

**Replacement Timing Relays for P28 and P29 Lube Oil Controls****Selection Chart**

Product Code Number	Voltage	Reset	Alarm Circuit	Timing (Seconds)
RLY13A-616R	120/240 VAC	Manual	No	120
RLY13A-613R	12 VAC	Manual	No	120
RLY13A-609R	24 VAC or DC	Manual	No	120
RLY13A-608R	120/240 VAC	Automatic	No	90
RLY13A-602R	120/240 VAC	Manual	No	90
RLY13A-600R	120/240 VAC	Manual	No	60
RLY13A-617R	120/240 VAC	Manual	No	45
RLY13A-610R	120/240 VAC	Manual	No	30



P100 Series Encapsulated Pressure Switches

Description

P100 Series switches are encapsulated, nonadjustable, single-pole, single-throw (SPST), direct-mount switches for use with non-corrosive refrigerants. The switches are available with automatic reset in both open low and open high configurations and manual reset with open high action.

Refer to the *P100 Series Encapsulated Pressure Controls Product Bulletin (LIT-121485)* for important product application information.

Features

- compact size and light weight allow for direct mounting
- trip-free manual reset (manual reset models); contacts cannot be overridden by continued depression of the reset button

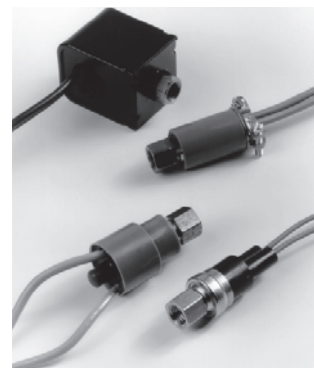
- use with all non-corrosive refrigerants
- encapsulated switch, dust tight
- 1/4 in. internal flare fitting with built-in Schrader type depressor is standard
- electrical connections are made to 48 in. leads

Applications

- low limit, high limit, and fan cycling control in commercial refrigeration
- ice machines
- food service equipment

Repair Information

If the P100 Series Encapsulated Pressure Switches fails to operate within its specifications, replace the unit. For a replacement switch, contact the nearest Johnson Controls® representative.



P100 Series Encapsulated Pressure Switch

Technical Specifications

Standard Duty Electrical Contact Ratings

Switch Action-Model Numbers	SPST-P100AA, AC, AG, AJ, CA, CC, CG, CJ, DA, and DC		SPST-P100AP, CP	
	120V	240V	120V	240V
Motor Ratings				
AC Full Load Ampere	5.8	2.9	6.0	6.0
AC Locked Rotor Ampere	34.8	15.0	36.0	36.0
Non-Inductive Ampere	-	-	-	-
Inductive Ampere	-	-	-	-
Pilot Duty	375 VA		375 VA	

Heavy Duty Electrical Contact Ratings

Switch Action-Model Numbers	SPST-P100AE and CE				SPDT-P100EE			
	120V		240V		120V		240V	
Motor Ratings								
Contact Type	N.O.	N.C.	N.O.	N.C.	N.O.	N.C.	N.O.	N.C.
AC Full Load Ampere	13.0	13.0	10.0	10.0	5.8	13.0	2.9	10.0
AC Locked Rotor Ampere	65.0	60.0	45.0	45.0	34.8	60.0	17.4	45.0
Non-Inductive Ampere	13.0	25.0	10.0	25.0	10.0	25.0	5.0	25.0
Inductive Ampere	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0
Pilot Duty	278 VA	125 VA	278 VA	125 VA	278 VA	125 VA	278 VA	125 VA



P100 Series Encapsulated Pressure Switches (Continued)

Selection Chart (Part 1 of 3)

Product Code Number	Switch Action	Setpoints - psig (kPa)		Replaces:								
		Opens	Closes	Ranco®	Robert-shaw®	Saginomiya	Danfoss®	Klixon®	Supco	Wilspec	International Refrigeration Products	Gemline
P100AC-1C ²	Open on Pressure Drop	5 (34)	20 (138)	MPL-7001	-	ACB-2UA318W	-	PS80-K2-F0305-020-005	SLP0520	HR201A020005D	SLP0520	-
P100AP-354C		5 (34)	30 (207)	-	3100-002	-	-	-	SLP0530	-	-	-
P100AP-15C		10 (69)	25 (172)	HR00011A1R702	3100-050	ACB-2UA97W	061F7523	PS80-K2-F0307-025-005	SLP1025	HR201A025010D	SLP1025	-
P100AP-201C		10 (69)	32 (221)	MPL-7011	3100-050	ACB-2UA101	-	-	SLP1032	-	SLP1032	-
P100AC-2C ²		15 (103)	30 (207)	MPL-7002	-	-	-	-	-	-	-	-
P100AP-356C		20 (138)	45 (310)	-	3100-003	ACB-2UA40W	-	-	SLP2045	-	-	-
P100AP-12C		25 (172)	50 (345)	-	-	ACB-2UA143	-	PS80-K2-F0316-050-005	SLP2550	HR201A050025D	SLP2550	-
P100AP-9C		25 (172)	80 (551)	MPL-7003	3101-003	-	-	PS80-K2-F0325-080-005	SLP2580	HR201A080025D	SLP2580	-
P100AP-105C		30 (207)	60 (413)	-	3100-004	ACB-2UA94	-	-	-	-	SLP3560	-
P100AP-2C		35 (241)	60 (414)	MPL-7004	3100-004	-	-	-	SLP3560	-	SLP3560	-
P100AP-10C		40 (276)	60 (413)	HR00011A1R704	-	-	-	-	-	-	-	-
P100AP-357C		40 (276)	80 (551)	-	3100-052	ACB-2UA354W	-	PS80-K2-F0326-080-005	SLP4080	HR201A080040D	SLP4080	-
P100AP-361C		50 (345)	90 (620)	-	-	-	-	PS80-KS-F0328-090-005	SLP5090	HR201A090050D	SLP5090	-
P100AP-358C		75 (517)	100 (689)	-	-	ACB-2UA441W	-	-	-	-	SLP75100	-
P100AP-351C ¹		75 (517)	120 (827)	-	-	-	-	-	SFC75120	-	-	-
P100AP-352C ¹		110 (758)	170 (1,171)	-	-	-	-	-	SFC110170	-	-	-
P100AP-353C ¹		126 (868)	264 (1,819)	-	-	-	-	-	SFC125265	-	-	-
P100AP-3C ¹		150 (1,034)	225 (1,551)	MPF-7008	-	ACB-2UA685W	-	-	SFC150225	-	-	-
P100AP-359C ¹		165 (1,137)	215 (1,481)	-	3100-215	ACB-2UA48W	-	-	-	-	-	-
P100AP-4C ¹		170 (1,172)	250 (1,724)	-	-	ACB-2UA631W	-	-	SFC170250	-	-	-
P100AP-362C ¹	195 (1,344)	240 (1,654)	-	3100-080	-	-	-	-	-	-	-	
P100AP-200C ¹	195 (1,344)	275 (1,895)	-	-	-	-	-	-	-	-	-	

The performance specifications are nominal and conform to acceptable industry standards. For applications at conditions beyond these specifications, consult the local Johnson Controls office. Johnson Controls, Inc. shall not be liable for damages resulting from misapplication or misuse of its products. © 2015 Johnson Controls, Inc. www.Johnsoncontrols.com



Pressure Sensors and Accessories

P100 Series Encapsulated Pressure Switches (Continued)

Selection Chart (Part 2 of 3)

Product Code Number	Switch Action	Setpoints - psig (kPa)		Replaces:									
		Opens	Closes	Ranco®	Robert-shaw®	Saginomiya	Danfoss®	Klixon®	Supco	Wilspec	International Refrigeration Products	Gemline	
P100AP-354C ¹	Open on Pressure Drop	210 (1,447)	275 (1,895)	-	-	ACB-2UA319W	-	-	SFC210275	-	SFC210275	-	
P100EE-79C		300 (2,068)	370 (2,551)	-	-	-	-	-	-	-	-	-	
P100AP-332C ¹		300 (2,068)	400 (2,758)	MPF7010	-	-	ACB-2UA627W	061F7514	-	SFC300400	-	-	-
P100CP-157C	Open on Pressure Rise	225 (1,550)	150 (1,034)	-	-	-	-	-	-	-	-	-	
P100CP-158C		250 (1,723)	150 (1,034)	-	-	-	-	PS80-K1-0336-250-150	SHP250150	HR202A250150D	SHP250150	-	
P100CP-159C		270 (1,860)	200 (1,378)	-	-	-	-	-	-	-	-	-	
P100CC-9C ²		275 (1,896)	175 (1,207)	-	3100-112	ACB-2UB724W	-	-	-	-	-	-	-
P100CP-91C		300 (2,067)	200 (1,378)	-	-	ACB-2UB723W	-	-	PS80-K1-0341-300-200	-	HR202A300200D	SHP300200	-
P100CP-166C		325 (2,239)	225 (1,550)	-	-	-	061F6080	PS80-K1-0346-320-230	SHP325225	HR202A325230D	-	-	-
P100CP-140C		350 (2,412)	245 (1,688)	-	3100-150	ACB-2UB273W	061F3212	PS80-K1-0348-350-245	-	HR202A350245D	SHP350250	-	-
P100CP-160C		375 (2,584)	275 (1,895)	-	-	ACB-2UB191	061F7509	-	-	-	SHP375265	-	-
P100CP-161C		400 (2,756)	200 (1,378)	-	3100-152	-	-	PS80-K1-0357-400-200	SHP400200	HR202A400200D	SHP400200	-	-
P100CP-162C		400 (2,756)	280 (1,929)	-	-	-	-	PS80-K1-0358-400-280	SHP400280	HR202A400280D	SHP400280	-	-
P100EE-78C		400 (2,756)	300 (2,068)	-	-	-	-	-	-	-	-	-	-
P100CP-1C		400 (2,758)	300 (2,068)	MPH-7107	3100-151	ACB-2UB35	061FS14	PS80-K1-0359-400-300	SHP400300	HR202A400300D	SHP400300	PC 151	-
P100CP-156C		410 (2,825)	290 (1,998)	-	-	-	-	-	-	-	-	-	-
P100CP-163C		425 (2,928)	300 (2,067)	-	-	-	-	PS80-K1-0360-425-300	SHP425300	HR202A425300D	SHP425300	-	-
P100CP-2C		425 (2,930)	325 (2,241)	MPH-7108	3100-100	ACB-2UB282W	-	-	SHP425325	-	-	-	PC 100
P100CP-164C		450 (3,101)	250 (1,723)	-	-	-	-	PS80-K1-0363-450-250	SHP450250	HR202A450250D	SHP450250	-	-
P100CP-38C		500 (3,447)	325 (2,241)	-	-	-	-	-	-	-	-	-	-
P100CP-165C		600 (4,134)	475 (3,273)	HR00011B1R704	-	-	-	061F7517	-	SHP600475	-	-	-
P100CP-85C		665 (4,585)	565 (3,895)	-	-	-	-	-	SHP665565	-	-	-	-

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Selection Chart (Part 3 of 3)

Product Code Number	Switch Action	Setpoints - psig (kPa)		Replaces:								
		Opens	Closes	Ranco®	Robert-shaw®	Saginomiya	Danfoss®	Klixon®	Supco	Wilspec	International Refrigeration Products	Gemline
P100DA-35C	Open on Pressure Rise	350 (2,413)	Lockout Manual Reset	-	-	ACBPC45M	-	-	-	-	-	-
P100DC-3C ³		375 (2,586)	Lockout Manual Reset	-	-	-	-	-	-	-	SMR375	-
P100DA-1C		410 (2,827)	Lockout Manual Reset	-	3100-103	ACBPB115M	-	29PSL012-24	SMR410	HM202A410000D	SMR410	PC 103
P100DA-100C		415 (2,859)	Lockout Manual Reset	-	3100-103	-	-	29PSL004-1	-	HM202A415000D	SMR410	-
P100DA-101C		440 (3,032)	Lockout Manual Reset	-	-	-	-	-	SMR440	-	SMR440	-
P100DA-2C		475 (3,275)	Lockout Manual Reset	-	3100-106	-	-	-	-	HM202A475000D	-	-
P100DA-86C		575 (3,964)	Lockout Manual Reset	-	-	-	-	-	SMR575	-	-	-
P100DA-81C		630 (4,343)	Lockout Manual Reset	-	-	-	-	-	SMR630	-	-	-

1. Models are designed for condenser fan cycling.
2. Includes conduit clamp for 3/8 in. flexible metal conduit.
3. Includes conduit box with opening for 1/2 in. conduit connector.

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P499 Series Electronic Pressure Transducers

Description

The P499 Series Electronic Pressure Transducers are compact, economical, rugged, direct-mount pressure transducers designed for use in commercial refrigeration and air conditioning applications. These transducers produce an analog signal based on the sensed pressure.

The P499 Series transducers feature environmentally protected electronics with stainless steel construction. The digitally compensated P499 transducers are highly accurate over a broad temperature range, resisting the effects of wide ambient temperature swings, high humidity, condensation, and icing.

The pressure port is machined from a solid piece of 17-4PH stainless steel. No O-rings, organic materials, or welds are exposed to the pressure media, allowing for a leak-proof, all-metal, sealed pressure system.

The P499 Series transducers operate with any corrosive or non-corrosive pressure medium that is compatible with 17-4PH stainless steel, including water, condensate, carbon dioxide, glycol, most refrigerants (including ammonia), and many other compatible fluids and gases.

The P499 Series provides transducers in a variety of pressure ranges, covering most common refrigeration and air conditioning applications.

Features

- single-piece machined 17-4PH stainless steel pressure port provides a durable assembly that eliminates refrigerant loss due to O-ring or weld failures; resists damage due to physical shock, vibration, and pressure pulsations; enables use with non-corrosive or corrosive pressure media that is compatible with 17-4PH stainless steel.
- environmentally protected electronics withstand the effects of adverse conditions associated with typical HVAC/R applications, including freeze/thaw applications on suction lines.
- reliable, repeatable performance and long operating life minimizes service and replacement costs.
- many available pressure ranges provide a single line of transducers for all refrigeration and air conditioning application needs.
- 1% total error band provides high-accuracy performance.
- slender body design facilitates use of deep-socket wrenches for ease of installation; requires zero turning radius.
- CE and UL agency listings allow for global applications.



P499 Electronic Pressure Transducers; Style 47 Fitting Shown on the Left and Style 49 Fitting Shown on the Right

Refer to the *P449 Series Electronic Pressure Transducer Product/Technical Bulletin (LIT-12011190)* for important product application information.

Repair Information

If the P499 Series Electronic Pressure Transducer fails to operate within its specifications, replace the unit. For a replacement transducer, contact the nearest Johnson Controls® representative.

Accessories

P499 transducers require wire harnesses for all models that do not have an integral cable.

Wire Harnesses with Packard Electrical Connectors

Product Code Number ¹	Length
WHA-PKD3-200C	6-1/2 ft (2.0 m)
WHA-PKD3-400C	13 ft (4.0 m)
WHA-PKD3-600C	19-5/8 ft (6.0 m)

1. Wire harnesses for P399 transducers and P499 transducers are interchangeable.

Selection Chart

0.5 to 4.5 VDC Ratiometric P499 Transducer Models with Packard Electrical Connections, psis

Product Code Number	Pressure Connection	Pressure Range ¹		Individual or Kit ²
		Minimum Pressure (Pmin)	Maximum Pressure (Pmax)	
P499RAPS100C	1/8 in. 27 NPT External Thread (Style 49)	-10 psis (-0.7 bar)	100 psis (6.9 bar)	Individual
P499RAPS100K		[20 in. Hg]		Kit
P499RAPS102C		0 psis (0 bar)	200 psis (13.8 bar)	Individual
P499RAPS102K				Kit
P499RCPS100C	1/4 in. SAE 45° Flare Internal Thread (7/16-20 UNF) with Depressor (Style 47)	-10 psis (-0.7 bar)	100 psis (6.9 bar)	Individual
P499RCPS100K		[20 in. Hg]		Kit
P499RAPS102C		0 psis (0 bar)	200 psis (13.8 bar)	Individual
P499RAPS102K				Kit

1. Transducer sealed and rated for IP67 harsh environments.

2. The **Individual** pack comes with a transducer only - you must order the wire harness separately. The **Kit** is packaged with a transducer, 6-1/2 ft (2 m) wire harness, and technical documentation.



P499 Series Electronic Pressure Transducers (Continued)

0.5 to 4.5 VDC Ratiometric P499 Transducer Models with Integral 2 m (6-1/2 ft) Shielded Cable, psis

Product Code Number	Pressure Connection	Pressure Range ¹	
		Minimum Pressure (Pmin)	Maximum Pressure (Pmax)
P499RCSS101C	1/4 in. SAE 45° Flare Internal Thread (7/16-20 UNF) with Depressor (Style 47)	0 psis (0 bar)	100 psis (6.9 bar)

1. Transducer sealed and rated for IP67 harsh environments.

0.5 to 4.5 VDC Ratiometric P499 Transducer Models with Packard Electrical Connections, psi

Product Code Number	Pressure Connection	Pressure Range		Individual or Kit ¹
		Minimum Pressure (Pmin)	Maximum Pressure (Pmax)	
P499RAP-101C	1/8 in. 27 NPT External Thread (Style 49)	0 psi (0 bar)	100 psi (6.9 bar)	Individual
P499RAP-101K				Kit
P499RAP-102C		0 psi (0 bar)	200 psi (13.8 bar)	Individual
P499RAP-105C		0 psi (0 bar)	500 psi (34.5 bar)	Individual
P499RAP-105K				Kit
P499RAP-107C		0 psi (0 bar)	750 psi (51.7 bar)	Individual
P499RAP-107K				Kit
P499RCP-101C	1/4 in. SAE 45° Flare Internal Thread (7/16-20 UNF) with Depressor (Style 47)	0 psi (0 bar)	100 psi (6.9 bar)	Individual
P499RCP-101K				Kit
P499RCP-105C		0 psi (0 bar)	500 psi (34.5 bar)	Individual
P499RCP-105K				Kit
P499RCP-107C		0 psi (0 bar)	750 psi (51.7 bar)	Individual
P499RCP-107K				Kit

1. The **Individual** pack comes with a transducer only - you must order the wire harness separately. The **Kit** is packaged with a transducer, 6-1/2 ft (2 m) wire harness, and technical documentation.

0 to 10 VDC P499 Transducer Models with Packard Electrical Connections, psi

Product Code Number	Pressure Connection	Pressure Range		Individual or Kit ¹
		Minimum Pressure (Pmin)	Maximum Pressure (Pmax)	
P499VAP-101C	1/8 in. 27 NPT External Thread (Style 49)	0 psi (0 bar)	100 psi (6.9 bar)	Individual
P499VAP-101K				Kit
P499VAP-105C		0 psi (0 bar)	500 psi (34.5 bar)	Individual
P499VAP-105K				Kit
P499VAP-107C		0 psi (0 bar)	750 psi (51.7 bar)	Individual
P499VAP-107K				Kit
P499VCP-101C		1/4 in. SAE 45° Flare Internal Thread (7/16-20 UNF) with Depressor (Style 47)	0 psi (0 bar)	100 psi (6.9 bar)
P499VCP-101K				Kit
P499VCP-105C	0 psi (0 bar)		500 psi (34.5 bar)	Individual
P499VCP-105K				Kit
P499VCP-107C	0 psi (0 bar)		750 psi (51.7 bar)	Individual
P499VCP-107K				Kit

1. The **Individual** pack comes with a transducer only, you must order the wire harness separately. The **Kit** is packaged with a transducer, 6-1/2 ft (2 m) wire harness, and technical documentation.

4 to 20 mA P499 Transducer Models with Packard Electrical Connections, psi (Part 1 of 2)

Product Code Number	Pressure Connection	Pressure Range		Individual or Kit ¹
		Minimum Pressure (Pmin)	Maximum Pressure (Pmax)	
P499AAP-101C	1/8 in. 27 NPT External Thread (Style 49)	0 psi (0 bar)	100 psi (6.9 bar)	Individual
P499AAP-101K				Kit
P499AAP-105C		0 psi (0 bar)	500 psi (34.5 bar)	Individual
P499AAP-105K				Kit
P499AAP-107C		0 psi (0 bar)	750 psi (51.7 bar)	Individual
P499AAP-107K				Kit



P499 Series Electronic Pressure Transducers (Continued)

4 to 20 mA P499 Transducer Models with Packard Electrical Connections, psi (Part 2 of 2)

Product Code Number	Pressure Connection	Pressure Range		Individual or Kit ¹
		Minimum Pressure (Pmin)	Maximum Pressure (Pmax)	
P499ACP-101C	1/4 in. SAE 45° Flare Internal Thread (7/16-20 UNF) with Depressor (Style 47)	0 psi (0 bar)	100 psi (6.9 bar)	Individual
P499ACP-101K				Kit
P499ACP-105C		0 psi (0 bar)	500 psi (34.5 bar)	Individual
P499ACP-105K				Kit
P499ACP-107C		0 psi (0 bar)	750 psi (51.7 bar)	Individual
P499ACP-107K				Kit

1. The **Individual** pack comes with a transducer only, you must order the wire harness separately. The **Kit** is packaged with a transducer, 6-1/2 ft (2 m) wire harness, and technical documentation.

Technical Specifications

P499 Series Electronic Pressure Transducers		
Pressure Ranges		-10 to 100 psis, 0 to 100 psi, 0 to 200 psi, 0 to 500 psi, 0 to 750 psi
Maximum Working Pressure		2x Pressure Range; short duration; infrequent, abnormal condition
Burst Pressure		5x Pressure Range
Vacuum		30 microns (0.03 mm Hg); short term
Media Compatibility		All media compatible with 17-4PH stainless steel, including ammonia
Output Signal		0.5 to 4.5 VDC, 0 to 10 VDC, or 4 to 20 mA
Supply Voltage	0.5 to 4.5 VDC Ratiometric Output	5.0 ±0.25 VDC, Safety Extra-Low Voltage (SELV) or Class 2
	4 to 20 mA Output	9 to 30 VDC, SELV or Class 2
	0 to 10 VDC Output	12 to 30 VDC, SELV or Class 2
Direct-Mount Pressure Connections		1/8 in. 27 NPT External Thread (Style 49), 1/4 in. SAE 45° Flare Internal Thread (7/16-20 UNF) with Depressor (Style 47)
Temperature and Humidity	Storage	-40 to 257°F (-40 to 125°C)
	Operating	-40 to 185°F (-40 to 85°C)
	Compensated Range	-4 to 185°F (-20 to 85°C)
	Humidity	0 to 100% RH
Linearity		±0.25% Full Span best fit straight line
Accuracy		±1% Full Span (maximum) over compensated temperature range
Materials	Pressure Port	17-4PH stainless steel construction
	Packard Connector	40% glass-filled Polyetherimide (PEI)
Vibration		20G, 20 to 200 Hz
Shock		200G/11 ms
Compliance	United States	UL Listed, File E29374, CCN NKPZ UL Recognized for Use in Class I, Division 2 Hazardous Locations, File E322274
	Canada	UL Listed, File E29374, CCN NKPZ7 UL Recognized for Use in Class I, Division 2 Hazardous Locations, File E322274
	Europe	CE Mark – Johnson Controls, Inc., declares that this product is in compliance with the essential requirements and other relevant provisions of the EMC Directive 2004/108/EC.
	Australia/ New Zealand	C-Tick Mark, Emissions Compliant

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R310A Series Current Sensing Switch

Description

The R310A Series Current Sensing Switch detects alternating current (AC) flow in a single circuit without being connected to that circuit. It may be used in any application where current detection is required.

The R310A replaces the R10A used with Johnson Controls/PENN® time delay oil failure cutout controls such as the P28, P45, and P445. These applications incorporate internal line breaking overload protection, where lockout due to overload cycling is unacceptable or undesirable. The R310A switch is not intended to detect breakage of belts.

The R310A is molded in a high dielectric material, which permits mounting inside a starter or contactor.

Refer to the *R310A Series Current Sensing Switch Product Bulletin (LIT-121536)* for important product application information.

Features

- small size allows mounting in small enclosure
- solid-state switching contains no moving parts to fail
- low 0.5 ampere activation allows monitoring of most small equipment circuit loads
- high 200 ampere monitoring capacity allows monitoring of heavy duty equipment
- large 0.70 in. (18 mm) diameter sensor hole accepts large diameter wire sizes and multiple coilings of smaller diameter wire sizes

Applications

The R310A Current Sensing Switch is designed to sense alternating current in a conductor that passes through its opening. The R310A sensor closes an electronic switch if the alternating current in the conductor exceeds 0.5 amperes. Thus, the R310A switch may be used for several purposes:

- switch a pilot circuit
- energize a run signal on a device such as a fan, motor, or pump
- monitor motors and electrical loads for proper operation
- monitor on/off status of process motors

The R310A Series Current Sensing Switch is available in two models. The R310AD-1 switch is for use in low-voltage applications, such as with the P445 Electronic Lube Oil Control. The R310AE-2 switch is for use in high-voltage applications, such as with the P28 and P45 Electromechanical Lube Oil Controls.

The R310A switch avoids nuisance lockouts by sensing the lack of current flow to the motor. Regardless of the reason for motor shutdown, the lube oil control time delay circuit is de-energized when the current flow in the motor supply line drops below 0.5 amperes.

In a typical application, the lube oil control does not lock out when the control circuit shuts off the compressor. However, if the compressor overheats and the internal thermal overload circuits open, the compressor shuts itself down, which causes the oil pressure to drop. This drop in oil pressure will energize the lube oil control heater (P28, P45) or timer (P445), causing a



R310A Series Current Sensing Switch

nuisance lockout. In this situation, the R310 switch senses the lack of current to the motor, and is used to de-energize the time delay heater (P28, P45) or electronic timer (P445) before a nuisance lockout occurs.

Repair Information

If the R310A Series Current Sensing Switch fails to operate within its specifications, replace the unit. For a replacement switch, contact the nearest Johnson Controls® representative.

Selection Chart

Product Code Number	Description
R310AD-1C	Current Sensing Switch Voltage switching capacity: 0 to 30 VAC Used with: P445 Electronic Lube Oil Control
R310AE-2C	Current Sensing Switch Voltage switching capacity: 120 to 240 VAC Used with: P28 and P45 Electromechanical Lube Oil Controls

Technical Specifications

R310A Series Current Sensing Switch		
Switch Action	SPST, normally open	
Current Sensing Range	R310AD-1C	0.5 to 200 Amperes
	R310AE-2C	0.75 to 200 Amperes
Switch Threshold	R310AD-1C	0.5 Amperes
	R310AE-2C	0.75 Amperes
Sensor Supply Voltage	Induced from monitored conductor, isolation 600 VAC RMS	
Switching Capacity (General Purpose)	R310AD-1C	0.1A at 30 VAC/DC
	R310AE-2C	0.5 at 250 VAC/DC
Output Polarity	Non-polarity sensitive output	
Enclosure	NEMA 1	
Ambient Operating Conditions	5 to 140°F (-15 to 60°C); 0 to 95% RH, noncondensing	
Ambient Storage Conditions	-40 to 158°F (-40 to 70°C); 0 to 95% RH	
Dimensions (H x W x D)	2.34 x 1.85 x 0.875 in. (59 x 46 x 22 mm)	
Sensor Hole Size	7/10 in. (17 mm) Diameter	
Agency Listings	UL Guide NRNT cUL Guide NRNT7	



Universal Mounting Brackets

Description

The 271-51 is the universal mounting bracket used with many Johnson Controls/PENN® products. BKT38A-601R contains one mounting bracket with screws. BKT38A-600R contains five 271-51 angle mounting brackets with screws.

Selection Chart

Product Code Number	Description
271-51	Universal Mounting Bracket
BKT38A-600R	Five Universal Mounting Brackets with ten screws



271-51
Universal Mounting Bracket



SEC99A UltraCap Armored Capillary

Description

The SEC99A UltraCap Armored Capillary is designed for use as a pressure connection in refrigeration and air conditioning applications. This small-orifice capillary minimizes pressure pulsation, and the brass armor sleeve improves resistance to abrasion caused by vibration. The copper capillary inside the armored sleeve allows no effusion of refrigerant to the environment.

UltraCap is designed for use with 1/4 in. SAE external flare fitting connectors, such as those found on the Johnson Controls/PENN® lines of pressure-actuated controls. Integral Schrader valve depressors are available.

UltraCap Armored Capillary is compatible with all common non-corrosive refrigerants. The UltraCap capillary is available in a variety of lengths, and in models with two straight fittings or with one straight fitting and one 90° elbow fitting.



SEC99AB and SEC99AA UltraCap Armored Capillaries

Selection Chart

Product Code Number	Description
Schrader Depressor in One End	
SEC99AA-18C	Two straight fittings Length: 18 in. (457 mm)
SEC99AA-24C	Two straight fittings Length: 24 in. (610 mm)
SEC99AA-36C	Two straight fittings Length: 36 in. (914 mm)
SEC99AA-48C	Two straight fittings Length: 48 in. (1,219 mm)
SEC99AA-60C	Two straight fittings Length: 60 in. (1,524 mm)
Schrader Depressor in Both Ends	
SEC99AB-18C	One straight and one 90° fitting Length: 18 in. (457 mm)
SEC99AB-24C	One straight and one 90° fitting Length: 24 in. (610 mm)
SEC99AB-36C	One straight and one 90° fitting Length: 36 in. (914 mm)
SEC99AB-48C	One straight and one 90° fitting Length: 48 in. (1,219 mm)
SEC99AB-60C	One straight and one 90° fitting Length: 60 in. (1,524 mm)

Repair Information

If the SEC99A UltraCap Armored Capillary fails to operate within its specifications, replace the unit. For a replacement capillary, contact the nearest Johnson Controls® representative.

Technical Specifications

SEC99A UltraCap Armored Capillary	
Capillary Diameters	Inside: 0.062 in. (1 mm); Outside: 0.125 in. (3 mm)
Temperature Range	-50 to 350°F (-46 to 177°C)
Burst Pressure	3,000 psig (20,685 kPa)
Maximum Working Pressure	600 psig (4,137 kPa)
Suggested Torque to Seal	8 to 10 lb-ft (10.9 to 13.6 N-m)
Fittings: Straight	1/4 in. Internal Flare Connector with Schrader Depressor
90° Elbow	1/4 in. Internal Flare Connector with Schrader Depressor
Material	Forged Brass Nut with Copper Stem
Agency Listings	UL Recognized: File SA9457, CCN SFCS2 UL Recognized for Canada: SA9457, CCN SFCS8