Quick Response Expansion Valve (QREV) and Precision Superheat Controller (PSHC) Catalog Page

Description

The Quick Response Expansion Valve (QREV) and the Precision Superheat Controller (PSHC) together are 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, and provides 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 extending valve life. You can order QREVs in several capacity ranges.

The PSHC is an electronic superheat controller that provides precise control to the QREV through varying load conditions. You install the PSHC on a pressure port at the evaporator outlet. 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. The PSHCs are currently set up to control one of 18 approved refrigerants for easy commissioning.

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

Figure 1: QREV, PSHC, 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® Remote Terminal Unit (RTU) compliant subordinate device

Provides remote monitoring and adjustment on modbus networks.

Compact solution

Use in limited-space applications.

Applications

The QREV and the PSHC replace electronic expansion valves (EEVs) and standard thermostatic expansion valves (TEV/TXVs) in commercial refrigeration and HVAC applications.

Note: A QREV and PSHC application requires a QREV model expansion valve, a PSHC model controller, and a wiring harness. 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

Feature	Code letter or number and description	Product code example: QREV01-24SC-C
Family code	QREV	QREV
Sequence Code	01–08	01
	09–15	
Valve voltage	12 = 12 VDC	24
	24 = 24 VDC/VAC	
Valve body type	S = Straight body connection	SC
Engineering version	C = Alpha character	
Packaging	C = Individual	C

Note: See QREV product code numbers and nominal capacities to determine the QREV capacity that you require.

Contact your Johnson Controls account representative about availability of 12 VDC QREV models.

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

Feature	Code letter or number and description	Product code example: PSHC01-134A-C
Controller series	PSHC	PSHC
Firmware version	01	01
Refrigerant type	134A = R-134A	134A
	0022 = R-22	
	404A = R-404A	
	407A = R-407A	
	407C = R-407C	
	407F = R-407F	
	410A = R-410A	
	417A = R-417A	
	422A = R-422A	
	422D = R-422D	
	427A = R-427A	
	438A = R-438A	
	448A = R-448A	
	449A = R-449A	
	405A = R-405A	
	452A = R-452A	
	0507 = R-507	
	513A = R-513A	
Packaging	C = Individual	C

QREV product code numbers and nominal capacities

➤ **Important:** The 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.

Table 3: QREV valve selection guide and nominal capacities: QREV 01-08

	Sequence codes and nominal capacities kW (ton)							
	QREVxx							
Refrigerant	01	02	03	04	05	06	07	08
R134A	1.76 (1/2)	5.28 (1 1/2)	7.03 (2)	8.79 (2 1/2)	10.55 (3)	13.19 (3 3/4)	15.83 (4 1/2)	18.46 (5 1/4)
R22	2.64 (3/4)	6.15 (1 3/4)	8.79 (2 1/2)	10.55 (3)	14.07 (4)	17.59 (5)	20.22 (5 3/4)	23.74 (6 3/4)
R404A	1.76 (1/2)	3.52 (1)	6.15 (1 3/4)	7.03 (2)	10.55 (3)	12.31 (3 1/2)	14.95 (4 1/4)	16.71 (4 3/4)
R407A	2.64 (3/4)	6.15 (1 3/4)	8.79 (2 1/2)	10.55 (3)	14.95 (4 1/4)	17.59 (5)	21.1 (6)	23.74 (6 3/4)
R407C	2.64 (3/4)	7.03 (2)	8.79 (2 1/2)	11.43 (3 1/4)	15.83 (4 1/2)	18.46 (5 1/4)	21.98 (6 1/4)	25.5 (7 1/4)
R407F	2.64 (3/4)	7.03 (2)	9.67 (2 3/4)	12.31 (3 1/2)	16.71 (4 3/4)	19.34 (5 1/2)	22.86 (6 1/2)	26.38 (7 1/2)
R410A	2.64 (3/4)	7.03 (2)	10.55 (3)	13.19 (3 3/4)	17.58 (5)	21.1 (6)	24.62 (7)	28.14 (8)
R417A	1.76 (1/2)	4.4 (1 1/4)	6.15 (1 3/4)	7.91 (2 1/4)	10.55 (3)	13.19 (3 3/4)	14.95 (4 1/4)	17.59 (5)
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)	11.43 (3 1/4)	13.19 (3 3/4)	14.95 (4 1/4)
R422D	1.76 (1/2)	4.4 (1 1/4)	6.15 (1 3/4)	7.03 (2)	10.55 (3)	12.31 (3 1/2)	14.07 (4)	16.71 (4 3/4)
R427A	2.64 (3/4)	6.15 (1 3/4)	7.91 (2 1/4)	10.55 (3)	14.07 (4)	16.71 (4 3/4)	20.22 (5 3/4)	22.86 (6 1/2)
R438A	1.76 (1/2)	5.28 (1 1/2)	7.03 (2)	8.79 (2 1/2)	12.31 (3 1/2)	14.95 (4 1/4)	17.59 (5)	20.22 (5 3/4)
R448A	2.64 (3/4)	6.15 (1 3/4)	8.79 (2 1/2)	10.55 (3)	14.95 (4 1/4)	17.59 (5)	21.1 (6)	23.74 (6 3/4)
R449A	2.64 (3/4)	6.15 (1 3/4)	8.79 (2 1/2)	10.55 (3)	14.07 (4)	17.59 (5)	20.22 (5 3/4)	23.74 (6 3/4)
R450A	1.76 (1/2)	4.4 (1 1/4)	6.15 (1 3/4)	7.03 (2)	9.67 (2 3/4)	12.31 (3 1/2)	14.07 (4)	15.83 (4 1/2)
R452A	2.64 (3/4)	4.4 (1 1/4)	6.15 (1 3/4)	8.79 (2 1/2)	11.43 (3 1/4)	13.19 (3 3/4)	15.83 (4 1/2)	17.59 (5)
R507	1.76 (1/2)	4.4 (1 1/4)	6.15 (1 3/4)	7.03 (2)	9.67 (2 3/4)	12.31 (3 1/2)	14.07 (4)	16.71 (4 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)	11.43 (3 1/4)	13.19 (3 3/4)	15.83 (4 1/2)

Table 4: QREV valve selection guide and nominal capacities kW (ton): QREV 09-15

	Sequence codes and nominal capacities kW (ton)						
	QREVxx						
Refrigerant	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)

Table 5: PSHC 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
PSHC01-422D-C	R422D
PSHC01-427A-C	R427A
PSHC01-438A-C	R438A
PSHC01-448A-C	R448A
PSHC01-449A-C	R449A
PSHC01-450A-C	R450A
PSHC01-452A-C	R452A
PSHC01-0507-C	R507
PSHC01-513A-C	R513A

Table 6: Wiring harness product code number

Product code number
WHA-PSHC-150-1C

QREV and PSHC technical specifications

Table 7: QREV technical specifications

Specification	Description
Power supply	12 VDC ±15% for 12 V QREV control 24 VAC or 24 VDC ±15% (50/60 Hz ± 1%) for 24 V QREV control
Electrical connection	Two 0.50 mm^2 (20 AWG), UL 1332, copper wires, with black FEP insulation
Power consumption	Max power 10±1 W | $t_{operating} \geq 0.5$ S
Working principle	Specialized pulse signal
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 01-08: 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, R452A, R507, and R513A
Refrigerant oil compatibility	Polyolester (POE); Alkylbenzene (AB); Polyalkylene Glycol (PAG); Mineral Oil (MO)
Braze connections—diameter and material	QREV 01-08: 9.5mm (3/8 in.) O.D. copper tube QREV 09-15: 15.8 mm (5/8 in.) O.D. copper tube
Braze connections—length	QREV 01–08: 6.9cm (3 in.) each QREV 09–15: 10.4 cm (4.1 in.) each
Enclosure	IP67 when you use dielectric grease on the wire harness connector
Moisture and corrosion	100 hour salt spray test ASTM B117
Fluid cleanliness requirement	ISO 11171 18/16/13
Warranty	3 years
Compliance	North America: United States: ULus Listed; File YIOZ.MH3536 Canada: cUL Listed; File YIOZ7.MH3536

Table 8: PSHC technical specifications

Specification	Description
Dimensions (L x W x H (±1 mm))	48 mm x 42.9 mm x 36.2 mm (1.89 in. x 1.69 in. 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 Hz or 60 Hz at 24 VAC
Voltage	24 VAC/VDC ±15%
Power	% Duty cycle at 24 VDC P < 500 mW not including valve power.
Current	Operating: 1.5 A minimum
	Peak | $t = 10$ 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
Pulse-width modulation (PWM) control range	Operating: 0% to 98%
Temperature (storage and operating)	-40°C to 70°C (-40°F to +158°F)

Table 8: PSHC technical specifications

Specification	Description
Suitable environmental humidity	< 95% RH
Superheat factory setpoint	5.5°C (10°F)
Voltage requirements	12 VDC ±15% for 12 V QREV control 24 VAC or 24 VDC ±15% (50/60 Hz ± 1%) for 24 V QREV control
Power consumption	≤ 12 W at 95% duty cycle at 24 VDC
Operating pressure	1.4 bar to 16.5 bar (20 psi 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)
Burst pressure	103.4 bar (1500 psi)
Refrigerant compatibility	R134A, R22, R404A, R407A, R407C, R407F, R410A, R417A, R422A, R422D, R427A, R438A, R448A, R449A, R452A, R450A, R507A, 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.
Warranty	3 years
Compliance	North America: United States: ULus Listed; File XACN.E27734 FCC Compliant to Emissions, Part 15 Class B Canada: cUL Listed; File XACN7.E27734 Industry Canada Compliant to ICES-003 Issue 5
CE	Europe: CE Mark – Johnson Controls declares that this product is in compliance with the essential requirements and other relevant provisions of the RoHS Directive, and EMC Directive.

The performance specifications are nominal and conform to acceptable industry standards. For application at conditions beyond these specifications, consult the local Johnson Controls office. Johnson Controls shall not be liable for damages resulting from misapplication or misuse of its products.