

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

Installation Instructions

Part No. 24-7664-2055, Rev. E

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Applications

IMPORTANT: The V146 Series 2-Way Pressure-Actuated Water-Regulating Valves is intended to control coolant media flow under normal operating conditions. Where failure or malfunction of the V146 valve could lead to personal injury or property damage to the controlled equipment or other property, additional precautions must be designed into the control system. Incorporate and maintain other devices, such as supervisory or alarm systems or safety or limit controls, intended to warn of or protect against failure or malfunction of the V146 valve.

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.

Installation



CAUTION: Risk of Environmental Damage.

Provide proper containment for any potential release of refrigerant, solvent, or oil. Such hazardous materials can be harmful to the environment if they are released.

IMPORTANT: If the valve is installed on equipment that contains hazardous or regulated materials such as certain refrigerants or lubricants, you must comply with all standards and regulations governing the containment and handling of those materials.

IMPORTANT: After installing the valve, evacuate pressure connection lines to remove air, moisture, and other contaminants in a manner consistent with applicable environmental regulations and standards.

IMPORTANT: Apply a non-hardening, pliable sealant (Loctite 567 or equivalent) to the face of the copper tailpiece to compensate for slight piping misalignments and surface imperfections on union ends.

IMPORTANT: Take care to prevent foreign materials such as weld slag, thread burrs, metal chips, and scale from entering the piping system. This debris can damage or severely impede the operation of the valve by embedding itself in the seats, scoring the valve, and ultimately resulting in seat leakage. If the debris becomes embedded in the seats, subsequent flushing and filtering of the piping system with the valve installed does not remedy the problem.

Install the valve vertically with the range adjustment screw on the top, and the sensing element and pressure connection line on the bottom, to allow oil and refrigerant to drain away from the valve sensing element.

Mount the valve so that the sensing element is above the refrigerant tap point, if possible. If it is not possible to mount the bellows of the valve above the tap point, loop the capillary above the tap point and below the bellows and then connect to the valve. Tap off of the topside of the high side line. This minimizes the effect of refrigerant oil in the capillary on valve reaction time.

Do not mount the valve in any position other than vertical unless specified by the manufacturer of the equipment on which the valve is installed. Follow the manufacturer's installation instructions.

The direction of water flow is indicated by an arrow on the valve body. See Figure 1 and Figure 2.

Setup and Adjustments

If the system is located in an area with high ambient temperatures, refrigerant head pressures may remain high enough during Off cycles to prevent the valve from completely closing. In such instances, raise the opening point pressure of the valve just enough to cause the valve to stop flow to the condenser during compressor standby periods.

Manually Flushing the Valve

Manually flush the fluid piping after installation to remove filings, chips, or other foreign material. Manual flushing does not affect valve adjustment.

To flush the valve, insert screwdrivers under both sides of the valve spring guide and lift upward. See Figure 1 and Figure 2.

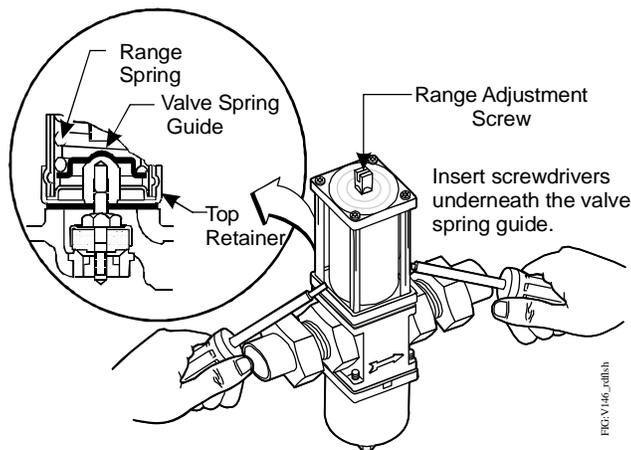


Figure 1: Manual Flushing for 3/4 in. Valves

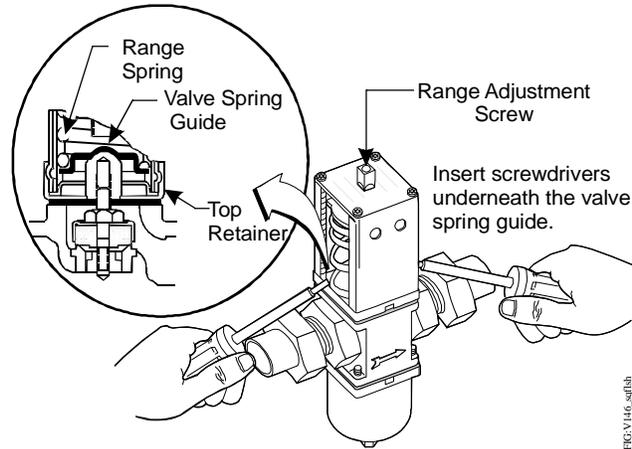


Figure 2: Manual Flushing for 1 in. Valves

Pressure Connections



WARNING: Risk of Personal Injury.

Shut off the liquid supply and relieve pressure in the line before servicing the valve. Contents of liquid lines could be under pressure and the release of liquid under pressure may cause severe personal injury.

Connect the refrigerant-side flare connector to the appropriate high-side pressure tap point. If additional capillary tubing is necessary, use 1/4 in. copper tubing.

Follow the guidelines below when making pressure connections:

- Purge all tubing and lines before making pressure connections.
- Use pressure tap points located on the top side of the refrigerant lines. This reduces the possibility of oil, liquids, or sediment accumulating in the pressure connection line or valve bellows, which could cause valve malfunction.
- Avoid sharp bends in the capillary tubes. Sharp bends can weaken or kink capillary tubes, which may result in refrigerant leaks or restrictions.
- Allow for slack in the capillary tubes to dampen vibration. Mechanical vibration can weaken or damage the capillary tubes.
- Avoid contact between the capillary tubing and sharp or abrasive objects. Vibration or rubbing of sharp or abrasive objects in contact with capillary tubes can cause leaks.

- Coil and secure excess capillary tubing away from contact with sharp or abrasive objects or surfaces. Carefully loop any excess capillary tube into smooth, circular coils (minimum 2 in. [5 cm] diameter). Securely fasten the coiled capillary tube.
- Do not overtighten flare nuts on pressure connection line fittings. Overtightening flare connections may damage the threads and result in refrigerant leaks. Do not exceed 10 ft·lb (14 N·m) of torque when tightening flare connections.
- Avoid severe pressure pulsation at pressure tap points. Install pressure connection lines to pressure tap points away from the compressor discharge to minimize the effects of pressure pulsation from reciprocating compressors..

Table 1: Refrigerant Pressure Specifications

Product Code Number	Nominal Valve Size	Opening Point Adjustment Range	Factory-Set Opening Point
V146EK-1C	3/4 in.	70 to 260 psi (4.8 to 17.9 bar)	165 psi (11.4) bar
V146GK1-001C	3/4 in.	200 to 400 psi (13.8 to 27.6 bar)	275 psi (19 bar)
V146AL-1C	1 in.	70 to 260 psi (4.8 to 17.9 bar)	165 psi (11.4) bar
V146GL1-001C	1 in.	200 to 400 psi (13.8 to 27.6 bar)	275 psi (19 bar)

Adjustments

The V146 valves are factory adjusted for the settings shown in Table 1.

The **opening point pressure** (also called the crack-open point) is the refrigerant pressure (at the valve's sensing element) necessary to just lift the valve disc off the valve seat and allow water to flow through the valve body. Turning the range adjustment screw changes the opening point pressure.

Use a standard service valve wrench or screwdriver to adjust the opening point pressure.

- Turn the range adjustment screw **counterclockwise to raise the opening point pressure.**
- Turn the range adjustment screw **clockwise to lower the opening point pressure.**

Use a refrigerant pressure gauge to adjust the opening point pressure. Operate the system at normal load conditions and adjust the valve's opening point to the desired pressure. See Table 1 for refrigerant pressure specifications

System Check

Before leaving the installation, observe the system through at least one complete operating cycle to ensure that the valve is operating correctly.

Torque Specifications

To prevent water leakage, ensure that the spring housing screws and sensing element screws are tightened to the torque specifications in Table 2.

Table 2: Maximum Torque Specifications

Valve Size	Spring Housing Screws	Sensing Element Screws	1/4 in. Flare Pressure Connection
3/4 in.	35 lbf·in (3.7 N·m)	35 lbf·in (3.7 N·m)	10 ft·lb (14 N·m)
1 in.	55 lbf·in (5.9 N·m)	72 lbf·in (7.8 N·m)	10 ft·lb (14 N·m)

Repair Information

Repairs can be made. Replacement sensing elements, internal parts and diaphragms are available. For replacement parts kit product code numbers, see Table 3. To obtain replacement parts contact your local Johnson Controls/PENN Distributor.

For replacement parts kits instructions and details, refer to the following bulletins:

- *V146 Series Valves Replacement Kits Installation Instructions (Part No. 24-7664-2071)*
- *V146 and V148 Series Valves Sensing Element Replacement Kits Installation Instructions (Part No. 24-7664-2101)*

IMPORTANT: When servicing these valves, use only the replacement kits listed in Table 3. Use of an improper replacement kit may lead to premature failure and setpoint shift.

Table 3: Replacement Kits

Valve Product Code Number	Nominal Valve Size	Seat Replacement Kit Product Code Number	Diaphragm Replacement Kit Product Code Number	Sensing Element Replacement Kit Product Code Number
V146EK-1C	3/4 in.	STT16A-622R	DPM16A-622R	SEP38A-600R
V146GK1-001C	3/4 in.			SEP38A-601R
V146AL-1C	1 in.	STT17A-622R	DPM17A-622R	SEP38A-602R
V146GL1-001C	1 in.			SEP38A-603R

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

The performance specifications are nominal and conform to acceptable industry standards. For application at conditions beyond these specifications, consult Johnson Controls/PENN Refrigeration Application Engineering at 1-800-275-5676. Johnson Controls, Inc. shall not be liable for damages resulting from misapplication or misuse of its products.



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507 E. Michigan Street, Milwaukee, WI 53202

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