P77 and P78 Series Controls for Single and Dual Pressure Applications Product Bulletin

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Introduction

The P77 and P78 Series Pressure Controls are designed primarily for high and low pressure cut-out control, pump-down control, condenser fan cycling, and capacity control on commercial refrigeration and air-conditioning applications.

These controls are available in several pressure ranges and are compatible with most common refrigerants. They may also be used on other non-corrosive fluid applications. Controls also are available in several different electrical ratings and single-pole, double-throw (SPDT) switch configurations.

The P77 Series Controls for high or low pressure applications are designed for single pressure control of commercial refrigeration and air-conditioning applications.

The P78 Series Controls for dual pressure applications are designed primarily for use as combination high and low pressure controls on commercial refrigeration and air-conditioning applications.

Figure 1: P77 Single Pressure Control



Figure 2: P78 Dual Pressure Control



Features and benefits

Splash-proof enclosure

Built to provide long lasting, rugged protection for internal components.

Sight-set calibrated pressure adjustment

Displays a visible pressure scale, fully adjustable through the range without removing the cover.

Manual reset lockout option

Provides trip-free lockout that cannot be overridden or reset until pressure returns to a specified level.

Generous wiring space

Provides ample space for easy wiring and maintenance.

Applications

P77 and P78 Series Controls provide both high and low pressure control on commercial refrigeration and air-conditioning applications.

Important: Use this P77 or P78 Series Control only as an operating control. Where failure or malfunction of the P77 or P78 Control 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 P77 or P78 Control.

Important: Utiliser ce P77 or P78 Series Control uniquement en tant que dispositif de contrôle de fonctionnement. Lorsqu'une défaillance ou un dysfonctionnement du P77 or P78 Control risque de provoquer des blessures ou d'endommager l'équipement contrôlé ou un autre équipement, la conception du système de contrôle doit intégrer des dispositifs de protection supplémentaires. Veiller dans ce cas à intégrer de façon permanente d'autres dispositifs, tels que des systèmes de supervision ou d'alarme, ou des dispositifs de sécurité ou de limitation, ayant une fonction d'avertissement ou de protection en cas de défaillance ou de dysfonctionnement du P77 or P78 Control.

These controls are available in several pressure ranges and are compatible with most common non-corrosive refrigerants. Type 1 enclosures are standard on these models.

P77 and P78 Series Control models are typically used for high or low pressure cut-out applications, condenser fan cycling, and pump-down control. SPDT switches allow you to install alarm devices or other control circuits.

Low-pressure P77BCA Type, high-pressure P77BEA Type, and dual-pressure P78MCA Type models with Manual Reset Lockout lock out when the cut-out pressure is reached and do not automatically reset when the pressure changes after cut-out, providing shutdown capability for unmonitored equipment.

Table 5 lists the standard models and features of P77 Series Controls for low pressure applications. Table 6 lists the standard models and features of P77 Controls for high pressure applications. Table 7 lists the standard models and features of P78 Series Controls for dual pressure applications. These standard models are available through most authorized Johnson Controls/PENN® distributors.

Operation

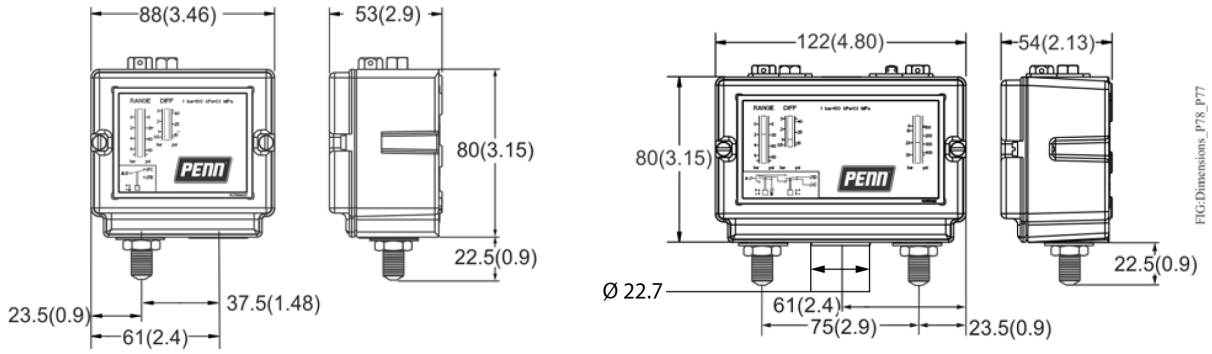
A pressure-actuated bellows on the control is connected to a pressure tap on the controlled system by a capillary or a field-installed hose. The bellows responds to system pressure changes and operates a snap-action electrical switch.

On most dual pressure control models, the two bellows are mechanically interconnected to operate a single switch. The switch is typically wired to provide control of the refrigeration or air-conditioning compressor and condenser fans. On some models, the switch may also be wired to control alarms or other auxiliary devices.

Dimensions

See Figure 3 for P77 and P78 Series Control dimensions. These dimensions are nominal and subject to accepted manufacturing tolerances and application variables.

Figure 3: P77 and P78 Pressure Controls with 7/16-20 UNF 6 mm flare fitting dimensions, mm (in.)



Wiring

See Figure 4 and Table 1 for wiring information for the P77 Series Pressure Controls for Low Pressure Applications. See Figure 5 and Table 2 for wiring information for the P77 Series Controls for High Pressure Applications. See Figure 6 and Table 3 for wiring information for the P78 Series Controls for Dual Pressure Applications.

Figure 4: P77 Low Pressure Control switch wiring (SPDT)

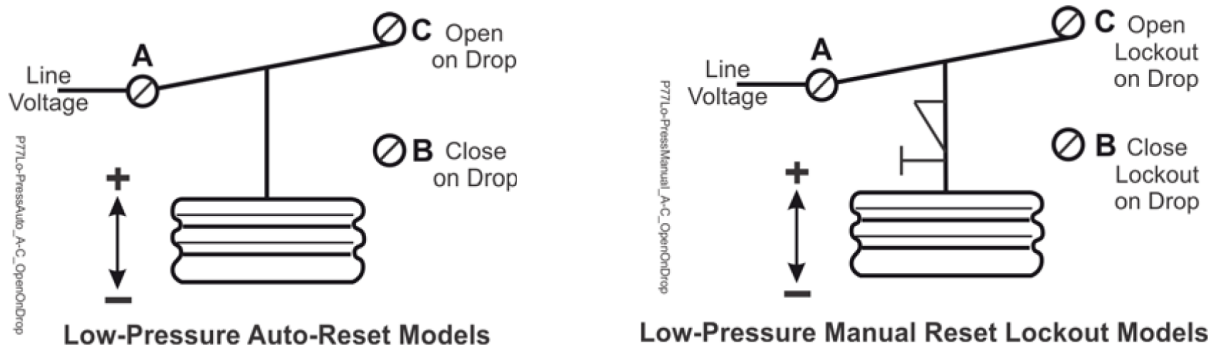


Table 1: P77 Low Pressure Control, low events, and high events

Switch and action	Low event on pressure drop	High event on pressure rise
SPDT	A to C opens; cut-out at low event A to B closes; cut-in at low event	A to C closes; cut-in at high event A to B opens; cut-out at high event

Figure 5: P77 High Pressure Control switch wiring (SPDT)

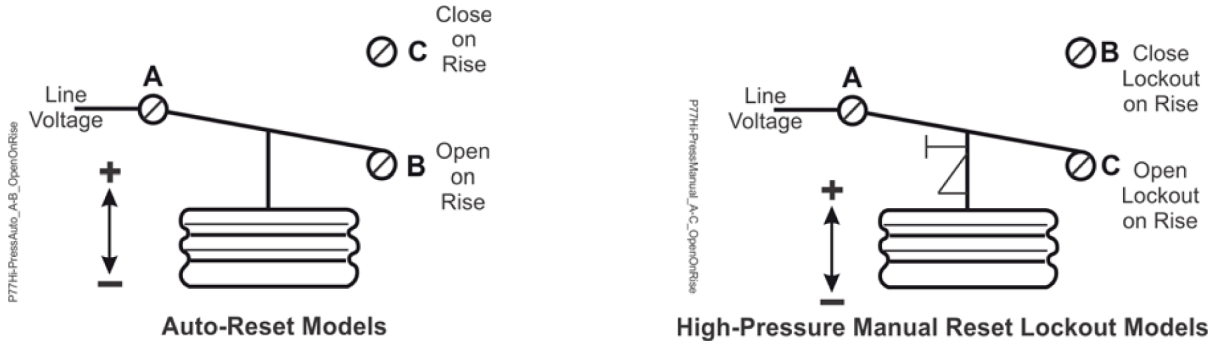


Table 2: P77 High Pressure Control, low events, high events, and model type

Switch and action	Low event	High event	Model type
SPDT	A to B closes on pressure decrease A to C opens simultaneously	A to B opens on pressure increase A to C closes simultaneously	P77AAA
	A to C closes on pressure decrease A to B opens simultaneously	A to B closes on pressure increase A to C opens simultaneously	P77BEA

Figure 6: P78 switch wiring

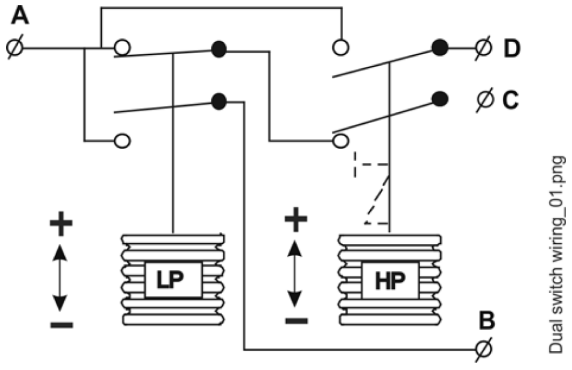


Table 3: P78 switch wiring

LP/HP	Description
LP	A-C opens on pressure decrease
	A-B closes simultaneously
HP	A-C opens on pressure increase
	A-D closes simultaneously

Ordering information

P77 and P78 Series Pressure Controls are available in a variety of standard and non-standard models. Table 4 is a type identification matrix that itemizes all the potential P77 and P78 Series Control types. Table 5, Table 6, and Table 7 are model selection charts that list the features on standard single and dual pressure control models available through most Johnson Controls or PENN authorized distributors.

Figure 7 illustrates the Style 45 connection available on P77 and P78 control models. Contact your Johnson Controls or PENN representative for availability and price.

Table 4: Identification matrix for P77 and P78 Series Pressure Controls

Type number	Description
P77AAA	Single pressure; automatic reset
P77BCA	Low pressure; manual reset
P77BEA	High pressure; manual reset
P78LCA	Dual pressure; automatic reset
P78MCA	Dual pressure; high-side manual reset

Table 5: Standard P77 models for low pressure applications for non-corrosive refrigerants

Model number	Individual pack	Bulkpack	Pressure connection	Switch action	Range bar (psi)	Differential bar (psi)	Maximum bellows pressure bar (psi)
P77AAA	-13000C	-13000D	7/16-20 UNF 6 mm (1/4 in.) flare fitting	SPDT	-0.5 to 7 (7 to 102)	0.6 to 3 (9 to 44)	20 (290)
	-15000C	-15000D	914 mm (36 in.) capillary with 6 mm (1/4 in.) flare fitting				
P77BCA	-13000C	—	7/16-20 UNF6 mm (1/4 in.) flare fitting			Manual reset	
	-15000C	—	914 mm (36 in.) capillary with 6 mm (1/4 in.) flare fitting				

Note: Manual reset: The control cannot be reset until the pressure rises 0.5 bar (7 psi) or greater above the low cut-out point.

Table 6: Standard P77 Models for High Pressure Applications (For Non-Corrosive Refrigerants)

Model Number	Individual Pack	Bulkpack	Pressure Connection	Switch Action	Rangebar (psi)	Differential bar (psi)	Maximum Bellows Pressure bar (psi)
P77AAA	-13500C	-13500D	7/16-20 UNF 6 mm (1/4 in.) flare fitting	SPDT	3 to 30 (44 to 435)	3 to 12 (44 to 174)	33 (479)
	-15500C	-15500D	914 mm (36 in.) capillary with 6 mm (1/4 in.) flare fitting				
P77BEA	-13500C	-13500D	7/16-20 UNF 6 mm (1/4 in.) flare fitting			Manual reset	
	-15500C	-15500D	914 mm (36 in.) capillary with 6 mm (1/4 in.) flare fitting				

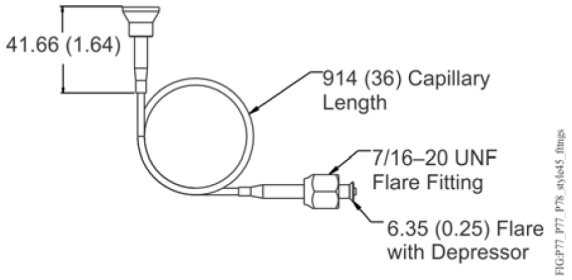
Note: Manual reset: The control cannot be reset until the pressure reduces 3 bar (44 psi) or lower below the high cut-out point.

Table 7: Standard P78 Dual Pressure Controls for non-corrosive refrigerants

Model number	Individual pack	Bulkpack	Pressure connection	Low pressure side bar (psi)		High pressure side bar (psi)		Maximum bellows pressure psi (bar)
				Range	Diff.	Range	Diff.	
P78LCA	-13000C	-13000D	7/16-20 UNF for 6 mm (1/4 in.) flare fitting	-0.5 to 7 (7 to 102)	0.6 to 3 (9 to 44)	3 to 30 (44 to 435)	3 fixed (44)	LP: 20 (290) HP: 33 (479)
	-15000C	-15000D	914 mm (36 in.) capillary with 6 mm (1/4 in.) flare fitting					
P78MCA	-13000C	-13000D	7/16-20 UNF for 6 mm (1/4 in.) flare fitting				Manual reset	
	-15000D	-15000D	914 mm (36 in.) capillary with 6 mm (1/4 in.) flare fitting					

Note: Manual reset: The control cannot be reset until the pressure reduces 3 bar (44 psi) below the cut-out point.

Figure 7: Capillary connector dimensions, mm (in.)



P77 and P78 Series technical specifications

Table 8: P77 Series electrical ratings

Volts AC 50/60 Hz	UL60730						
	24	120		208		240	
	–	Primary contact	Secondary contact	Primary contact	Secondary contact	Primary contact	Secondary contact
Horsepower	–	1	0.33	1	0.75	1	1
Full load amperes	–	16	7.2	9.2	7.6	8	8
Locked rotor amperes	–	96	43.2	55.2	45.6	48	48
Resistive amperes	16	16	8	10	8	10	8
Pilot duty VA	125	720	720	720	720	720	720

Note: When the primary contact is A–C, the secondary contact is A–B. When the primary contact is A–B, the secondary contact is A–C.

Table 9: P78 Series electrical ratings

Volts AC 50/60 Hz	UL60730						
	24	120		208		240	
	–	Primary contact	Secondary contact	Primary contact	Secondary contact	Primary contact	Secondary contact
Horsepower	–	1	0.33	1	0.75	1	1
Full load amperes	–	16	7.2	9.2	7.6	8	8
Locked rotor amperes	–	96	43.2	55.2	45.6	48	48
Resistive amperes	16/8	16	8	10	8	10	8
Pilot duty VA	125/125	720	720	720	720	720	720

Note: The primary contact is A–C; the secondary contacts are A–B and A–D.

Table 10: P77 Series applications technical specifications

Specification	Description
Product switch action	SPDT
Pressure connection	7/16-20 UNF for 6 mm (1/4 in. SAE external flare fitting), or 914 mm (36 in.) capillary with 6 mm (1/4 in.) flare fitting
Ambient conditions	Temperature: -40°C to 60°C (-40°F to 140°F) Humidity: 0% to 95% R.H. non-condensing
Enclosure	Type 1: cast aluminum
Dimensions (H x W x D)	Type 1 enclosure: 88 mm x 80 mm x 53 mm (3.48 in. x 3.15 in x 2.09 in.)
Approximate shipping weight	Individual pack: (Type 1 enclosure): 0.5 kg (1.1 lbs) Bulk pack: (Type 1 enclosure in multiples of 35 controls): 19 kg (41.88 lbs)
Compliance	cULus Listed; UL 60730, File SA516

Table 11: P78 Series applications technical specifications

Specification	Description
Product switch action	SPDT
Pressure connection	7/16-20 UNF for 6 mm (1/4 in.) flare nut, or 914 mm (36 in.) capillary with 6 mm (1/4 in.) flare nut
Ambient storage conditions	Temperature: -40°C to 60°C (-40°F to 140°F) Humidity: 0% to 95% R.H. non-condensing
Enclosure	Type 1: cast aluminum
Dimensions (H x W x D)	Type 1 enclosure: 122 mm x 80 mm x 53 mm (4.80 in. x 3.15 in. x 2.09 in.)
Approximate shipping weight	Individual pack: (Type 1 enclosure): 0.7 kg (1.55 lbs) Bulk pack: (Type 1 enclosure in multiples of 24 controls): 24.5 kg (54.01 lbs)
Compliance	cULus Listed; UL 60730, File SA516

Table 12: P77 for low pressure applications UL Conformity Declaration information

Information	Description
Purpose of control	Pressure operating control: automatic reset controls Pressure cut-out: manual reset controls
Construction of control	Electromechanical
Number of cycles	Automatic: 30,000 cycles Manual reset: 6,000 cycles
Method of mounting control	Independently-mounted control
Type 1 or Type 2 action	Automatic: Type 1; Type 1.C; micro-interruption Manual reset: Type 2
Pollution degree	Category 3
Heat and fire resistance category	N/A
Rated impulse voltage	4,000 V
Ball pressure temperature	N/A

Table 12: P77 for low pressure applications UL Conformity Declaration information

Information	Description
Field wiring rating	90°C (194°F)
Maximum overpressure	20 bar (290 psi)
Cover screw torque requirements	Tighten enclosure screws to: 1.1–1.4 N·m (10–12 in·lb)

Table 13: P77 for high pressure applications UL Conformity Declaration information

Information	Description
Purpose of control	Pressure operating control: automatic reset controls Pressure cut-out: manual reset controls
Construction of control	Electromechanical
Number of cycles	Automatic: 30,000 cycles Manual reset: 6,000 cycles
Method of mounting control	Independently-mounted control
Type 1 or Type 2 action	Automatic: Type 1; Type 1.C; micro-interruption Manual reset: Type 2
Pollution degree	Category 3
Heat and fire resistance category	N/A
Rated impulse voltage	4,000 V
Ball pressure temperature	N/A
Field wiring rating	90°C (194°F)
Maximum overpressure	33 bar (479 psi)
Cover screw torque requirements	Tighten enclosure screws to: 1.1–1.4 N·m (10–12 in·lb)

Table 14: P78 for dual pressure applications UL Conformity Declaration information

Information	Description
Purpose of control	Pressure operating control: automatic reset controls Pressure cut-out: manual reset controls
Construction of control	Electromechanical
Number of cycles	Automatic 30,000 cycles Manual reset 6,000 cycles
Method of mounting control	Independently-mounted control
Type 1 or Type 2 action	Automatic: Type 1; Type 1.C; micro-interruption Manual reset: Type 2
Pollution degree	Category 3
Heat and fire resistance category	N/A
Rated impulse voltage	4,000 V
Ball pressure temperature	N/A
Field wiring rating	90°C (194°F)
Maximum overpressure	LP: 20 bar (290 psi) HP: 33 bar (479 psi)
Cover screw torque requirements	Tighten enclosure screws to: 1.1–1.4 N·m (10–12 in·lb)

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.

Repair information

If the P77 or P78 Series Pressure Control fails to operate within its specifications, replace the unit. For a replacement P77 or P78 Control, contact the nearest Johnson Controls® representative.