

V148 Series

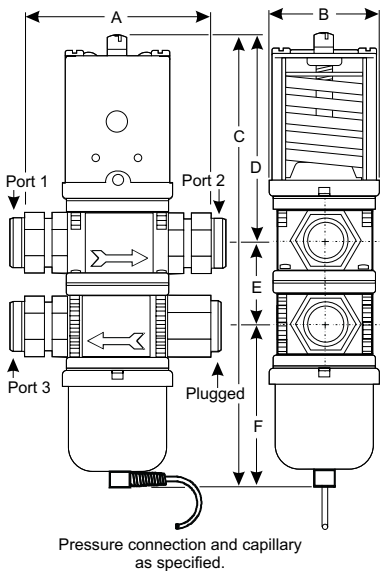
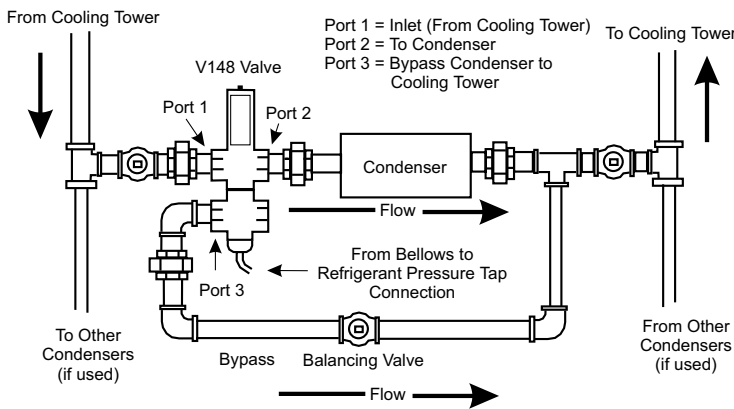
High Water Pressure 3-Way Pressure-Actuated Water-Regulating Valves



Description

V148 Series 3-Way Pressure-Actuated Water-Regulating Valves are designed to regulate water flow and control refrigerant head pressure in systems with single or multiple water-cooled condensers. The V148 valves are ideal for applications with system water pressures of up to 350 psi (2413 kPa), such as high-rise buildings.

V148 valves may be used with standard non-corrosive refrigerants. V148 valves have a monel (nickel-copper alloy) seat and disc holder.



Specifications

| V148 Series 3-Way Pressure-Actuated Water-Regulating Valves | |
|---|--|
| Nominal Valve Size | 1 in. |
| Maximum Refrigerant Pressure at Bellows | 320 psi (2206 kPa) |
| Opening Point | 145-190 psi |
| Adjustment Range | 1000-1310 kPa |
| Factory-Set Opening Point (Port 1 to Port 2) | 165 psi (1138 kPa) |
| Throttling Range | 70 psi (483 kPa) |
| Maximum Pressure | 350 psi (2413 kPa) |
| Minimum Temperature | 40°F (4°C) |
| Maximum Temperature | 170°F (77°C) |
| Material | Body 1 in. - Cast Iron with Corrosion-resistant Finish |
| | Disc Stud, Valve Stem Brass |
| | Disc Cup, Valve Seat Monel (Nickel-Copper Alloy) |
| | Valve Disc Buna-N |
| | Sensing Element Brass Bellows in Brass Cup |
| | Diaphragm Nylon-Reinforced Buna-N |

Features

- no close-fitting or sliding parts in water passages provides control in less-than-ideal water conditions
- high-pressure design allows use in systems with up to 350 psi (2413 kPa) water pressure
- pressure-balanced design resists changes to setpoint caused by gradual or sudden water pressure changes
- corrosion-resistant material for internal parts promotes long valve life
- accessible range spring allows easy manual flushing
- take-apart construction allows access to valve interior without removing valve from refrigeration system or pumping down

Applications

V148 valves regulate water flow to water-cooled condensers (and may be applied to hydronic systems) with water pressures up to 350 psi (2413 kPa). The V148 valves have an adjustable opening point in a refrigerant pressure range of 145-190 psi (1000-1310 kPa). V148 valves may be used with standard non-corrosive refrigerants. Internal valve parts that come into contact with water are constructed of monel (nickel-copper alloy) and brass to resist corrosion.

To Order

Specify the code number from the following selection chart. Also refer to *Finding the Valve Size Required* and *Valve Sizing Example* on the following page.

Selection Chart

| Code Number | Nominal Valve Size | Inlet and Outlet Ports | Pressure Connection Style |
|-------------|--------------------|------------------------|---------------------------|
| V148AL-1C | 1 in. | Union (Sweat) | 46 |

V148 Valve Dimensions, inches (millimeters), and Shipping Weight, pounds (kilograms)

| Valve Code Number | Nominal Valve Size | Callout | | | | | | Shipping Weight |
|-------------------|--------------------|-------------|------------|----------|---------------|--------|--------------|-----------------|
| | | A | B | C | D | E | F | |
| V148AL-1C | 1 in. | 4-3/4 (121) | 2-3/4 (71) | 12 (305) | 5-15/16 (151) | 2 (51) | 4-1/16 (103) | 12 (5.4) |

V148 Series High Water Pressure 3-Way Pressure-Actuated Water-Regulating Valves (Continued)

Finding the Valve Size Required

Each application is unique and will require specific engineering data to properly size and design a system to fulfill the appropriate requirements. Typically, a valve will be replaced with another valve of the same size in a properly-sized and engineered system. Contact Johnson Controls/Penn Refrigeration Application Engineering at (800) 275-5676 to obtain specific engineering data. 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 (see Flow Chart, 1 in. V148 Valve diagram) that satisfies these requirements:

Maximum Water Flow

Maximum water flow (Flow) required by the condenser should be taken from information provided by the manufacturer. If the manufacturer's information is unavailable, maximum water flow in gallons per minute (gpm) can be roughly approximated with the following information:

- System Capacity (**Tons of Refrigeration**)
- Outlet Water Temperature (**Temp. _{Outlet}**)
- Inlet Water Temperature (**Temp. _{Inlet}**)

If the outlet temperature is unknown, assume it to be 10°F (5.5°C) above the inlet temperature.

Refrigerant Head Pressure Rise

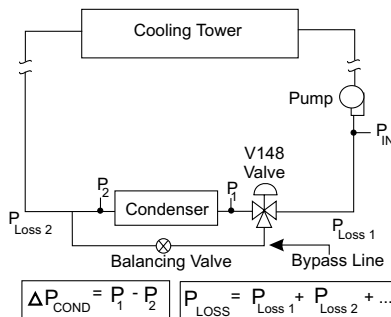
Refrigerant Head Pressure Rise Above Valve Opening Point (P_H) can be roughly approximated with the following information:

- **Refrigerant Condensing Pressure (P_{COND})** is the manufacturer's recommended condensing pressure.
- **Valve Closing Pressure (P_{VC})** is equal to the refrigerant pressure at the highest ambient temperature the refrigeration equipment will be subjected to in the Off cycle. Use a Pressure-Temperature Chart to find this pressure.

Maximum Available Water Pressure Drop

The maximum available water pressure drop through the valve is the water pressure actually available to force water through the valve.

- **Minimum Inlet Pressure** is the water pressure from city water mains, pumps or other sources.
- **Pressure Drop Through Condenser** is the difference in water pressure between the condenser inlet and the condenser outlet. Obtain this information from the condenser manufacturer.
- **Pressure Drop Through All Associated Piping** is an estimated or calculated value.



Maximum Available Water Pressure Drop

Equations

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

$$\text{Refrigerant Head Pressure Rise } P_H = P_{COND} - (P_{VC} + 7 \text{ psi})$$

$$\text{Maximum Available Water Pressure Drop } P_{AVAIL} = P_{IN} - \Delta P_{COND} - P_{LOSS}$$

Metric conversions

Use these equations to convert between U.S. and S.I. units.

$$1 \text{ dm}^3/\text{s} = 3.6 \text{ m}^3/\text{h} = 15.8 \text{ U.S. gal. /min.} = 13.2 \text{ U.K. gal. /min.}$$

$$1 \text{ bar} = 100 \text{ kPa} = 0.1 \text{ MPa} \approx 1.02 \text{ kp/cm}^2 = 1.02 \text{ atm at } \approx 14.5 \text{ psi}$$

Valve Sizing Example

Maximum Water Flow

- According to the manufacturer's information, the maximum required water flow for the system is 40 GPM.

Maximum water flow is 40 GPM.

Refrigerant Head Pressure Rise

- The system uses refrigerant R-22.
- Maximum ambient temperature during the Off cycle is estimated at 95°F, which gives a refrigerant pressure of 180 psi. (P_{VC} = 180)
- The manufacturer's recommended condensing temperature is 110°F, so the Condensing Pressure is 226 psi. (P_{COND} = 226)
- $P_H = P_{COND} - (P_{VC} + 7 \text{ psi}) = 226 - (180 + 7) = 39 \text{ psi}$

Refrigerant Head Pressure Rise is 39 psi.

Maximum Available Water Pressure Drop

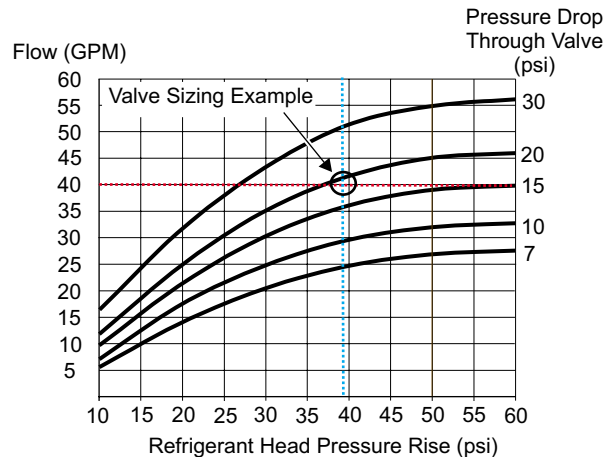
City water pressure (minimum inlet pressure) is 40 psi. (P_{IN} = 40 psi)

The manufacturer's table gives a pressure drop through the condenser and the accompanying piping and valves at 15 psi. (ΔP_{COND} = 15 psi) Water pressure drop through the installed piping is approximately 5 psi. (ΔP_{LOSS} = 5 psi)

$$P_{AVAIL} = P_{IN} - \Delta P_{COND} - \Delta P_{LOSS} = 40 - 15 - 5 = 20 \text{ psi}$$

Maximum Available Water Pressure Drop is 20 psi.

Using a flow of 40 GPM, a head pressure rise of 39 psi, and a pressure drop across the valve of 20 psi, the 1 in. valve meets these criteria. See the 1 in. V148 Valve flow chart.



Flow Chart, 1 in. V148 Valve

Note: The maximum differential water pressure across a valve is 60 psi (414 kPa).