

PM Series Pulse-Width Modulating (PWM) Valves

Copeland's PM Series valves are direct acting 2-way, normally closed solenoids. They have a gate valve construction with a precision orifice for metering refrigerant to an evaporator.

SPECIFICATIONS

Maximum Fluid Temperature (TS)	225°F (107°C)
Maximum Working Pressure (PS)	680 psig (47 bar)
Max Operating Pressure Differential	500 psig (35 bar)
UL/CUL File Number	MP604

SAFETY INSTRUCTIONS

1. Read all instructions thoroughly. Failure to comply can result in valve failure, system damage, or personal injury.
2. Approved for use with A1 class refrigerants, including R-744.
3. Do not use a PM Series valve as a safety shut-off valve.
4. **Warning:** If a hand valve is installed ahead of a PM Series valve, it should be closed only to service the system. The hand valve should be opened as soon as the service is complete. If both the PM Series valve and hand valve are closed, trapping liquid between the two can cause dangerous hydrostatic pressure, resulting in personal injury.
5. **Warning:** Do not attempt to install valve before pumping the system down to atmospheric pressure. The use of approved refrigerant recovery equipment may be required. Make absolutely certain that the pressure in the lines is at atmospheric pressure before removing any valve parts.
6. Do not use PM Series valve on any system where the system pressure can exceed the maximum working pressure (MWP) of the valve.
7. The coil should be fused in accordance with local codes. Electrically ground the valve body.
8. Do not use with ammonia or on hazardous or corrosive fluids.
9. **DISCONNECT ELECTRICAL POWER SOURCE, SHUT-OFF, FLUID POWER SOURCE, AND DEPRESSURIZE THE VALVE.**
7. Proper valve sizing is important.
8. PM Series valves are intended for liquid line usage and should not be cycled unless the system has been charged with refrigerant. Failure to do so can affect warranty consideration.
9. Before energizing valve, be sure that the source voltage and frequency match what is shown on the coil label. Do not energize coil unless coil is attached to valve.
10. Do not dent, bend or use the enclosing tube as a lever. A damaged enclosing tube may result in coil burnout or inoperative valve. Do not carry a coil assembly or a complete valve by the coil leads. This could damage the coil and cause coil burn-out.
11. There are no adjustments to be made on this valve either externally or internally.
12. Copeland recommends that a liquid line filter-drier, such as the EK Series or ALF Series, be installed as close to the valve inlet as possible to prevent debris from entering the valve.

INSTALLATION INSTRUCTIONS

1. Read installation and safety instructions thoroughly. Retain for future reference.
2. Failure to follow brazing instructions may result in body warping or external leakage of refrigerant.
3. **Warning:** Do not disassemble PM Series valves to braze into system. Use either chill block or wet rag to prevent damage from overheating. This valve is not field repairable and there are no internal replacement parts available.
NOTE: Disassembly in the field to install or service can affect warranty consideration.
4. Valves may be mounted horizontal, on side or in a vertical line. Upside-down position is not approved.
5. Allow adequate clearance above valve for removal of coil.
6. Direction of flow must match arrow on body.

SOLDER CONNECTIONS

1. Arrow on valve body must point in direction of flow.
2. The tip of the torch should be large enough to avoid prolonged heating of the connections.
3. **DIRECT THE FLAME AWAY FROM THE VALVE BODY.**
4. The use of soft solder is not recommended.
5. Use an alloy whose flow point is above 800°F.

R744 SYSTEMS

PM Series valve can be used in R744 (carbon dioxide) systems where the design pressure of the valve is greater than the design pressure of the pressure relief valve.

This product does not have a pressure relief or pressure regulating relief valve, so a sufficient number of either pressure relief valves or pressure regulating relief valves with adequate capacity should be field-installed on the refrigeration system. Do not put a stop valve between the pressure relief valve and the refrigeration system. Refer to the installation instructions provided by the end use equipment manufacturer.

When the refrigeration system is de-energized (shutdown for service or other reasons), venting of R744 through the pressure regulating relief valves on the refrigeration system can occur. In such cases, the system may need to be recharged with R744; therefore, the pressure regulating relief valve(s) are not to be disabled or capped. The relief setting shall not be altered.

COIL INSTALLATION

Before removing coil from valve, disconnect electrical power source. Failure to do so will cause coil to burnout.

1. Place coil over the enclosing tube. Coil may be rotated 360° for ease of wiring. It is recommended that coil lead connections be soldered on 24 vac applications.
2. Install valve name tag. Peel paper backing off valve name tag to expose adhesive. Stick nametag on side of coil housing and press down firmly (do not cover other labels).
3. Press coil housing down firmly to secure coil retainer around enclosing tube.
4. Refer to label on coil housing for dual voltage wiring diagram.
5. Use on DC voltage is not approved.

Coil Styles	Voltages
AMG – Junction Box	
AMC – Conduit Connection ½"	24 vac (50/60 Hz)
AMF – Open Frame	120 vac (50/60 Hz)
AMS – Spade Connection ¼"	208-240 vac (50/60 Hz)
ASC2, ASC2L – DIN	

SIZING APPLICATION

One way to check to see if a PM Series valve is not sized correctly is by listening to the length of the duty cycle of the valve. At the temperature set point, the valve should have a duty cycle of approximately 60% to 70%. If the valve never cycles, it is an indication that the valve is undersized. If the duty cycle is too short, the valve opens and closes very quickly, and the valve may be oversized.

DUTY CYCLE

When sizing PM Series valves, the term “duty cycle” is commonly used. Duty cycle is the percent of time that the valve is “on” (open) as compared to the total amount of time that the valve is allowed

to be on, often called the “period”. The period is usually preset in the controller and the duty cycle of the valve is based on the case temperature as determined by the controller.

The duty cycle of a valve will vary as the space temperature approaches the set point. The closer the space temperature gets to the set point the shorter the time that the valve will be turned on (open), the shorter the duty cycle. The reverse of this is also true, as the space temperature gets farther away from the set point, the longer the duty cycle.

An example would be if a case controller on a meat case checks the temperature of the case every 10 seconds. This would mean that the period is 10 seconds. After checking the case temperature, the controller decides that the valve needs to be on (open) 5 of the 10 seconds, this means for this period the valve will have a 50% duty cycle. If during the next period the temperature is closer to set point, the controller may decide that the valve only needs to be on for 4 seconds, meaning the valve has a duty cycle of 40%.

CONTROLLER

Copeland XM679, CC200, XEV12D, or other suitable controller recommended by Copeland applications engineering department.

MODEL NUMBER NOMENCLATURE

Example: PM 1S34VLC

VALVE SERIES	VALVE SIZE	CONNECTION TYPE	INLET SIZE	OUTLET SIZE	COIL
PM	1	5	3	4	VLC
Normally Closed PWM Valves	1/4, 1/2, 1, 3, 5, 6	S = ODF	In 1/8" 3 = 3/8"	In 1/8" 4 = 1/2"	VLC = Valve Less Coil

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