flare	Solder ODF										
KVP 12	1/2	1/2	0.748	0.748	7.047	3.898	2.598	2.520	1.614	0.394	1.181	0.9
KVP 15	5/8	5/8	0.945	0.945	7.047	3.898	2.598	2.520	1.614	0.472	1.181	0.9
KVP 22	—	7/8	0.945	0.945	7.047	3.898	2.598	2.520	1.614	0.669	1.181	0.9
KVP 28	—	1 1/8	0.945	0.945	10.197	5.945	4.055	4.134	1.890	0.787	1.693	2.0
KVP 35	—	1 3/8	—	—	10.197	5.945	4.055	4.134	1.890	0.984	1.693	2.0

Metric conversions
1 in. = 25.4 mm
1 lb = 0.454 mm