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Quick Response Expansion Valve and Precision Superheat Controller Catalog Page

Description

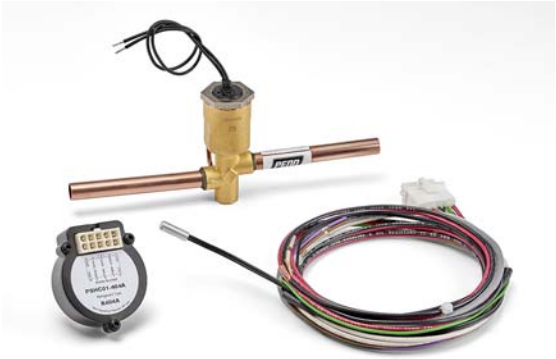
The Quick Response Expansion Valve (QREV) with the Precision Superheat Controller (PSHC) is a compact, electronic, closed loop, rapid response superheat control solution for refrigeration and HVAC applications.

The QREV is next generation electronic expansion valve (EEV) technology, providing maximum evaporator efficiency by quickly reaching the preferred superheat. The QREV includes a silicon-based microelectromechanical system (MEMS) pilot valve that responds to a signal from the PSHC and pilots a smooth gliding spool valve that regulates refrigerant flow through the QREV, virtually eliminating valve wear and greatly extending valve life.

The PSHC is an electronic superheat controller that provides precise control to the QREV through varying load conditions. The PSHC uses an internal pressure sensor and an external temperature sensor to control the QREV flow and maintain the preferred superheat at the evaporator outlet.

Refer to the *Quick Response Expansion Valve and Precision Superheat Controller Product Bulletin (LIT-12012398)* for important product application information.

Quick Response Expansion Valve, Precision Superheat Controller, and Wiring Harness



Features and Benefits

- **Quick Response Valve**—Provides rapid precision control of evaporator outlet superheat.
- **Silicon-Based MEMS Technology and Smooth-action Spool Valve**—Reduces valve wear and extends valve life.
- **Closed Loop Solution**—Simplifies installation and commissioning without the need for a front-end or supervisory controller.
- **Modbus® RTU Compliant Subordinate Device**—Provides remote monitoring and adjustment on modbus networks.
- **Compact Solution**—Allows use in limited-space applications.

Applications

The QREV, along with the PSHC, is designed to replace electronic expansion valves (EEVs) and standard thermostatic expansion valves (TEV/TXVs) in commercial refrigeration and HVAC applications.

Note: A QREV/PSHC application requires an expansion valve (QREV model), a controller (PSHC model), and wiring harness. You order these three components separately.

Repair Information

If a QREV or PSHC fails to operate within its specifications, replace the unit. For a replacement QREV or PSHC, contact the nearest Johnson Controls® representative.

Model Numbers

The following table explains the naming convention for the QREV model numbers, using the example code QREV01-24SC-C:

Table 1: QREV Product Code Matrix

	Code Letter/Number and Description	QREV	01	-	24	SC	-	C
Family Prefix								
Sequence Code*	01-05							
	09-15							
Valve Voltage	12 = 12 VDC**							
	24 = 24 VDC/VAC							
Valve Body Type	SC = Straight Body Connection							
Packaging	C = Individual							

*See the QREV Product Code Numbers and Nominal Capacities tables to determine the required QREV capacity.
**Contact your Johnson Controls sales representative about 12 VDC availability.

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The following table explains the naming convention for the PSHC model numbers, using the example code PSHC01-134A-C:

Table 2: PSHC Product Code Matrix

	Code Letter/Number and Description	PSHC	01	-	134A	-	C
Controller Series							
Firmware Version	01						
Refrigerant Type	134A = R134A						
	0022 = R22						
	404A = R404A						
	407A = R407A						
	407C = R407C						
	407F = R407F						
	410A = R410A						
	417A = R417A						
	422A = R422A						
	422D = R422D						
	427A = R427A						
	438A = R438A						
	448A = R448A						
	449A = R449A						
	405A = R405A						
	0507 = R507						
	513A = R513A						
Packaging	C = Individual						

QREV Product Code Numbers and Nominal Capacities

IMPORTANT: These nominal QREV capacities are determined at AHRI-ANSI standard expansion valve lab test conditions. The actual capacity required by your refrigeration system may vary significantly depending on local ambient conditions and the load encountered during system operation. The best practice is to select the valve size (tonnage) that meets the highest loads requirements of your system.

Refrigerant	Sequence Codes and Nominal Capacities kW (ton): QREV01 to QREV05				
	QREVxx				
	01	02	03	04	05
R134A	1.76 (1/2)	5.28 (1-1/2)	7.03 (2)	8.79 (2-1/2)	10.55 (3)
R22	2.64 (3/4)	6.15 (1-3/4)	8.79 (2-1/2)	10.55 (3)	14.07 (4)
R404A	1.76 (1/2)	3.52 (1)	6.15 (1-3/4)	7.03 (2)	10.55 (3)
R407A	2.64 (3/4)	6.15 (1-3/4)	8.79 (2-1/2)	10.55 (3)	14.95 (4-1/4)
R407C	2.64 (3/4)	7.03 (2)	8.79 (2-1/2)	11.43 (3-1/4)	15.83 (4-1/2)
R407F	2.64 (3/4)	7.03 (2)	9.67 (2-3/4)	12.31 (3-1/2)	16.71 (4-3/4)
R410A	2.64 (3/4)	7.03 (2)	10.55 (3)	13.19 (3-3/4)	17.58 (5)
R417A	1.76 (1/2)	4.4 (1-1/4)	6.15 (1-3/4)	7.91 (2-1/4)	10.55 (3)
R422A	1.76 (1/2)	4.4 (1-1/4)	5.28 (1-1/2)	6.15 (1-3/4)	8.79 (2-1/2)
R422D	1.76 (1/2)	4.4 (1-1/4)	6.15 (1-3/4)	7.03 (2)	10.55 (3)
R427A	2.64 (3/4)	6.15 (1-3/4)	7.91 (2-1/4)	10.55 (3)	14.07 (4)
R438A	1.76 (1/2)	5.28 (1-1/2)	7.03 (2)	8.79 (2-1/2)	12.31 (3-1/2)
R448A	2.64 (3/4)	6.15 (1-3/4)	8.79 (2-1/2)	10.55 (3)	14.95 (4-1/4)
R449A	2.64 (3/4)	6.15 (1-3/4)	8.79 (2-1/2)	10.55 (3)	14.07 (4)
R450A	1.76 (1/2)	4.4 (1-1/4)	6.15 (1-3/4)	7.03 (2)	9.67 (2-3/4)

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Refrigerant	Sequence Codes and Nominal Capacities kW (ton): QREV01 to QREV05				
	QREVxx				
	01	02	03	04	05
R507	1.76 (1/2)	4.4 (1-1/4)	6.15 (1-3/4)	7.03 (2)	9.67 (2-3/4)
R513A	1.76 (1/2)	4.4 (1-1/4)	5.28 (1-1/2)	7.03 (2)	9.67 (2-3/4)

Refrigerant	QREV Valve Selection Guide and Nominal Capacities kW (ton): QREV09 to QREV15						
	QREVxx						
	09	10	11	12	13	14	15
R134A	24.61 (7)	31.65 (9)	35.16 (10)	39.68 (11)	45.72 (13)	49.24 (14)	52.75 (15)
R22	31.65 (9)	39.68 (11)	45.72 (13)	52.75 (15)	56.27 (16)	63.30 (18)	70.34 (20)
R404A	21.10 (6)	28.13 (8)	31.65 (9)	35.16 (10)	42.20 (12)	45.72 (13)	49.24 (14)
R407A	31.65 (9)	39.68 (11)	45.72 (13)	49.24 (14)	56.27 (16)	63.30 (18)	70.34 (20)
R407C	35.16 (10)	42.20 (12)	49.24 (14)	52.75 (15)	59.79 (17)	66.82 (19)	77.37 (22)
R407F	35.16 (10)	42.20 (12)	49.24 (14)	56.27 (16)	63.30 (18)	73.85 (21)	80.89 (23)
R410A	35.16 (10)	45.72 (13)	52.75 (15)	59.79 (17)	70.34 (20)	77.37 (22)	87.92 (25)
R417A	24.61 (7)	28.13 (8)	31.65 (9)	39.68 (11)	42.20 (12)	45.72 (13)	52.75 (15)
R422A	17.58 (5)	24.61 (7)	28.13 (8)	31.65 (9)	35.16 (10)	39.68 (11)	45.72 (13)
R422D	21.10 (6)	28.13 (8)	31.65 (9)	35.16 (10)	39.68 (11)	45.72 (13)	49.24 (14)
R427A	31.65 (9)	39.68 (11)	42.20 (12)	49.24 (14)	56.27 (16)	63.30 (18)	66.82 (19)
R438A	31.65 (9)	31.65 (9)	39.68 (11)	42.20 (12)	49.24 (14)	52.75 (15)	59.79 (17)
R448A	31.65 (9)	39.68 (11)	45.72 (13)	52.75 (15)	56.27 (16)	63.30 (18)	70.34 (20)
R449A	31.65 (9)	39.68 (11)	45.72 (13)	49.24 (14)	56.27 (16)	63.30 (18)	70.34 (20)
R450A	21.10 (6)	24.61 (7)	31.65 (9)	35.16 (10)	39.68 (11)	42.20 (12)	49.24 (14)
R507	21.10 (6)	24.61 (7)	31.65 (9)	35.16 (10)	39.68 (11)	42.20 (12)	49.24 (14)
R513A	21.10 (6)	24.61 (7)	28.13 (8)	31.65 (9)	39.68 (11)	42.20 (12)	45.72 (13)

Precision Superheat Controller Product Code Numbers and Refrigerant Types

Product Code Number	Refrigerant
PSHC01-134A-C	R134A
PSHC01-0022-C	R22
PSHC01-404A-C	R404A
PSHC01-407A-C	R407A
PSHC01-407C-C	R407C
PSHC01-407F-C	R407F
PSHC01-410A-C	R410A
PSHC01-417A-C	R417A
PSHC01-422A-C	R422A

Product Code Number	Refrigerant
PSHC01-422D-C	R422D
PSHC01-427A-C	R427A
PSHC01-438A-C	R438A
PSHC01-448A-C	R448A
PSHC01-449A-C	R449A
PSHC01-450A-C	R450A
PSHC01-0507-C	R507
PSHC01-513A-C	R513A

Wiring Harness

Product Code Number
WHA-PSHC-150-1C

Technical Specifications

Quick Response Expansion Valve (Part 1 of 2)

Power Supply	**AC/DC:** 24 V ±15% (for 24 V QREVs)
Electrical Connection	Two 0.81 mm^2 (20 AWG), UL 1332, copper wires, with black FEP insulation
Power Consumption	Max power 10±1 W, Nominal 5±1 W $\|t_{operating} \geq 0.5$ S
Working Principle	Specialized pulse signal

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Quick Response Expansion Valve (Part 2 of 2)

Time to Fully Open	250 ms
Media Temperature	-40°C to 70°C (-40°F to 158°F)
Operating and Storage Temperature	-40°C to 70°C (-40°F to 158°F)
Environmental Humidity	< 95% RH
Minimum Valve Opening Pressure (VOP)	1 bar (100 kPa) (14.5 psi)
Maximum Working Pressure	34 bar (500 psi)
Maximum Overpressure	48 bar (700 psi)
Burst Pressure	**QREV 01-05**: 241.3 bar (3,500 psi) **QREV 09-15**: 224.5 bar (3,300 psi)
Refrigerant Compatibility	R134A, R22, R404A, R407A, R407C, R407F, R410A, R417A, R422A, R422D, R427A, R438A, R448A, R449A, R450A, R507, and R513A
Refrigerant Oil Compatibility	Polyolester (POE); Alkylbenzene (AB); Polyalkylene Glycol (PAG); Mineral Oil (MO)
Brazed Connector Fittings—Diameter and Material	**QREV 01-05**: 9.5mm (3/8 in.) O.D. Copper Tube **QREV 09-15**: 15.8 mm (5/8 in.) O.D. Copper Tube
Brazed Connector Fittings—Length	**QREV 01-05**: 6.9cm (3 in.) each **QREV 09-15**: 10.4 cm (4.1 in.) each
Enclosure	IP67 when using dielectric grease on the wire harness connector
Moisture/Corrosion	100 hour salt spray test ASTM B117
Fluid Cleanliness Requirement	ISO 11171 18/16/13
Warranty	3 years
Compliance	**North America:** **United States:** cULus Listed, YIOZ.MH3536 **Canada:** cULus Listed, YIOZ7.MH3536

Precision Superheat Controller (Part 1 of 2)

Dimensions L x W x H (±1 mm)	48 x 42.9 x 36.2 mm (1.89 x 1.69 x 1.425 in.)
Weight	75 g (2.65 oz.)
Pressure Connection	1/4 in. SAE 45° flare with Schrader® valve depressor, internal thread (16.26 N·m [12 ft·lb])
Enclosure IP Rating	IP 54 when the wire harness is not connected
	IP 65 with the wire harness connected
	IP 67 with the wire harness connected and dielectric grease applied to the connector
Frequency	50 or 60 Hz at 24 VAC +/- 1Hz
Voltage	24 AC/DC ±15%
Power	% Duty cycle at 24 VDC P < 500 mW. This does not include valve power.
Current	Operating: 1.5 A minimum
	Peak $\lvert_{t = 10\ S}$: 2.5 A minimum
External Temperature Sensor Accuracy	±1.2°C for -40°C to +70°C (± 2.2°F for -40°F to 158°F)
Response Time	250 ms
Communication Standard	Non-isolated RS-485 half-duplex
Temperature (Storage and Operating)	-40°C to 70°C (-40°F to +158°F)
Suitable Environmental Humidity	< 95% RH
Superheat Factory Set Point	5.5°C (10°F)
Power Consumption	≤ 12 W at 95% duty cycle at 24 VDC
Operating Differential Pressure Across Valve	1.4 to 16.5 bar (20 to 239 psi)
Pressure Accuracy	± 0.1 bar for 1.4 bar < P ≤ 13.8 bar, -20°C to 40°C (± 1.5 psi for 20 psia < P ≤ 200 psia, -4°F to 104°F) +/- 0.17 bar for 13.79 bar < P <= 16.33 bar, (same temperature as current -20°C to 40°C) +/- 2.5 psia for 200 psi < P <= 240 psia, (same temperature -4°F to 104°F)
Proof Pressure	41.1 bar (600 psi)

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Precision Superheat Controller (Part 2 of 2)

Burst Pressure	103.4 bar (1500 psi)
Refrigerant Compatibility	R134A, R22, R404A, R407A, R407C, R407F, R410A, R417A, R422A, R422D, R427A, R438A, R448A, R449A, R450A, R507, and R513A
Refrigerant Oil Compatibility	Polyolester (POE); Polyalkylene Glycol (PAG); Mineral Oil (MO), Alkylbenzene Oil (AB)
Communication	An external isolated RS-485 adapter is required when communicating with the PSHC.
Compliance	**North America:** **United States:** cULus Listed; File XACN.E27734 FCC Compliant to Emissions, Part 15 Class B **Canada:** cULus Listed, ; UL File XACN7.E27734 Industry Canada Compliant to ICES-103
CE	**Europe:** CE Mark – Johnson Controls declares that this product is in compliance with the essential requirements and other relevant provisions of the RoHS, LVD, and EMC Directives.