

# V146 Series 2-Way Pressure-Actuated Water-Regulating Valves

## Description

The V146 Series 2-Way Pressure-Actuated Water-Regulating Valves regulate water flow to control refrigerant head pressure in systems with water-cooled condensers. The V146 valves are ideal for applications with system water pressures of up to 350 psig (24.1 bar), such as high-rise buildings.

V146EK and V146AL valves have an adjustable opening point in a refrigerant pressure range of 70 to 260 psi (4.8 to 17.9 bar). V146EK and V146AL valves are available in a 3/4 in. and 1 in. size. Use these valves with standard, noncorrosive refrigerants.

V146GK1 and V146GL1 valves have an adjustable opening point in a refrigerant pressure range of 200 to 400 psi (13.8 to 27.6 bar). The V146GK1 and V146GL1 valves are available in 3/4 in. and 1 in. size for use with standard, noncorrosive, high-pressure refrigerants.

## Features

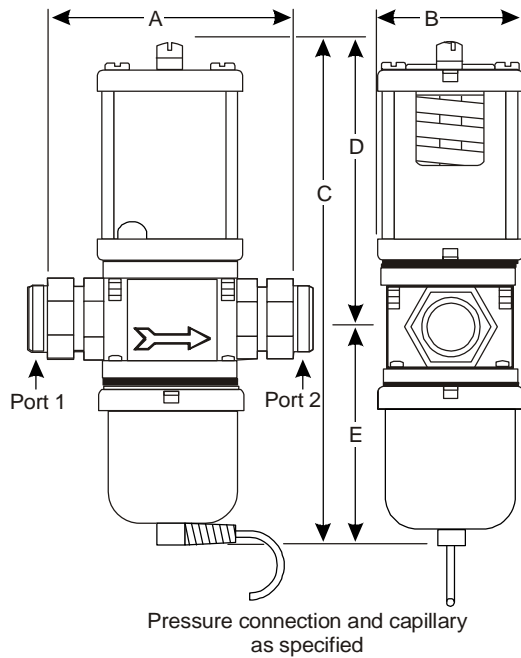
- No Close-Fitting or Sliding Parts in Water Passages
- High-Pressure Design
- Pressure-Balanced Design
- Corrosion-Resistant Material for Internal Parts
- Accessible Range Spring
- Take-Apart Construction

## Applications

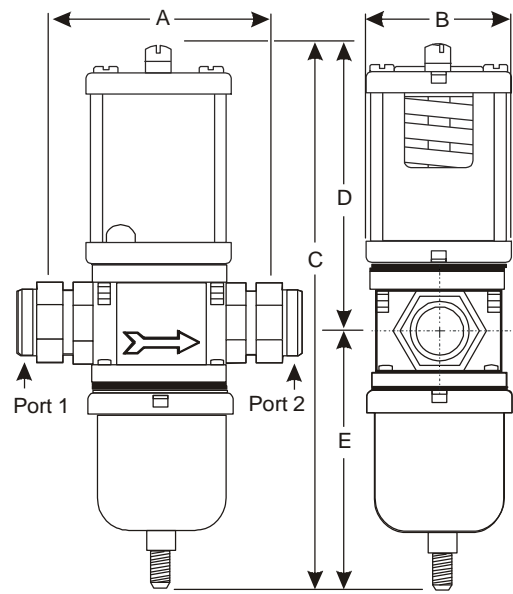
Each application is unique and requires specific engineering data to properly size and design a system to fulfill the appropriate requirements. Typically, a valve is replaced with another valve of the same size in a properly sized and engineered system.



**V146 Series Valve**



**3/4 in. V146EK Valves**

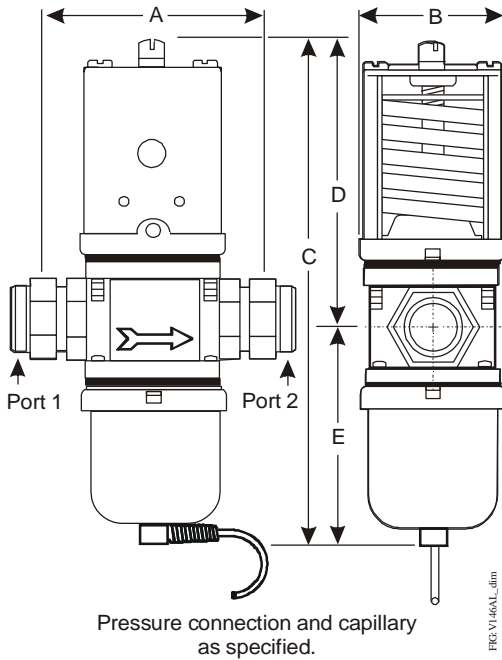


**High Refrigerant Pressure 3/4 in. V146GK1 Valves**

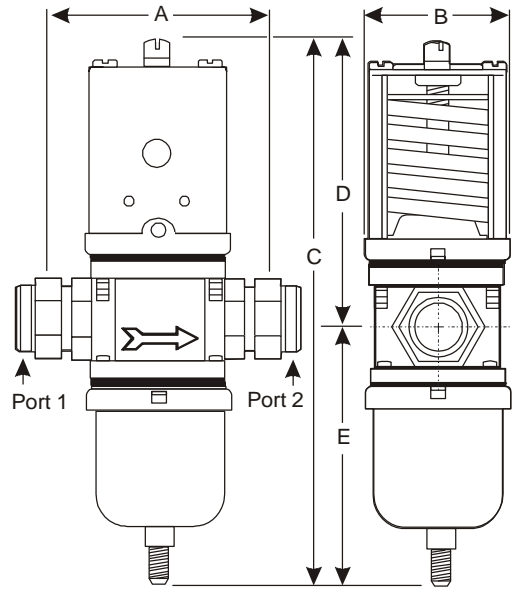
## V146 Series 2-Way Pressure-Actuated Water-Regulating Valves (Continued)

### Valve Dimensions, Inches (Millimeters)

Product Code Number	Nominal Valve Size	A	B	C	D	E
V146EK-1C	3/4 in.	3-3/8 (86)	2-3/16 (55)	7-3/16 (183)	4-3/16 (106)	3 (76)
V146GK1-001C	3/4 in.	3-3/8 (86)	2-3/16 (55)	8 (204)	4-3/16 (106)	3-13/16 (98)
V146AL-1C	1 in.	4-3/4 (121)	2-13/16 (72)	10 (254)	5-15/16 (151)	4-1/16 (103)
V146GL1-001C	1 in.	4-3/4 (121)	2-13/16 (72)	10-1/2 (267)	5-15/16 (151)	4-9/16 (116)



1 in. V146AL Valves



High Refrigerant Pressure 1 in. V146GL1 Valves

### Selection

To make a rough field estimate of the size of valve for an application, find the valve size by locating a point on a flow chart that satisfies these requirements:

- water flow required by the condenser (**Flow**)
- refrigerant head pressure rise (**P<sub>RISE</sub>**)
- available water pressure (**P<sub>AVAIL</sub>**)

Follow these steps, and use the information obtained to locate a point on one of the flowcharts that satisfies all three steps.

1. Take the water flow required by the condenser (**Flow**) from information provided by the manufacturer of the condensing unit. If the manufacturer's information is unavailable, use the following information to make a rough approximation of maximum water flow in gallons per minute (gpm) (cubic meters per hour [m<sup>3</sup>/hr]):
  - System Capacity (**Tons of Refrigeration**)
  - Outlet Water Temperature (**Temp. <sub>Outlet</sub>**)
  - Inlet Water Temperature (**Temp. <sub>Inlet</sub>**)

Calculate the flow using the following formula:

$$\text{Flow} = \frac{\text{Tons of Refrigeration} \times 30}{(\text{Temp.}_{\text{Outlet}} - \text{Temp.}_{\text{Inlet}})}$$

Flow Required

- Note: If the outlet temperature is unknown, assume it to be 10F° (5.6C°) above the inlet temperature.
2. Determine refrigerant head pressure rise above the valve opening point (**P<sub>RISE</sub>**) using the following steps:
    - a. The **Valve Closing Pressure (P<sub>CLOSE</sub>)** is equal to the refrigerant pressure at the highest ambient temperature the refrigeration equipment experiences in the Off cycle. Use a Pressure-Temperature Chart for the refrigerant selected to find this pressure.
    - b. To approximate the **Valve Opening Pressure (P<sub>OPEN</sub>)**, add about 7 psi (0.5 bar) for EK and AL models or 10 psi (0.7 bar) for GL1 or GK1 models to the Valve Closing Pressure.

## V146 Series 2-Way Pressure-Actuated Water-Regulating Valves (Continued)

$$P_{OPEN} = P_{CLOSE} + 7 \text{ psi (0.5 bar)}$$

$$P_{OPEN} = P_{CLOSE} + 10 \text{ psi (0.7 bar)}$$

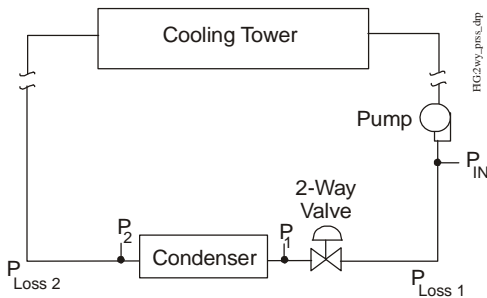
Valve Opening Pressure, EK and AL Models (Top) or GK1 and GL1 Models (Bottom)

- c. From the Pressure-Temperature Chart for the refrigerant selected, read the **Refrigerant Condensing Pressure ( $P_{COND}$ )** (operating head pressure) corresponding to the selected condensing temperature.
- d. Subtract the Valve Opening Pressure from the Refrigerant Condensing Pressure. This gives the head pressure rise.

$$P_{RISE} = P_{COND} - P_{OPEN}$$

**Figure 1: Refrigerant Head Pressure Rise**

3. Determine the available water pressure to the valve ( $P_{AVAIL}$ ) using the following steps. This is the actual water pressure available to force water through the valve.
  - a. Determine the minimum inlet pressure ( $P_{IN}$ ). This is the water pressure from city water mains, pumps, or other sources.
  - b. Pressure drop through condenser ( $\Delta P_{COND}$ ) is the difference in water pressure between the condenser inlet and the condenser outlet. Obtain this information from the condenser manufacturer.
  - c. Estimate or calculate the pressure drop through all associated piping ( $P_{LOSS}$ ).
  - d. Subtract the  $\Delta P_{COND}$  and  $P_{LOSS}$  from  $P_{IN}$ . The result is  $P_{AVAIL}$ .



$$\Delta P_{COND} = P_1 - P_2 \quad P_{LOSS} = P_{Loss 1} + P_{Loss 2} + \dots$$

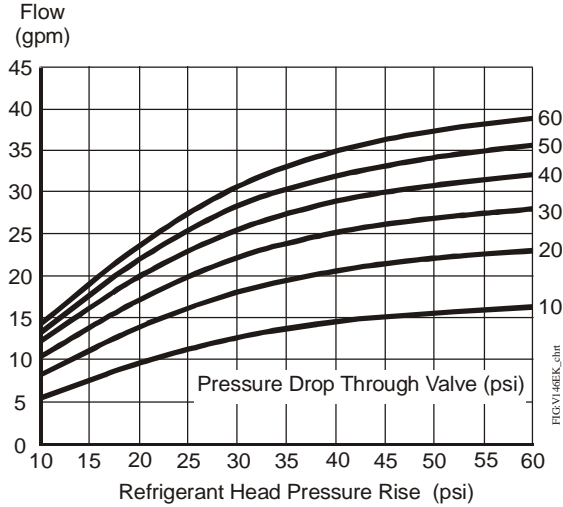
$$P_{AVAIL} = P_{IN} - (\Delta P_{COND} + P_{LOSS})$$

**Available Water Pressure**

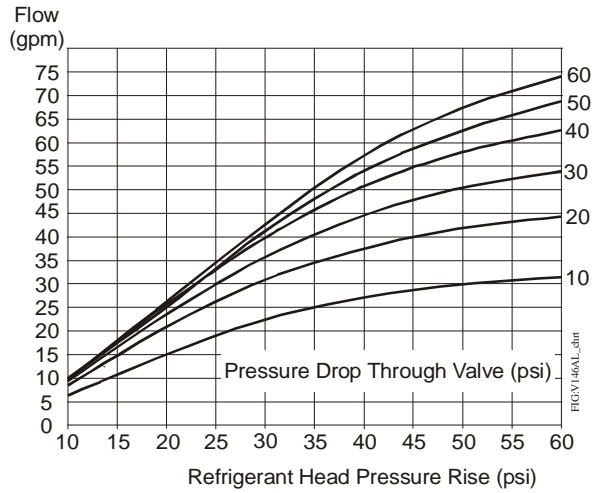
4. Select the proper valve size from the flowcharts by locating a point on a chart that satisfies the flow, the head pressure rise above opening point, and the pressure drop across the valve.
- Use these equations to convert between U.S. and S.I. units.

- $1 \text{ dm}^3/\text{s} = 3.6 \text{ m}^3/\text{h} = 15.9 \text{ U.S. gal. /min.} = 13.2 \text{ U.K. gal. /min.}$
- $1 \text{ bar} = 100 \text{ kPa} = 0.1 \text{ MPa} = 1.02 \text{ kg/cm}^2 = 0.987 \text{ atm} = 14.5 \text{ psi}$

The maximum recommended differential water pressure across a valve is 60 psi (4.1 bar).

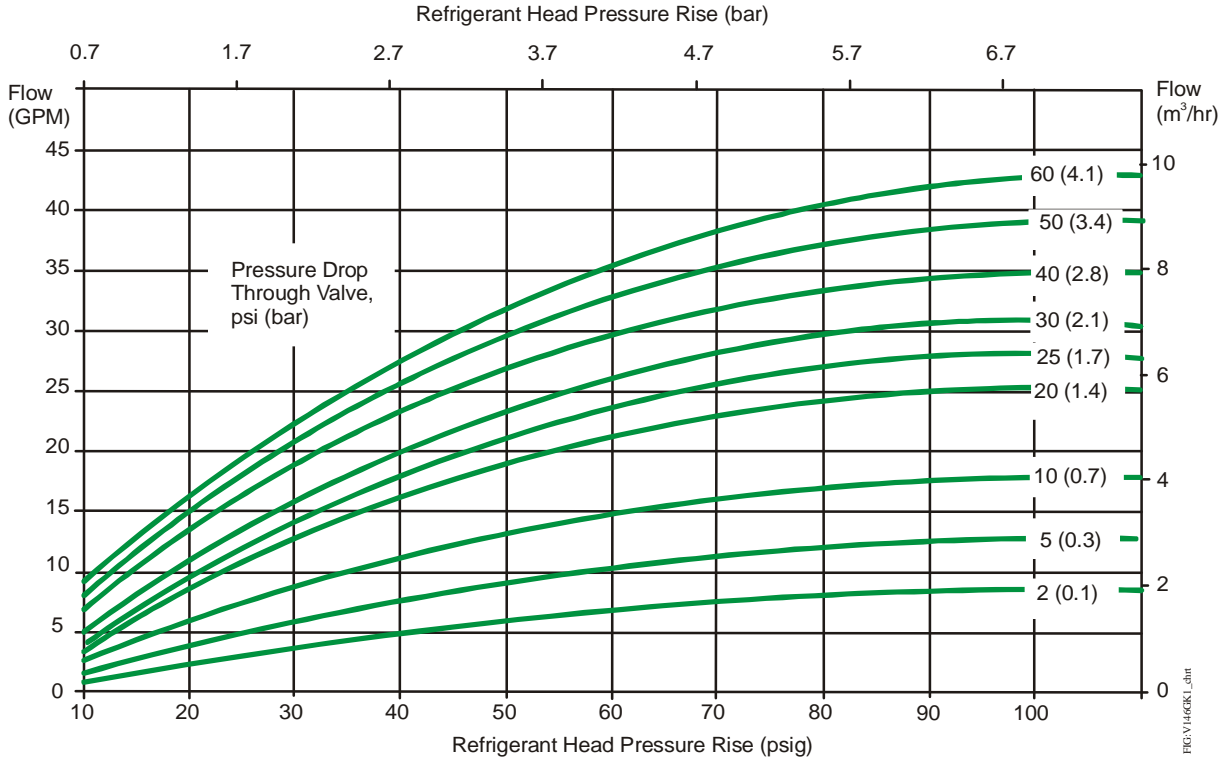


**3/4 in. V146EK Valve**

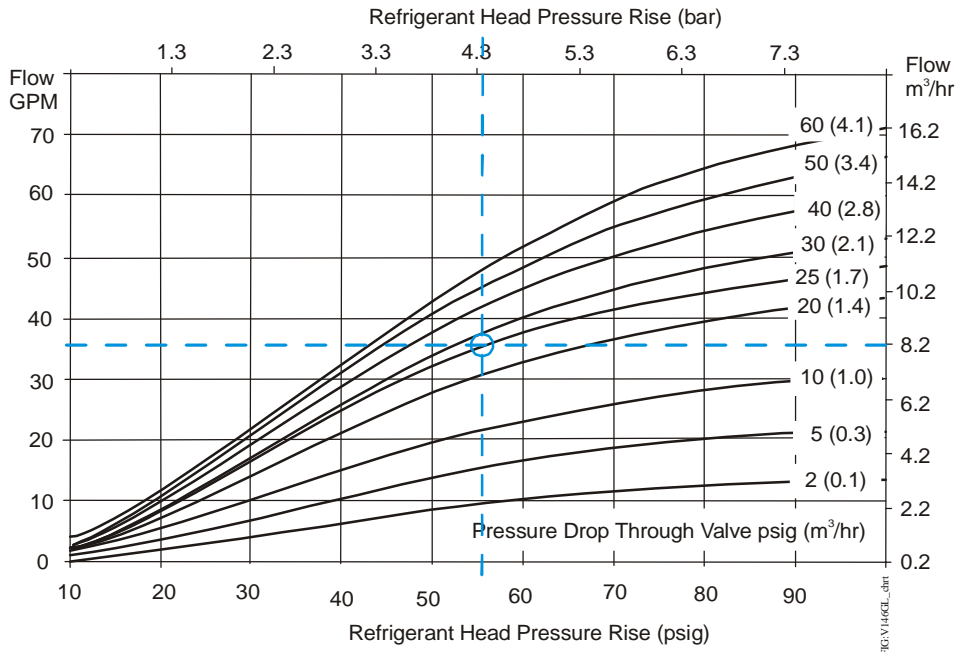


**1 in. V146AL Valve**

**V146 Series 2-Way Pressure-Actuated Water-Regulating Valves (Continued)**



**High Refrigerant Pressure 3/4 in. V146GK1 Valves**



**High Refrigerant Pressure 1 in. V146GL1 Valves**

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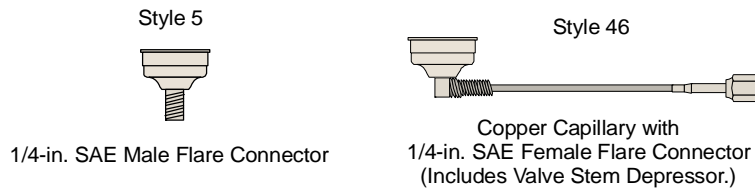


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### Pressure Connection Styles

#### Selection Chart

Product Code Number	Nominal Valve Size	Inlet and Outlet Ports	Pressure Connection Style	Shipping Weight
V146EK-1C	3/4 in.	Union (Sweat)	46	4.3 lb (2.0 kg)
V146GK1-001C	3/4 in.	Union (Sweat)	5	4.3 lb (2.0 kg)
V146AL-1C	1 in.	Union (Sweat)	46	9.3 lb (4.0 kg)
V146GL1-001C	1 in.	Union (Sweat)	5	9.3 lb (4.0 kg)

#### Repair Information

If the V146 Series 2-Way Pressure-Actuated Water-Regulating Valve fails to operate within its specifications, refer to the *V146 Series 2-Way Pressure-Actuated Water-Regulating Valves Product Bulletin (LIT-1201709)* for a list of repair parts available.

#### Technical Specifications

V146 Series 2-Way Pressure-Actuated Water-Regulating Valves	
Maximum Refrigerant Pressure	V146EK: 370 psi (25.5 bar) V146AL: 320 psi (22.1 bar)
Maximum Working Pressure	V146GK1, V146GL1: 630 psi (43.4 bar)
Opening Point Adjustment Range	V146EK, V146AL: 70 to 260 psi (4.8 to 17.9 bar) V146GK1, V146GL1: 200 to 400 psi (13.8 to 27.6 bar)
Factory-Set Opening Point	V146EK, V146AL: 165 psi (11.4 bar) V146GK1, V146GL1: 275 psi (19.0 bar)
Media	350 psi (24.1 bar) Maximum, -4°F to 170°F (-20°C to 77°C) glycol/water or liquids with low freezing points that are compatible with valve materials