JOHNSON CONTROLS

The A11 Series low temperature cutout controls incorporate a 20-ft long, vapor charged sensing element. The A11 reacts to the coldest 18-in. section of the controls sensing element. The A11 is suitable for monitoring the face temperature of hot water coils for freeze protection.

SELECTION CHART

PART NO	SWITCH ACTION	RANGE °F(°C)	DIFF F°(C°)	BULB AND CAPILLARY	RANGE ADJUSTER
A11A-1C	SPST - Open Low	35 to 45(2 to 7)	Manual Reset	20 ft of 1/8-in.O.D. Tubing, 4 ft Cap.	Screwdriver Slot

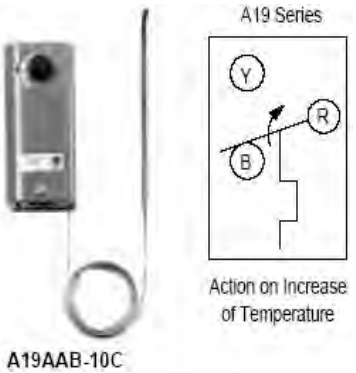
JOHNSON CONTROLS - A19 REMOTE BULB CONTROL

SELECTION CHART

Manual Reset

DESCRIPTION

The A19 Series are single stage temperature controls that incorporate liquid filled sensing elements.



A19AAB-10C

FEATURES

- Wide temperature ranges available
- Constant differential throughout the entire range
- Compact enclosure
- Fixed or adjustable differential available
- Variety of sensing element styles
- Unaffected by cross-ambient conditions

ACCESSORIES

A packing nut is available for closed tank application.
Specify the part number FTG13A-600R, bulb wells (WEL14A Series) are available for liquid immersion applications.

APPLICATIONS

The A19 is suitable for temperature control in heating, ventilating, and refrigeration.

SELECTION CHART

PART NO	SWITCH ACTION	RANGE °F (°C)	DIFF F° (C°)	BULB AND CAPILLARY	BULB WELL NO. (Order Separately)	RANGE ADJUSTER	MAX. BULB TEMP °F (C°
WIDE RANGE - ADJUSTABLE DIFFERENTIAL							
A19ABA-40C*	SPST Open Low	–30 to 100 (–34 to 38)	3 to 12 (1.7 to 6.7)	3/8 in. x 4 in., 6 ft Cap.	WEL14A-602R	Screwdriver Slot	140 (60)
A19ABC-4C	SPDT	50 to 130 (10 to 55)	3-1/2 to 14 (1.9 to 8)	3/8 in. x 5 in., 8 ft Cap.	WEL14A-603R	Knob	170 (77)
+A19ABC-24C†	SPDT	–30 to 100 (–34 to 38)	3 to 12 (1.7 to 6.7)	3/8 in. x 4 in., 8 ft Cap.	WEL14A-602R	Convertible	140 (60)
+A19ABC-36C	SPDT	–30 to 100 (–34 to 38)	3 to 12 (1.7 to 6.7)	3/8 in. x 4 in., 20 ft Cap.	WEL14A-602R	Convertible	140 (60)
A19ABC-37C	SPDT	–30 to 100 (–34 to 38)	3 to 12 (1.7 to 6.7)	3/8 in. x 4 in., 10 ft Cap.	WEL14A-602R	Screwdriver Slot	140 (60)
A19ABC-74C	SPDT	–30 to 100 (–34 to 38)	3 to 12 (1.7 to 6.7)	3/8 in. x 4 in., 6 ft Cap.	WEL14A-602R	Screwdriver Slot	140 (60)
FIXED DIFFERENTIAL							
A19AAF-12C	SPDT	25 to 225 (–4 to 107)	3-1/2 (1.9)	3/8 in. x 3 in., 10 ft Cap.	WEL14A-602R	Screwdriver Slot	275 (135)
CASE COMPENSATED — FIXED DIFFERENTIAL							
A19AAC-4C	SPDT	0to80(–18 to27)	5(2.8)	3/8 in. x 4 in., 6ft Cap.	WEL14A-602R	Screwdriver Slot	140 (60)
A19AAD-12C	SPST Open Low	–30 to 50 (–34 to 10)	2-1/2 (1.4)	3/8 in. x 4 in., 7 ft Cap.	WEL14A-602R	Screwdriver Slot	140 (60)
CLOSE DIFFERENTIAL							
A19AAD-5C**	SPST Open Low	30 to 50 (–1 to 10) (Bulk Milk Cooler)	2-1/2 (1.4)	3/8 in. x 2-5/8 in., 6 ft Cap.	WEL16A-601R	Screwdriver Slot	190 (88)
A19AAF-20C	SPDT	–30 to 100 (–34 to 38)	2-1/2 (1.4)	3/8 in. x 4 in., 6 ft Cap.	WEL14A-602R	Screwdriver Slot	140 (60)
A19AAF-21C	SPDT	40 to 90 (4 to 32)	1-1/2 (0.8)	3/8 in. x 5-3/4 in., 6 ft Cap.	WEL14A-603R	Screwdriver Slot	140 (60)
MANUAL RESET							
A19ACA-14C	SPST Open Low	–30 to 100 (–34 to 38)	Manual Reset	3/8 in. x 4 in., 6 ft Cap.	WEL14A-602R	Screwdriver Slot	140 (60)
A19ACA-15C	SPST Open Low	–30 to 100 (–34 to 38)	Manual Reset	3/8 in. x 4 in., 10 ft Cap.	WEL14A-602R	Screwdriver Slot	140 (60)
A19ADB-1C	SPST Open High	100 to 240 (38 to 116)	Manual Reset	3/8 in. x 3-1/2 in. 6 ft Cap.	WEL14A-602R	Knob	290 (143)
A19ADN-1	SPST Open HIgh	100 to 240 (38 to 116)	Manual Reset	3/8 in. x 4 in., 6 ft Cap.	WEL14A-602R	Screwdriver Slot	290 (143)

JOHNSON CONTROLS - A19 REMOTE BULB CONTROL

SELECTION CHART

Manual Reset

*Replaces White-Rodgers 1609-101.
**Case-Compensated.
†Replaces White-Rodgers 1609-12, -13; Ranco O10-1408, -1409, -1410, -1490, O60-110;
+ Universal Replacement
Honeywell L6018C-1006, L6021A-1005, T675-1011, -1508, -1516, -1821, T4301A-1008,
T6031A-1011, T6031A-1029.

JOHNSON CONTROLS - SPECIAL PURPOSE THERMOSTAT (Rubber-Coated Bulb and Capillary)

A19Series

SELECTION CHART

A19AAF-4

DESCRIPTION
This thermostat's rubber-coated bulb is designed for direct immersion.

FEATURES
The rubber-coated bulb and capillary provide corrosion resistance

APPLICATION
• Designed for use in cooling towers

SPECIFICATIONS
• Maximum bulb temperature: 140°F (60°C)

SELECTION CHART

PART NO	SWITCH ACTION	RANGE °F(°C)	DIFF F°(C°)	Bulb and capillary	Range Adjuster	Max. Bulb Temp °F(°C)
A19AAF-4C	SPDT	40 to 90 (4 to 32)	1-1/2 (0.8)	3/8 in. * 5-3/4 in.Rubber-Coated 6 ft.Cap	ScrewDriver slot Visible scale	140(60)

JOHNSON CONTROLS - TEMPERATURE CONTROL WITH RAINPROOF ENCLOSURE

SELECTION CHART

A19ANC-1

DESCRIPTION
This is a remote bulb temperature control with a rainproof (NEMA type 3R) enclosure.

FEATURES
• Rainproof gasketed enclosure

SPECIFICATIONS
• Maximum bulb temperature 190°F (88°C)
• Maximum ambient temperature: 140°F

APPLICATION
• Control of cooling tower sump heaters

SELECTION CHART

PART NO	SWITCH ACTION	RANGE °F(°C)	DIFF F°(C°)	Bulb and capillary	Bulb Well No.(order separately)	Range Adjuster	Max. Bulb Temp °F(°C)
A19ANC-1C	SPDT	0 to 150(-16 to 66)	5 (2.8) Fixed	0.290 x 2 1/2 in.10 ft.Cap.	WEL11A-601R	ScrewDriver slot	190(88)

JOHNSON CONTROLS - THERMOSTAT FOR CROP DRYING

SELECTION CHART

A19 Series

A19AAE-3

DESCRIPTION

The A19 series are single stage temperature controls that incorporate liquid filled sensing elements.

FEATURES

- Designed for high temperature applications
- Narrow (2ºF fixed) or wide adjustable differentials.

SPECIFICATIONS

- Maximum bulb temperature
  - A19AAE- 200ºF (93ºC)
  - A19ABB- 240ºF (118ºC)

APPLICATION

Crop drying thermostat energizes gas valve to maintain temperature.

SELECTION CHART

PART NO	SWITCH ACTION	RANGE °F(°C)	DIFF F°(C°) (Factory SET)	Bulb and capillary	Range Adjuster	Max. Bulb Temp °F(°C)
A19AAE-3C	SPST Open High	80 to 180(27 to 82)	2(1.1)Fixed	1/8 in. 1 ¼ in.Copper-coiled 10ft cap.	KnobExt.Scale	200(93)
A19ABB-2C	SPST Open High	50 to 200(10 to 93)	6 to 24(3 to 13) Adjustable	0.290 in. x 2 1/2 in.10 ft. Cap.	KnobExt.Scale	240(116)

JOHNSON CONTROLS - A19 SERIES HOT WATER TEMPERATURE CONTROL (Well Immersion)

HOT WATER TEMPERATURE CONTROL (Well Immersion)

SELECTION CHART

A19ABC-11

A19ABC-12

DESCRIPTION

This is a universal replacement control for open high or SPDT applications. The control is furnished with a well assembly for ½ inch dappling.

FEATURES

- Liquid-filled element provides rapid response to temperature change
- Adjustable differential
- Universal replacement

APPLICATIONS

Operating control for water boilers.

SELECTION CHART

PART NO	APPLICATION	SWITCH ACTION	RANGE °F(°C)	DIFF °F(C°)	WELL CONN.SIZE-NPT	RANGE ADJUSTER	MAX BULB TEMP °F (°C)
A19ABC-11C	Open High (R-B) Open Low (R-Y)	SPDT	100 to 240 (38 to 116)	6 to 24 (3 to 13)	1/2 in.	Convertible	250 (121)
A19ABC-12C	Open High (R-B) Open Low (R-Y)	SPDT	100 to 240 (38 to 116)	6 to 24 (3 to 13)	1/2 in.8 ft. Cap.	Convertible	290 (143)
A19ADB-2C	High Temp Lockout	Open High with Lockout	100 to 240 (38 to 116)	Manual Reset(locks out high)	1/2 in.	Knob	250 (121)

JOHNSON CONTROLS - AGRICULTURAL/INDUSTRIAL THERMOSTATS with NEMA 4X Enclouser

A19

SELECTION CHART

A19PRC

DESCRIPTION

The A19PRC is a single stage electromechanical thermostat designed for heating and ventilation application. It features a rain tight enclosure for use in agricultural and industrial applications that require compliance with Article 547 of the National Electrical Code. The A19PRC has a rugged plastic enclosure that meets NEMA 4X specifications.

FEATURES

- An O-ring sealed set point adjustment Knob
- Exposed portion of the liquid filled sensing elements are plated and plastic coated to resist damage inn corrosive atmospheres.

APPLICATIONS

Typical Application includes neither controlling ventilation nor heating equipment in animal confinement or industrial buildings.

SELECTION CHART

PART NO	SWITCH ACTION	RANGE °F(°C)	DIFF F°(C°)	Bulb and Capillary	Range Adjuster
A19PRC-1C	SPDT	30 to 110(1 to 43)	3 to 12 1.7 to 6.7)	1 3/8 in. x 2 1/4 in. coiled	Knob

JOHNSON CONTROLS - A19 SERIES COILED BULB SPACE THERMOSTAT

SELECTION CHART

VENTILATING, HEATING

A19BAC

DESCRIPTION

Wide range temperature control with air coil sensing element.

FEATURES

- Wide temperature range
- NEMA1 enclosure.

APPLICATION

- Return air or space temperature sensing

To Order

Specify the code number from the following selection chart.

SELECTION CHART

PART NO	SWITCH ACTION	RANGE °F(°C)	DIFF F°(C°)	BULB AND CAPILLARY	RANGE ADJUSTER	MAX BULB TEMP °F (°C)
A19BAB-3C	SPST, Open High	35 to 95(0 to 35)	3.0 (1.7) Fixed	1-3/8 in. x 2-1/4 in. Coiled	Knob	140 (60)
A19BAC-1C	SPDT	30 to 110(–1 to 43)	3.5 (1.9) Fixed	1-3/8 in. x 2-1/4 in. Coiled	Convertible	140 (60)
A19BAF-1C	SPDT	30 to 110(–1 to 43)	1.5 (0.9) Fixed	1-3/8 in. x 2-1/4 in. Coiled	Knob	140 (60)

COOLING

PART NO	SWITCH ACTION	RANGE °F(°C)	DIFF F°(C°)	BULB AND CAPILLARY	RANGE ADJUSTER	MAX BULB TEMP °F (°C)
A19BBC-2C*	SPDT	–30 to 100(–34 to 38)	3 to 12 (1.7 to 7)	1-3/8 in. x 2-1/4 in. Coiled	Convertible	140 (60)

*Replaces White-Rodgers 201-16, -8, 2A37-1; Ranco 010-1418, -1802, 016-594, C30-C1101; Honeywell T631A, T696A, T6054 A1005.
Universal Replacement

JOHNSON CONTROLS - A19 SERIES WATER CHILLER CONTROL (With Locked Cutout/Adjustable Cut-in)

SELECTION CHART

A19ZBA-1

DESCRIPTION

Remote bulb temperature control with limited set point range, adjustable differential, and adjustable cut-out.

FEATURES

- Adjustable cut-out (38° to 47°F)
- Wide differential adjustment range.

ACCESSORIES

- Include Part No. FTG13A-600R packing nut as standard.
- Replacement cover: CVR61A-600R

APPLICATIONS

- Water chillers

SPECIFICATIONS

Maximum bulb temperature: 140°F (60°C)

SELECTION CHART

PART NO	SWITCH ACTION	RANGE °F(°C)	DIFF F°(C°)	BULB AND CAPILLARY	BULB WELLNO (Order Separately)	RANGE ADJUSTER
A19ZBA-1C	SPST Close High, Open Low	38 to 80(3 to 27)	8 to 40 (4 to 22) Adjustable	3/8-in. x 3-7/16 in., 6 ft Cap.	WEL14A-602R	Knob

JOHNSON CONTROLS - A19 DEFROST DURATION AND FAN DELAY CONTROL

DEFROST DURATION AND FAN DELAY CONTROL

SELECTION CHART

A19ZBC-2

DESCRIPTION

Remote bulb control with adj. defrost termination temperature & preset fan delay temperature.

FEATURES

- Sensing element unaffected by barometer pressure & cross-ambient temperature problems.
- Limited adjustment range.

APPLICATION

- Defrost termination control for refrigerated display cases.

SPECIFICATIONS

- Maximum bulb temperature: 140°F (60°C).
- Fan delay temperature: factory set at 25°F (-4°C).

SELECTION CHART

PART NO	SWITCH ACTION	DEFROST TERMINATION °F (°C)	BULB AND CAPILLARY	RANGE ADJUSTER
A19ZBC-2C	SPDT	45 to 85 (7 to 29)	19/64 in. x 3-1/8 in. 6 ft Cap.	Knob

JOHNSON CONTROLS - A19 SERIES AUTOMATIC CHANGEOVER WITH STRAP-ON MOUNTING

AUTOMATIC CHANGEOVER WITH STRAP-ON MOUNTING

SELECTION CHART

A19CAC-2 (Remote Bulb Model)

DESCRIPTION

This is a changeover control for use with combination heating and cooling thermostats.

FEATURES

- Automatically select the correct thermostat function

APPLICATION

Recommended for convertors, fan coils, and blast coil units, and similar devices. The A19CAC-2 can be mounted directly on either a vertical or a horizontal pipe, using the can mounting strap supplied with control. The A19CAC-1 has a remote bulb for greater mounting convenience.

SPECIFICATIONS

- Maximum case ambient temperature: 131°F (55°C)
- Maximum bulb temperature: 250°F (121°C).

SELECTION CHART

PART NO	SWITCH ACTION	RANGE °F(°C)	DIFF F°(C°)	MOUNTING
A19CAC-1C	SPDT	60 to 90 (16 to 32)	10 (5.6)	42 in. cap.
A19CAC-2C	SPDT	60 to 90 (16 to 32)	10 (5.6)	Direct

JOHNSON CONTROLS - A19 HOT WATER TEMPERATURE CONTROL WITH STRAP-ON MOUNT

HOT WATER TEMPERATURE CONTROL WITH STRAP-ON MOUNT

SELECTION CHART

A19DAC-1

DESCRIPTION

A SPDT, Strap-on, surface type hot water control for reverse action. Can be used as either an open high control or an open low control.

FEATURES

- Terminals are color-coded to simplify installation
- Can be mounted on either a horizontal or a vertical rise pipe.
- The insulated back portion of the case minimizes the effects of ambient temperature.
- The SPDT switch action for high or low temperature detection.
- Supplied with convertible range adjuster which provides either knob or screwdriver adjustment.

SELECTION CHART

PART NO	SWITCH ACTION	RANGE °F(°C)	DIFF F°(C°)	MOUNTING
A19DAC-1C	SPDT	100 to 240 (38 to 116)	10 (5.6)	Clamp-on Strap Supplied

NOTE: Replaces White -Rodgers 1127-2. A19DAC-1 not for use as a limit control.

JOHNSON CONTROLS - FLANGE MOUNTED DUCT THERMOSTAT

SELECTION CHART

A19EAF

DESCRIPTION

A wide-range temperature control with a special air coil sensing element and an adjustable mounting flange.

FEATURES

- SPDT snap-action switch
- Unaffected by barometric pressure or cross-ambient temperatures
- Flat flange mounting with the coil element permits positioning the sensing bulb in the appropriate portion of the air stream.

APPLICATIONS

These ducts thermostats are used on rooftop units, makeup-heaters, duct heaters, and air handling systems of all types.

SELECTION CHART

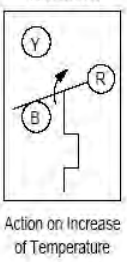
PART NO	SWITCH ACTION	RANGE °F(°C)	DIFF F°(C°)	MAXIMUM BULB
A19EAF-1C	SPDT	60 to 130 (16 to 54)	2 (1.1)	200 (93)
A19EAF-2C	SPDT	30 to 110 (–1 to 43)	2 (1.1)	140 (60)

JOHNSON CONTROLS - HIGH RANGE TEMPRATURE CONTROL

A19Series

SELECTION CHART

A19AAB-10C



Terminal Arangement for SPDT

DESCRIPTION

The A19 Series controls are single stage temperature controls that incorporate liquid-filling elements.

FEATURES

- Wide temperature ranges available
- Constant differential throughout the entire range
- SPST or SPDT snap-acting switches
- Fixed or adjustable differential available
- Unaffected by barometric pressure changes
- Unaffected by cross-ambient conditions
- Compact enclosure
- Variety of sensing element styles

APPLICATIONS

The A19's are suitable for temperature control in heating, ventilating, and refrigeration applications.

SELECTION CHART

PART NO	SWITCH ACTION	RANGE °F(°C)	DIFF F°(C°) (Factory SET)	Bulb and capillary	Bulb Well No.	Range Adjuster	Max. Bulb Temp °F(°C)
A19AAB-4C	SPST, Open High Remote Bulb Thermostat	30 to 110(-1 to 43)	3 1/2(1.9)	3/8 in. x 5 in.copper 6 ft.Cap	WEL14A-602R	ScrewDriver slotVisible scale	140(60)
A19AAB-7C	SPST ,Open High Oven Thermostat	100 to 300(38 to 149)	7 (3.9)	3/16 in. x 9 1/2 in.copper 6 ft. Cap	WEL14A-602R	KnobVisible scale	350(177)
A19AAB-10C	SPST ,Open High Oven Thermostat	200 to 550(93 to 288)	10(5.6)	3/16 in. x 6in.copper 8 ft.Cap	WEL14A-602R	Convertible	620(327)
A19AAC-9C	SPDT	100 to 240(38 to 116)	6(3.3)	3/8 in. x 3-1/2 in.copper 6 ft.Cap	WEL14A-602R	ScrewDriver slotVisible scale	290(143)
A19ABB-2C	SPST, Open High Remote Bulb Thermostat	50 to 200(10 to 93)	adj.6 to 24 (3 to 13)	0.290 in x 2 1/2 in.10 ft cap	WEL14A-602R	KnobExt.Scale	240(116)
A19ABB-7C	SPST, Open High Remote Bulb Thermostat	60 to 201(10 to 94)	adj.6 to 24 (3 to 13)	7.4 x 64 mmcopper 3m Cap	WEL14A-602R	KnobVisible scale	240(116)

JOHNSON CONTROLS - INDUSTRIAL THERMOSTAT (Watertight and Dusttight)

A19

SELECTION CHART

A19KNC-1

DESCRIPTION

Wide range temperature control with rainproof enclosure. SPDT switch, and 5°F fixed differential.

APPLICATIONS

Refrigeration, air conditioning and heating applications that require a NEMA 4 watertight and dusttight enclosure.

SELECTION CHART

PART NO	SWITCH ACTION	RANGE °F(°C)	DIFF F°(C°)	Bulb and capillary	Bulb Well No.	Range Adjuster
A19KNC-1C	SPDT	0 to 150(-15 t0 66)	5(2.8)Fixed	0.290*2 1/2 in.10ft. Cap	WEL16A-600R	Knob

JOHNSON CONTROLS - THERMOSTAT FOR HAZARDOUS LOCATIONS

SELECTION CHART

DESCRIPTION

This thermostat provides remote bulb or coiled bulb sensing for hazardous environments.

FEATURES

- A precision enclosed switch and a liquid filled sensing element provides repeat accuracy that is unaffected by barometric pressure and cross-ambient temperature fluctuations.
- The SPDT switch provides open high or close high action for heating or cooling
- The electrical rating permits direct control of most equipment

APPLICATIONS

These thermostats are designed for use in grain elevators, chemical and powder plants, mines, oil refineries, and similar sites. For use in Class I, Group D and Class II, Groups E, F, and G hazardous locations.

SELECTION CHART

PART NO	SWITCH ACTION	RANGE °F(°C)	DIFF F°(C°)	Bulb and capillary	Range Adjuster	Bulb Well (if required)	Max. Bulb Temp °F(°C)
A19AUC-1C	SPDT	-30 to 50 (-34 to 10)	5 (2.8)	3/8 in. * 4-1/16 in. 6 ft. Cap.	Knob	WEL14A-602R	140(60)
A19AUC-1C	SPDT	20 to 80 (-7 to 27)	3-1/2(1.9)	3/8 in.* 4-31/32 in.6 ft.Cap.	Knob	WEL14A-603R	140(60)
A19BUC-2C	SPDT	20 to 80 (-7 to 27)	3-1/2(1.9)	Coiled	Knob	WEL14A-603R	140(60)

JOHNSON CONTROLS - THERMOSTAT FOR PORTABLE HEATERS(Chain Mount and Drop Cord Elecrical Connection)

SELECTION CHART

DESCRIPTION

Sturdy compact thermostat designed especially for temporary installations.

FEATURES

- 6 foot extension cord with piggyback style plug
- NEMA 1 enclosure
- Chain mount

APPLICATIONS

- On/Off control of portable space heaters
- Agriculture

SELECTION CHART

PART NO	SWITCH ACTION	RANGE °F(°C)	DIFF F°(C°)	Max. Bulb Temp °F(°C)
A19BAG-1C	SPST Open High No Heat position	35 to 95 (2 to 35)	3 (1.7)Non-Adj.	140(60)

JOHNSON CONTROLS - Warm Air Limit Control with Manual Reset

A25 Series

SELECTION CHART

DESCRIPTION

The A25 warm air control locks out on temperature increase to the control set point. Manual reset is required before the electrical contacts can be enclosed. The A25 is normally located in a return air duct and is wired to shut down A/C or ventilating fans when the temperature of the air becomes excessively hot.

FEATURES

- TRIP-tree reset lever does not permit restarting unit until the reset lever is manually released.
- The rod and tube type sensing element provides positive control action

APPLICATIONS

- High temperature out-put

SPECIFICATIONS

- Maximum element temperature: 300°F (149°C)

SELECTION CHART

PART NO	SWITCH ACTION	RANGE °F(°C)	DIFF F°(C°)	Range Adjuster
A25AN-1C	SPST Open High	25 to 215(-4 to 102)	Knob	High Limit Set at 125(52)
A25CN-1C	SPDT	25 to 216 (-4 to 102)	Knob	High Limit Set at 125(52)

Factory Manual approved Models

PART NO	SWITCH ACTION	RANGE °F(°C)	DIFF F°(C°)	Range Adjuster
A25AP-1C	SPST Open High	25 to 216 (-4 to 102)	Concealed ScrievDriver Slot	High Limit Set at 125(52)
A25CP-1C	SPDT	25 to 216 (-4 to 102)	Concealed ScrievDriver Slot	High Limit Set at 125(52)

JOHNSON CONTROLS - FOUR WIRE, TWO-CIRCUIT TEMPERATURE CONTROL

A70 Series

SELECTION CHART


A70GA-1

DESCRIPTION

The A70 Series temperature control incorporates a vapor-charged sensing element. The A70G, A70H, A70K have a 4-wire, 2-circuit contact block that contains two isolated sets of contacts. The contacts are designed so that when the main contact opens, the auxiliary contact closes.

FEATURES

- Long-life, snap-acting contacts
- Automatic or manual reset models

APPLICATIONS

Typical applications include energizing an indicator light and a low temperature cutout on a ventilating system.

SELECTION CHART

	SWITCH ACTION						
PART NO	MAIN CONTACTS	AUXILIARY CONTACTS	Range F°(C°)	Diff F°(C°)	BULB AND CAPILLARY	Max Bulb Temp F°(C°)	Range Adjuster
A70GA-1C(a)	Open Low	Close Low	15 to 55(-1 to 15)	5(2.8)	20 ft of 1/8 in.O.D. Tubing	400 (260)	ScrewDriver Slot
A70GA-2C	Open Low	Close Low	35 to 80(0 to 25)	3 to 30,Factory set at 12 (-11.1)	3/8 in.*3 in.6 ft.Cap	250(121)	ScrewDriver Slot
A70HA-1C(a)	Open Low	Close Low	15 to 55(-10 to 15)	Manual Reset	20 ft.of 1/8 O.D. Tubing	400(260)	ScrewDriver Slot
A70HA-2C	Open Low	Close Low	35 to 80(0 to 25)	Manual Reset	3/8 in.*3 in.6 ft. Cap	250(121)	ScrewDriver Slot
A70KA-1C	Open High	Close High	100 to 770(38 to 77)	Manual Reset	3/8 in.*10 in.6 ft. Cap	240(116)	ScrewDriver Slot

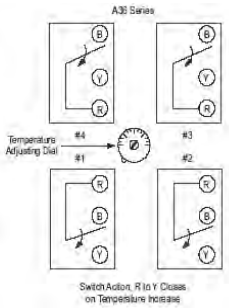
(a) The low cutout stop is set and sealed at 35°F (1.6°C). The control responds only to the lowest temperature along any one ft. of the entire 20ft. element or bellows cup.

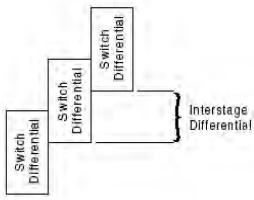
JOHNSON CONTROLS - FOUR STAGE REMORE BULB THERMOSTATS

A36 Series

SELECTION CHART

A36AHA-52





DESCRIPTION

The A36 series are four stage thermostats with open construction for use in panel mounting.

FEATURES

- Screwdriver slot adjustment w/calibrated dial enables movement of entire staging band within the range.

ACCESSORIES

- Enclosure: CSE57A-600

APPLICATIONS

- Cycling control for multiple refrigeration compressors or unloading type compressors.

SPECIFICATIONS

- Maximum bulb temperature:
  - 120°F (49°C) in operation
  - 140°F (60°C) when sniping

SELECTION CHART

PART NO	SWITCH ACTION	Range F°(C°)	Diff F°(C°)	BULB AND CAPILLARY	Bulb Well No.(Order Separetely)	Range Adjuster
A36AHA-50C(a)	4 SPDT-Switches	65 to 95 (13 to 35)	2 Each Stage 1-1/2 Between Stages	3/8 in. x 5 1/4 in.w/12 in.Nylon Armor	WEL14A-603R	Screw Driver Slot Calibrated Dia.
A36AHA-52C(a)	4 SPDT-Switches	65 to 95 (13 to 35)	2 Each Stage 1-1/2 Between Stages	3/8 in. x 5 1/4 in.w/12 in.Nylon Armor	WEL14A-603R	Screw Driver Slot
A36AHA-58C(b)	4 SPDT-Switches	0 to 70 (-18 to 21)	2 Each Stage 1-1/2 Between Stages	3/8 in. x 4 3/4 in.15ft.Braid Armor Cap	WEL14A-502R	Screw Driver Slot
A36AHB-33C(b)	4 SPDT-Switches	0 to 70 (-18 to 21)	2 Each Stage 1-1/2 Between Stages	3/8 in. x 4 3/4 in.15ft.Braid Armor Cap	WEL14A-502R	Screw Driver Slot

(a) Calibrated at mid switching point...computer room or comfort control.
(b) Calibrated at low switching point...special close control chiller applications.

JOHNSON CONTROLS - COOLING TOWER OR EVAPORATIVE CONDENSER CONTROLS (Single Stage Temperature Contr withOutdoor Enclosure)

A72 Series

SELECTION CHART

DESCRIPTION

The A72AE and A72CE are wide range temperature controls with heavy duty DPST contacts and neoprene coated sensing elements.

APPLICATIONS

- Control of cooling tower fans; motorized valves or solenoid operated valves.

SPECIFICATIONS

- Ambient temperature limits: -65 to 150°F (-54 to 66°C).
- Maximum bulb temperature: 170°F (77°C).

SELECTION CHART

PART NO	SWITCH ACTION	RANGE °F(°C)	DIFF F°(C°)	BULB AND CAPILLARY	RANGE Adjuster
A72AE-1C	DPST Close High	25 to 90 (–5 to 30)	4 to 25 (2.2 to 14)	1-1/16 in. x 6-3/4 in. Neoprene Coated 6 ft. Cap.	Internal Screwdriver Slot
A72CE-1C	DPST Close High	25 to 90 (–5 to 30)	4 to 25 (2.2 to 14)	1-1/16 in. x 6-3/4 in. Neoprene Coated 6 ft. Cap.	Internal Screwdriver Slot

JOHNSON CONTROLS - TWO POLE HEAVY DUTY TEMPERATURE CONTROL(Adjustable Differential)

SELECTION CHART

DESCRIPTION

The A72 Series temperature controls incorporate a vapor charged sensing element and heavy duty contacts.

FEATURES

- Double pole single throw contact block contain two isolated sets of contacts that make or break simultaneously.

APPLICATIONS

- Automatic control of heavy electrical loads.

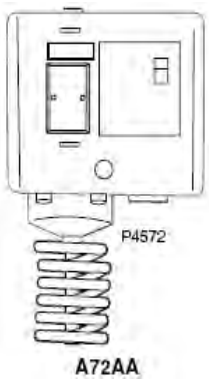
SELECTION CHART

PART NO	SWITCH ACTION	RANGE °F(°C)	DIFF F°(C°)	BULB AND CAPILLARY	Max Bulb Temp F°(C°)	Range Adjuster
A72AA-1C	DPST Close High Open Low	-30 to 30 (-34 to -1)	4 to 25 (2 to 14)	3/8 in.* 3in. C ft. Cap	200(93)	ScrewDriver Slot
A72AA-2C	DPST Close High Open Low	15 to 55 (-9 to 13)	3 to 30 (1.7 to 17)	3/8 in.* 3in. C ft. Cap	200(93)	ScrewDriver Slot
A72AA-3C	DPST Close High Open Low	50 to 90 (10 to 32)	3 to 30 (1.7 to 17)	11/16 in.*6-3/4 in.Cross Ambient 6 ft. Cap	135(57)	ScrewDriver Slot
A72AP-1C	DPST Close High Open Low	-10 to 65 (-23 to 18)	4 to 40 (2 to 22)	11/16 in.*6-3/4 in.Cross Ambient 6 ft. Cap	130(54)	ScrewDriver Slot

(a) Packing nut assembly available for direct immersion applications, Part No, FTG13A-800R.
(b) Equipped with manual “PUSH TO START” button. Manual start feature is especially dose between closing and opening setting of switch.

JOHNSON CONTROLS - A72AA SERIES COILED BULB SPACE THERMOSTAT (Cooling)

SELECTION CHART



DESCRIPTION

The A72 is a space sensing thermostat with heavy-duty contacts

APPLICATION

Compressor cycling for walk-in coolers and freezers.

SELECTION CHART

PART NO	SWITCH ACTION	RANGE °F(°C)	DIFF F°(C°)	BULB AND CAPILLARY	RANGE Adjuster
A72AA-4C	DPST Close High Open Low	15 to 55 (–9 to 13)	3 to 30 (1.7 to 17)	Coiled Copper Bulb	ScrewDriver Slot

JOHNSON CONTROLS - A319 ELECTRONIC TEMPERATURE CONTROL

ELECTRONIC TEMPERATURE CONTROL

SELECTION CHART

A319 Electronic Temperature Control

DESCRIPTION

The A319 Series is a line voltage, single-stage electronic temperature control with Single-Pole, Double-Throw (SPDT) relay output and LED indication. The A319 features heating or cooling modes of operation, adjustable cut-in, adjustable differential, and an interchangeable temperature sensor. The A319 couples electronic accuracy with remote sensing capability in a NEMA 1 high-impact plastic enclosure suitable for surface or DIN rail mounting.

FEATURES

- Operates on 120 or 208/240 volts, which eliminates need for a separate transformer, saving installation time and cost.
- Electronic circuitry improves accuracy and provides higher reliability than equivalent electromechanical controls.
- Solid-state sensor handles remote sensing applications without the need for ambient compensation or other limitations of electromechanical temperature controls.
- Interchangeable temperature sensors and mounting accessories allow flexibility in application; increasing versatility and serviceability.
- Two models cover temperature ranges from -20 to 220°F (-30 to 105°C), reducing inventory by encompassing the temperature ranges required to support the majority of refrigeration and HVAC applications.
- Wide adjustable differential of 1 to 30°F (0.5 to 17°C) enables the user to match equipment cycle rate for a given applications; maintains a tighter differential than typical electromechanical controls.
- Field selectable mode jumpers work to control either heating or cooling equipment with LED indication of relay energization status.

APPLICATIONS

The A319 can be used to control a wide variety of single stage refrigeration or HVAC equipment.

Typical applications include:

- Frozen/refrigerated food cases.
- Compressor lockout.
- Beverage/milk coolers.
- Condenser fan cycling.
- Pump control (cooling lowers).
- Boiler control.
- Space and return-air temperature control
- Immersion sensing for actuation of hot water and steam values in heating applications.

SELECTION CHART

PART NO	DESCRIPTION
A319ABC-12-01	A319 Temperature Control with Sensor(100 to 200 F range)
A319ABC-24-01	A319 Temperature Control With Sensor(20 to 100 F range)

ACCESSORIES

PART NO	DESCRIPTION
TE-6300-608	NTC Thermistor sensor with 8 ft (2.4 m) leads
TE-6300-610	NTC Thermistor sensor with 12 ft (3.7 m) leads
SHL10A- 603R	Sun shield for use with TE- 6300-608 And BOX10A-600R
APD11A-600R	1/2 in,dia, EMT conduit Adapter (box of 10)for use with BOX10A-600R
BKT287-1R	35 X 7.5 MM,0.305m(12 in)long D/N rail for use with A319
BKT287-2R	35 X 7.5 MM,0.914m(36 in)long D/N rail for use with A319
PLT344-1R	End clamps,(2) for DIN rail mounting of A319 controls

JOHNSON CONTROLS - A319 ELECTRONIC TEMPERATURE CONTROL

SELECTION CHART


A419 Control and Sensor

DESCRIPTION

The A419 series controls are line voltage, single-stage, electrical temperature controls with a SPDT output relay. They feature a lockable front-panel touched for setup and adjustment, and a Liquid Crystal Display for viewing the temperature and status of other functions.

The A419 controls have heating and cooling modes, adjustable set point and differential, an adjustable anti-short cycle delay, and a temperature offset (setback) function.

APPLICATIONS

The A419 is used to control a wide variety of single-stage refrigeration or HVAC equipment.

Typical applications include:

- Freezer control in convenience stores
- Reach-in coolers
- Supermarket display cases for produce or meats
- Restaurant or convenience store walk-in coolers
- Boiler control
- Compressor lockout (display exceeds limits)
- Condenser fan cycling
- Pump control for cooling towers
- Space and return air temperature

SELECTION CHART

PART NO	ITEM	DESCRIPTION
A419ABC-1C	Line Voltage,NEMA 1 Enclousure A419 Series Electronic Temperature Control with Display, A99 Sensor included	Supply Voltage:120 or 240 VAC RANGE :-30 to 212 F(-34 TO 100 C) Diffrential:1 to 3CF(1 to 30 C)
A419ACE-IC	Line Voltage,NEMA 4X Enclousure A419 Series Electronic Temperature Control with Display, A99 Sensor included	Supply Voltage:120 or 240 VAC RANGE :-30 to 212 F(-34 TO 100 C) Diffrential:1 to 3CF(1 to 30 C)
A419GBF-1C	24 VAC,NEMA 1 Enclousure A419 Series Electronic Temperature Control with Display, A99 Sensor included	Supply Voltage:24 VAC,Class 2 RANGE :-30 to 212 F(-34 TO 100 C) Diffrential:1 to 3CF(1 to 30 C)
A419GEF-1C	24 VAC,NEMA 4X Enclousure A419 Series Electronic Temperature Control with Display, A99 Sensor included	Supply Voltage:24 VAC,Class 2 RANGE :-30 to 212 F(-34 TO 100 C) Diffrential:1 to 3CF(1 to 30 C)

ACCESSORIES

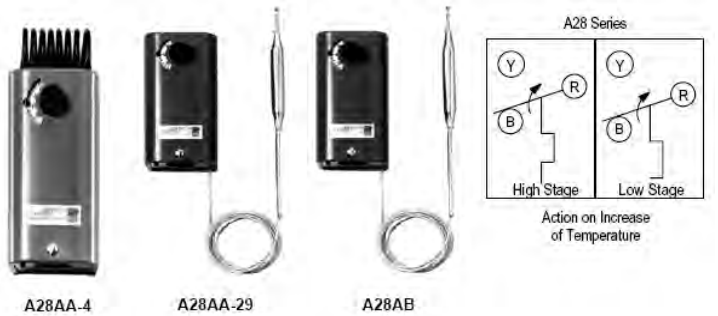
PART NO	ITEM	DESCRIPTION
BKT287-1R	Accessory Mounting Hardware	12 in (305 mm)long DIN Rail
BKT287-2R	Accessory Mounting Hardware	36 in (914 mm)long DIN Rail
PLT344-1R	Accessory Mounting Hardware	Two End Clams for DIN Rail Mounting
CLK350-2C	Digital Clock	7 Days Programmable Digital Clock for controlling Temperature Offset

JOHNSON CONTROLS - TWO STAGE TEMPERATURE CONTROL

A28 Series

SELECTION CHART

Coild Bulb-Fixed Differential



DESCRIPTION

The A28 Series are two stage temperature controls that incorporate a liquid filled sensing element.

FEATURES

- Wide temperature ranges available
- Constant differential throughout the entire range
- SPDT snap action switches
- Unaffected by changes in barometric pressure
- Unaffected by cross ambient conditions
- Compact enclosure
- Variety of sensing element styles

APPLICATIONS

Temperature sensing applications requiring two stage control of HVAC/ Refrigeration equipment.

SPECIFICATIONS

Maximum bulb temperature:

- A28AA-37, 230°F (110°C)
- All others, 140°F (60°C)

ACCESSORIES

- Packing nut assembly available for direct immersion applications
- (Part No. FTG13A-600R)
  Remote bulb models include 5/8 in. mounting clip.

COILED BULB-FIXED DIFFERENTIAL

PART NO	SWITCH ACTION	RANGE °F(°C)	DIFF F°(C°)	Bulb and capillary	Bulb Well No.(order separately)	Range Adjuster
A28AA-4C	2-SPDT	30 to 110 (-1 to 43)	3 1/2(1.9) Ea.Stage 3(1.7)Fixed Between Stages	1 3/8 in.* 2 1/4 in.Coiled	--	Convertible

Case Compensated-Fixed differential

PART NO	SWITCH ACTION	RANGE °F(°C)	DIFF F°(C°)	Bulb and capillary	Bulb Well No.	Range Adjuster
A28AA-8C	2-SPDT	-30 to 50(34 to 10)	5(2.8) Ea.Stage 3(1.7)Fixed Between Stages	3/8 in. * 4 in.6 ft.Cap.	WEL14A-602R	Knob
A28AA-9C	2-SPDT(b)	20 to 80(-7 to 27)	3 1/2(1.9) Ea.Stage 3(1.7)Fixed Between Stages	3/8 in. * 5 in.6 ft.Cap(a).	WEL14A-603R	Knob

Wide Range-Adjustible interstage differential

PART NO	SWITCH ACTION	RANGE °F(°C)	DIFF F°(C°)	Bulb and capillary	Bulb Well No. (order seprately)	Range Adjuster
A28AA-28C	2-SPDT(d)	30 to 110(-1 to 43)	3 1/2 (1.9)Ea.Stage 2 to 7 Adj.Between Stages	12 ft averaging bulb 6 ft. Cap.	--	ScrewDriver Slot
A28AA-29C	2-SPDT(b)	-30 to 100(-34 to 38)	5(2.8)Ea.Stages 2 to 7 Adj.Between Stages	3/8 in.**4 in. 6 ft.Cap.	WEL14A-502R	Convertible
A28AA-36C	2-SPDT	40 to 90(4 to 32)	3 Ea.Stages 2 to 7 Adj. Between Stages	3/8 in.*5 3/4 in.6 ft. Cap.	--	Knob
A28AA-37C	2-SPDT	60 to 140(16 to 60)	5 Ea.Stage 2 to 7 Adj. Between Stges	3/8 in.*4 in.6 ft.CAP.	WEL14A-602R	Knob
A28AJ-4C	2-SPDT	20 to 80 (-7 to 27)	2 Ea.Stage 2 TO 7 adj. Between Stages	3/16 in.*22 in.6 ft.Cap.	--	Knob

ChangeOver Control

PART NO	SWITCH ACTION	RANGE °F(°C)	DIFF F°(C°)	Bulb and capillary	Bulb Well No. (order seprately)	Range Adjuster
A28AB-1C	2-SPDT(b)	20 to 80 (-7 to 27)	3 1/2 (1.9)	3/8 in.*5 in.6 ft. Cap.	WEL14A-603R	ScrewDriver Slot
A28AB-2C(c)	2-SPDT(d)	60 to 90(16 to 32)	6(2.8)	Strap-on Grid Blue 42 in.Cap.	--	ScrewDriver Slot

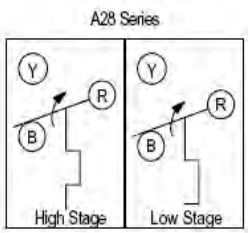
(a) Packing not assembly available for direct immersion applications (Par No.FTG13A-600R)
(b) Switches with in 1°F (0.6°C) of each other.
(c) Maximum sensing element temperature is 250°F (121°C)
(d) Switches within 5°F (3°C).

JOHNSON CONTROLS - A28 SERIES TWO-STAGE FLANGE MOUNTED DUCT THERMOSTAT

TWO-STAGE FLANGE MOUNTED DUCT THERMOSTAT

SELECTION CHART

A28AK



Action on Increase of Temperature

DESCRIPTION

The A28AK is a two-stage temperature control with special air coil sensing element and adjustable mounting flange.

APPLICATIONS

These duct thermostats are used on the roof top unit make up heaters, and air handling systems of all types.

FEATURES

- Flat flange mounting with special coils elements permits positioning of sensing bulb in the appropriate portion of the air stream.
- 2 SPDT snap acting switches.
- Unaffected by barometric pressure or cross ambient temperatures.

SELECTION CHART

PART NO	SWITCH ACTION	RANGE °F(°C)	NUMBER OF STAGES	DIFFERENTIAL F° (C°) FIXED		MAXIMUM ALLOWABLE TEMPERATURE AT BULB °F (°C)
				Each Stage	FIXED Between Stage	
A28AK-1	2-SPDT Switches	30 to 110 (–1 to 43)	2	2 (1.1)	3 (1.7)	140 (60)
A28AK-2	2-SPDT Switches	60 to 130 (16 to 54)	2	2 (1.1)	3 (1.7)	200 (93)

JOHNSON CONTROLS - TWO STAGE INDUSTRIAL THERMOSTAT(Watertight and Dusttight)

A28

SELECTION CHART

A28KA

DESCRIPTION

The A28KA is a wide range temperature control with gasketed enclosure and two SPDT switches.

APPLICATIONS

This control is for refrigeration, air conduction and heating applications. This control incorporates gasketed enclosures that can be used in a range of industrial and general purpose applications.

FEATURES

- Rugged steel enclosure
- Liquid filled sensing element that provides uniform control

SELECTION CHART

PART NO	SWITCH ACTION	Range	Diff	Bulb and Capillary	Bulb Well No. (order separately)	Range Adjuster
A28KA-1C	2-SPDT	0 to 150 (-15 t0 65)	5 (2.5) Ea.Stage 3(1.7) Fixed Between stages	8.290 *2/1/2 in 10ftCap	WEL16A-600R	Knob

JOHNSON CONTROLS - TWO STAGE TEMPERATURE CONTROL WITH WEATHERPROOF ENCLOSURE

A28

SELECTION CHART

A28MA-1

DESCRIPTION

The A28MA controls are wide range temperature controls with rainproof NEMA 3R Enclosure and SPDT switches.

APPLICATIONS

- Sump water temperature control for cooling towers and evaporative condensers
- Fan cycling control to air cooled condensers

FEATURES

- Rugged steel enclosure
- Liquid filled sensing element (provides uniform control)

SELECTION CHART

PART NO	SWITCH ACTION	Range F°(C°)	Diff F°(C°)	BULB AND CAPILLARY	Range Adjuster
A28MA-1C	2 Stage 2-SPDT Switches	40 to 120 (4 t0 49)	Factory set 5(2.8) Each Stage 8 (4.4) Between Stages	3/8 in.*4in.Neaoprene Coated 6ft Cap	Screw Driver Slot
A28MA-2C	2 Stage 2 SPDT Switches	40 to 120 (4 t0 49)		3/8 in* 4 1/6 in. 6 ft Cap.	Screw Driver Slot

JOHNSON CONTROLS - TWO STAGE AGRICULTURAL THERMOSTAT WITH NEMA 4X ENCLOSURE

A28

SELECTION CHART

A28PJ-1

DESCRIPTION

The A28PJ is a two stage electromechanical thermostat with rain tight & dust tight enclosure.

FEATURES

- Rugged thermoplastic gasketed enclosures that meet NEMA 4X specifications.
- O-ring sealed set point adjustment knobs.
- Range scale with oversized white markings for easy readability in low light.
- Exposed portion of liquid filled sensing elements are plated and plastic coated to resist damage in corrosive atmospheres.

APPLICATIONS

Designed for use in agricultural and industrial applications that require compliance with Article 547 of the National Electrical Code.

SELECTION CHART

PART NO	SWITCH ACTION	Range F°(C°)	Diff F°(C°)	BULB AND CAPILLARY	Range Adjuster
A28PJ-1C	2-SPDT	30 to 110(-1 to 43)	2(1.1) Ea. Stage2-7 (1.1-3.9) Adj. Between Stages	1 3/8 in.*2 1/4 in. Coiled	Knob

JOHNSON CONTROLS

A99B Series

Temperature Sensor

Description

The A99B Series Temperature Sensors are passive PTC (Positive Temperature Coefficient) sensors. The A99B sensors are splashproof and are designed to measure temperature in a variety of refrigeration applications. Several accessories allow easy tailoring of the temperature sensor to various mounting configurations.

Applications include temperature sensing for freezers and coolers, as well as in defrost termination sensing, space and return air temperature sensing, and condenser fan cycling.

Features

- variety of lead lengths available to encompass most application requirements and simplify wiring sensors
- an assortment of mounting hardware provides configurations for many applications
- exceptional accuracy of sensing element provides excellent performance in a wide variety of control applications
- stainless steel sensing bulb allows use in more applications than other types of bulbs without corrosion
- lead length may be extended up to 800 ft

A99B Temperature Sensors

Selection Chart

Part Number	Description
A99BA-200C	PTC Silicon Sensor with Shielded Cable; Cable length 6-1/2 ft (2 m); Range: -40 to 212°F (-40 to 100°C)
A99BB-25C	PTC Silicon Sensor with PVC Cable; Cable length 9-3/4 in. (0.25 m); Range: -40 to 212°F (-40 to 100°C)
A99BB-200C	PTC Silicon Sensor with PVC Cable; Cable length 6-1/2 ft (2 m); Range: -40 to 212°F (-40 to 100°C)
A99BB-300C	PTC Silicon Sensor with PVC Cable; Cable length 9-3/4 ft (3 m); Range: -40 to 212°F (-40 to 100°C)
A99BB-500C	PTC Silicon Sensor with PVC Cable; Cable length 16-3/8 ft (5 m); Range: -40 to 212°F (-40 to 100°C)
A99BB-600C	PTC Silicon Sensor with PVC Cable; Cable length 19-1/2 ft (6 m); Range: -40 to 212°F (-40 to 100°C)
A99BC-25C	PTC Silicon Sensor with High Temperature Silicon Cable; Cable length 9-3/4 in. (0.25 m); Range: -40 to 248°F (-40 to 120°C)
A99BC-300C	PTC Silicon Sensor with High Temperature Silicon Cable; Cable length 9-3/4 ft (3 m); Range: -40 to 248°F (-40 to 120°C)
A99BC-500C	PTC Silicon Sensor with High Temperature Silicon Cable; Cable length 16-3/8 ft (5 m); Range: -40 to 248°F (-40 to 120°C)
A99BC-1500C	PTC Silicon Sensor with High Temperature Silicon Cable; Cable length 49 ft (15 m); Range: -40 to 248°F (-40 to 120°C)

Accessories

Part Number	Description
A99-CLP-1	Surface Mounting Clip for the A99B Temperature Sensor
ADP11A-600R	1/2 in. diameter EMT Conduit Adapter (box of 10) for use with BOX10A-600R
BOX10A-600R	PVC Enclosure
SHL10A-600R	Sun Shield for Single Sensor
SHL10A-603R	Sun Shield for Two Sensors
WEL11A-601R	Immersion Well

Applications

The A99B temperature sensor line offers an economical solution for a wide variety of temperature sensing needs in refrigeration and HVAC applications.

Typical temperature sensing applications and environments include:

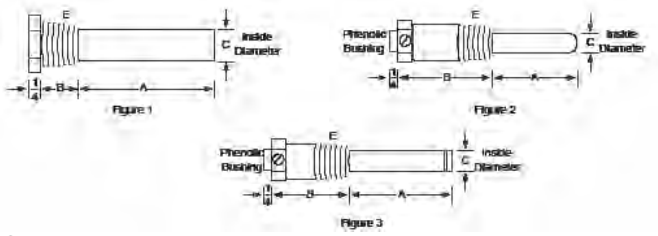
- freezers
- display cases
- walk-in coolers
- reach-in coolers
- defrost termination temperature sensing
- condenser fan cycling
- space and return air temperature sensing
- outdoor air sensing
- process cooling and heating

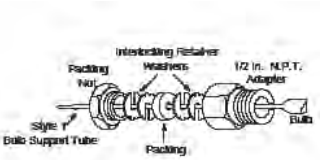
Technical Specifications

A99B Series Temperature Sensor		
Sensing Range	A99BA A99BB	-40 to 212°F (-40 to 100°C)
	A99BC	-40 to 248°F (-40 to 120°C)
Reference Resistance		1035 ohms at 77°F (25°C)
Accuracy		0.9°F (0.5°C) between 5 and 167°F (-15 and 75°C)
Sensor Construction		Stainless Steel Probe
Sensor Lead Wire Insulation	A99BA	Shielded PVC Cable
	A99BB	PVC Cable
	A99BC	High Temperature Silicon Cable
Lead Wire Gauge		22 AWG
Maximum Allowable Bulb Temperature		257°F (125°C)
Ambient Operating Conditions	A99BA A99BB	-40 to 212°F (-40 to 100°C); 0 to 100% RH, Condensing
	A99BC	-40 to 248°F (-40 to 120°C); 0 to 100% RH, Condensing
Ambient Storage Conditions	A99BA A99BB	40 to 221°F (-40 to 105°C); 0 to 100% RH, Condensing
	A99BC	-40 to 266°F (-40 to 130°C); 0 to 100% RH, Condensing

JOHNSON CONTROLS - Bulb Wells

Selection Chart (WEL Series Bulb Wells)





DESCRIPTION

Bulb Wells are used in conjunction with Remote Bulb Temperature Controls where bulb insertion into a vessel or container to sense temperature is required. WZ Series wells are used with TE-6000 and TE-6300 sensors. A variety of shapes, sizes, and materials are available for a wide range of applications. Refer to the appropriate temperature control for the exact bulb well required. The Code No. FTG13A-600R packing nut assembly is used in applications where the temperature does not fall below -35°F (-37°C). The maximum liquid pressure limit is 150 psig (1034 kPa). Use with Style 1, 3/8" diameter bulb for direct immersion application. A19 require models with support tube, A70 and A72 do not need support tubes.

		Dimension						Pipe Thread				See	
PART NO	See Figure	A (in)	B (in)	C (in)	Material Connector	Max. Temp °F	Material Tube	Max. Pressure PSIG	Inside D (in)	Outside E (in)	Plating	Note	Figure	Type of Solder Joint
WEL11A-601R	2	2-3/8	2-5/16	.299	Brass	250	Copper	300	--	1/2	--	1	2	Soft
WZ-1000-2	1	5-1/4	1-1/4	.500	Stainless steel	300	Stainless steel	400	1/2	1/2	--	3	1	--
WZ-1000-4	1	5-1/4	1-1/4	.500	Stainless steel	600	Stainless steel	400	1/2	1/2	--	--	1	--
WZ-1000-5	2	2-3/8	2-5/16	.299	Malleable	250	Brass	300	--	1/2	--	3	2	--
WEL14A-600R (a)	3	4-3/4	1-13/16	.444	Monel	700	Monel	1000	--	1/2	--	2	3	TIG weld
WEL14A-601R (a)	3	7-9/16	1-13/16	.430	Brass	250	Copper	300	--	1/2	Brite-Dip	2	3	Silver
WEL14A-602R (a)	3	4-15/16	1-13/16	.430	Brass	250	Copper	300	--	1/2	Brite-Dip	2	3	Silver
WEL14A-603R (a)	3	5 13/16	1 13/16	.430	Brass	250	Copper	300	--	1/2	Brite-Dip	2	3	Silver
WEL16A-600R	2	2-3/8	1-5/16	.299	Brass	250	Copper	300	--	1/2	--	1	2	Soft
WEL16A-601R	2	2-13/16	1-13/16	.375	Brass	250	Copper	300	--	1/2	--	2	2	Soft
WEL17A-600R(b)	1	10-7/16	3/4	.763	Malleable	250	Copper	250	1/2	3/4	Tin	--	1	Silver
WEL17A-601R(b)	1	8-11/16	3/4	.763	Malleable	250	Copper	250	1/2	3/4	Tin	--	1	Silver
WEL17A-602R(b)	1	10-7/16	3/4	.753	Malleable	250	Steel	540	1/2	3/4	Tin	--	1	Silver
WEL17A-603R(b)	1	10-7/16	3/4	.753	Monel	700	Monel	1000	1/2	3/4	--	--	1	TIG weld
WEL17A-604R(b)	1	14-13/32	3/4	.763	Malleable	250	Copper	250	1/2	3/4	Tin	--	1	Silver
WEL17A-606R(b)	1	8-11/16	1-3/32	.755	Monel	700	Monel	1000	1/2	3/4	--	--	1	TIG weld
WEL18A-600R(b)	1	3-1/2	3/4	.773	Malleable	250	Steel	150	1/2	3/4	Tin	--	1	Silver
WEL18A-601R (b)	1	3-1/2	3/4	.773	Monel	700	Monel	1000	1/2	3/4	--	--	1	TIG weld
WEL18A-602R(b)	1	3-1/2	3/4	.773	Malleable	250	Brass	150	1/2	3/4	Tin	--	1	Silver

(a) For 3/8" style 1 bulbs
(b) For 11/16" diameter style 4 bulbs.
Style 1 can be used, but is not fastened into well.

NOTE 1: With phenolic bushing; 0.093" slot
NOTE 2: With phenolic bushing; 0.125" slot
NOTE 3: Includes thermal compound

Selection Chart (T-800 Wells)

PART NO	DESCRIPTION
T-800-1605	Brass well, 6-1/2 inch
T-800-1606	Stainless steel well, 5-1/4 inch
T-800-1618	Brass well, 9-1/2 inch
T-800-1620	Brass well, 9-1/2 inch
T-800-1624	Dual brass well, 6-1/2 inch

JOHNSON CONTROLS

G Series

Thermostat and Humidistat Guards

GRD10-1R
Wire Guard

GRD10A-601
Cast Aluminum Guard

GRD10A-608
Large Clear Plastic Guard

GRD10A-609
Rectangular Clear Plastic Guard

Description

The G Series guards protect thermostats and humidistats from damage, vandalism, tampering, and unauthorized adjustment. They are available in plastic, cast aluminum, or wire construction.

Features

- clear plastic guards have tumbler-type key locks
- GRD10A-608 and -609 include a mounting ring for mounting to a wall or flat surface
- plastic baseplate and plastic mounting ring available
- the baseplate mounts to a flat surface or to a single or double outlet box
- the mounting ring permits mounting over a thermostat or humidistat already installed

Applications

Ideal for locations where locked protection is required, such as schools, warehouses, churches, hospitals, or offices.

Selection Chart

Part Number	Description	Thermostat or Humidistat Series Number				
		122	125	126	128 No Switches	T91
GRD10-1R	Wire guard only		--		--	
GRD10A-600	Wire guard and baseplate		--		--	
GRD10A-601	Aluminum guard and baseplate		--			
GRD10A-606	Plastic guard with baseplate			--		
GRD10A-608	Plastic guard with baseplate, mounting ring					
GRD10A-609	Plastic guard with baseplate, mounting ring					

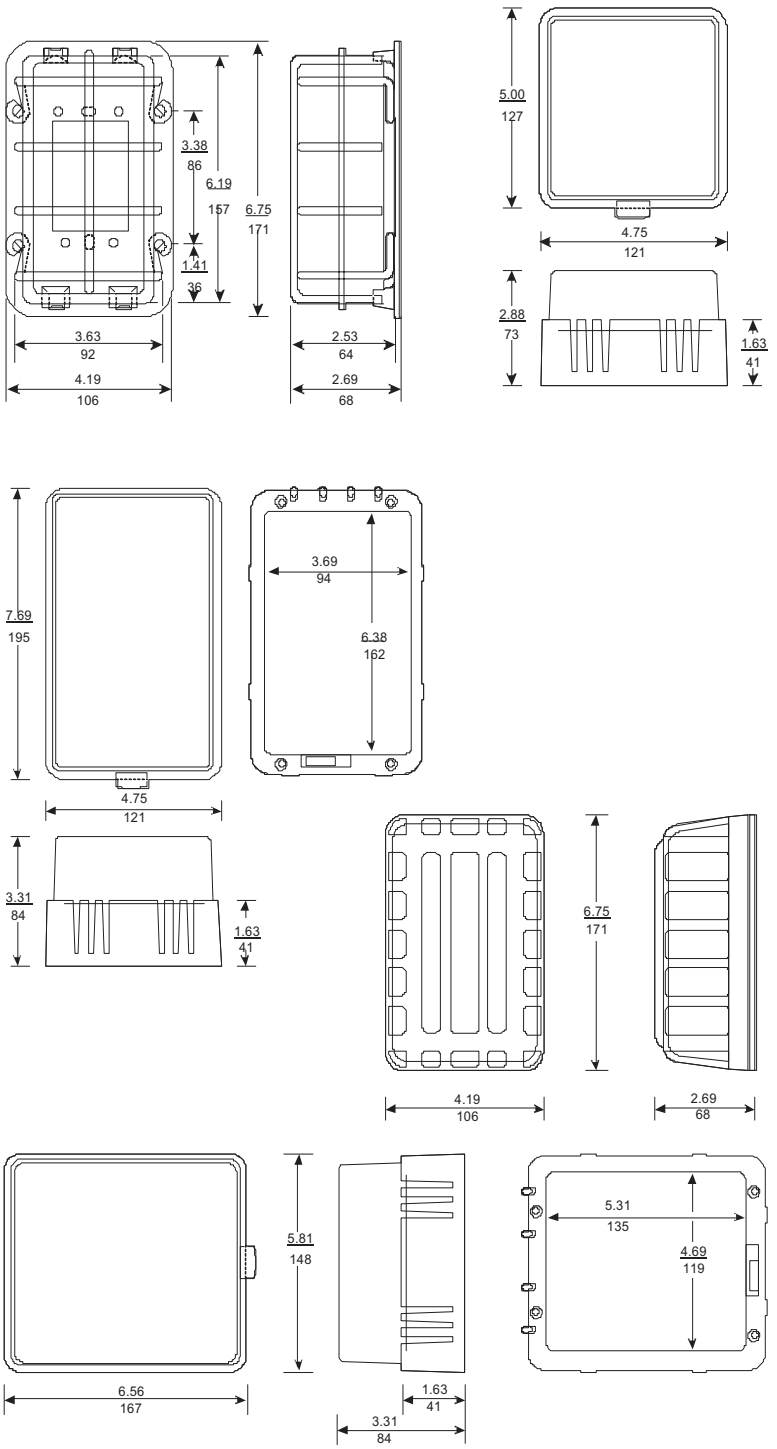
Repair Parts

Replacement key **KEY12A-600** (set of two) is available.

JOHNSON CONTROLS

Thermostat and Humidistat Guards (Continued)

Technical Specifications



G Series Dimensions, in. (mm)

JOHNSON CONTROLS - Air Conditioning/Pressure Cutout Control

P20 Series

Selection Chart

P20DB-1

DESCRIPTION

The P20 Series are field replacement high and low pressure controls for non-corrosive refrigerants.
They include a dust-tight contact unit with quick connect connectors and a 36" capillary with the ¼" sweat section. The set point is screwdriver adjustable.

FEATURES

- Accurate repeatability
- Compact size
- Trip-free manual reset

APPLICATIONS

- Air conditioning high/low pressure control
- Refrigeration high/low pressure control
- Head pressure control

SELECTION CHART

PART NO	Max. Temperature	Switch Action	Range psig (kPa)	Differential psi (kPa)	Factory Setting – psig (kPa)		Max Bellows Pressure psig (kPa)
					Opens	Closes	
P20BB-1C(a)	140°F	Open On Fall	7 to 150(48 to 1034)	Manual Reset	40(276)	Lockout	250(1724)
P20DB-1C(b)	140°F	Open On Rise	100 to 425(690 to 2930)	Manual Reset	400(2758)	Lockout	450(3103)
P20EB-1C(c)	140°F	SPDT	7 to 150(48 to 1034)	30 (172)Fixed	40(276)	70(448)	250(1724)
P20EB-2C(d)	140°F	SPDT	100 to 425(690 to 2930)	75 (483)Fixed	400(2758)	324(2275)	450(3103)

(a) Replaces Ranco G20-4412; Robertshaw 3126-216, 3160-212
(b) Replaces Ranco G23-5253; Robertshaw 3127-220, 3161-205; Honeywell P430X-1250, 1268, 1292, 1300
(c) Replaces Ranco G20-4050; Robertshaw 3126-116, 3160-012, 3160-014; Honeywell P431X-1092, 1100
(d) Replaces Ranco G23-5052; Robertshaw 3127-140, 3127-414, 3161-009; Honeywell P430X, 1235, 1243, 1276, 1284
Universal Replacement

JOHNSON CONTROLS - Steam Pressure Limit Control

P47 Series

Selection Chart

Contacts Open On Rise – Automatic Reset

P47AA-1

DESCRIPTION

The P47 controls are available with SPST, DPST, or 4-wire, two-circuit contacts for line voltage or low voltage. The pressure connector is 1/4 in. male NPT (0-15 psig only) or 1/4 in. female NPT (for all other ranges).

FEATURES

- Long-life contact structure with high contact force
- Easy-to-adjust single sight set scales show both cut-in and cut-out settings

APPLICATIONS

P47 steam pressure controls are designed for high limit or operating control applications. A typical use is as a limit control on steam heating systems. Models that close on a pressure increase are used on steam unit heaters to avoid blower operation when steam pressure is below the point required for adequate heating. The P47 can be used with steam, water, air, or noncombustible gases that do not harm iron or copper.

ACCESSORIES

Part No. TBG16A-600R Siphon is supplied with all controls except models with 0 to 15 psig range.

SELECTION CHART

			Differential psi (kPa)		
PART NO	Number of Poles	Range	Min	Max	Max Overpressure psig (kPa)
P47AA-1C	1	0 to 15 psig(0 to 103 kPa)	2 (14)	8 (55)	50 (345)
P47AA-4C	1	20 in. Hg to 50 psig(-68 to 345 kPa)	5 (34)	35(241)	180 (1241)
P47AA-13C	1	0 to 150 psig(0 to 1034 kPa)	12 (83)	50(345)	325 (2241)

Contacts Close On Rise – Automatic Reset

			Differential psi (kPa)		
PART NO	Number of Poles	Range	Min	Max	Max Overpressure psig (kPa)
P47BA-1C	1	0 to 15 psig(0 to 103 kPa)	2 (14)	8 (55)	50 (345)
P47BA-6C	1	0 to 150 psig(0 to 1034 kPa)	12 (83)	50(345)	325 (2241)

SPDT – 4-Wire Two Circuit(a) – Automatic Reset

			Differential psi (kPa)		
PART NO	Number of Poles	Range	Min	Max	Max Overpressure psig (kPa)
P47GA-9C (a)	MainOpen HighAuxiliaryOpen Low	0 to 150 psig(0 to 1034 kPa)	12 (83)	50(345)	325 (2241)

(a) The main contacts (Line-M2) open on rise, as the auxiliary contacts (Line-M1) close.

JOHNSON CONTROLS - Pressure Switch

P61 Series

Selection Chart


P61 Pressure Switch

DESCRIPTION

The P61 Series Pressure Switches automatically control residential water pumps, small air compressors (not requiring mechanical release valves), and other electrically-operated pressure equipment. They use a Double-Pole/Single-Throw (DPST) switch that opens on pressure rise. The P61 switches are enclosed in a compact NEMA 1 case and are available with a choice of four standard ranges.

FEATURES

- Small size, narrow design, and small turning radius allow control to fit in tightly-spaced applications
- Nylon-reinforced Buna-N diaphragm provides long life and trouble-free operation
- Large screw-type terminals allow quick and easy wiring

SELECTION CHART

	Factory Setting psig (kPa)			Differential psi (kPa)				
PART NO	Cut-in	Opens	Cut-out Range psig (kPa)	Min	Max	PRESSURE CONNECTOR	Pulsation Orifice	Max Overrun Pressure
P61AA-6C	40 (276)	20 (138)	15 to 70 (103 to 483)	15 (103)	30 (206)	1/4 in. NPTF	Yes(Snap-in)	175 psi
P61AA-35C	15 (103)	8 (55)	6 to 30 (41 to 207)	4 (28)	11 (76)	1/4 in. NPTF	Yes(Snap-in)	175 psi
P61NA-2C	85 (585)	60 (414)	40 to 100 (276 to 700)	16 (110)	38 (262)	1/4 in. NPTF	Yes(Snap-in)	250 psi
P61NA-4C	125 (860)	95 (655)	90 to 150 (600 to 1000)	25 (172)	40 (276)	1/4 in. NPTF	Yes(Snap-in)	250 psi

(a) Cut-in = Cut-out - Diff.

SPECIFICATIONS

P61 SERIES PRESSURE SWITCH				
		120 VAC (1, 2, 3 Phase)	240 VAC (1, 2, 3 Phase)	32 VDC
Contact Ratings	Horsepower	1	1	1/4
	Full Load Amps	16	8	8.6
	Locked Rotor Amps	96	48	86.0
Contact Unit		Snap-acting High Contact Force		
Material	Diaphragm	Nylon Reinforced Buna-N		
	Case	0.062 in. (1.57 mm) Cold Rolled Steel		
	Cover	0.032 in. (0.8 mm) Cold Rolled Steel		
	Finish	Gray Baked Enamel		
Conduit Openings		Two 0.88 in. (22 mm) Diameter Holes for 1/2 in. Conduit		
Enclosure		NEMA 1		
Wiring Connections		Screw Type Terminals		
Agency Listings		UL Guide No. NKPZ, NKPZ7, File EZ9374 CSA Class 3211 06, File LR948		
Ambient Operating Conditions		0 to 77°F (-18 to 25°C)		
Dimensions (H x W x D)		3.98 X in. (101 x 74 x 50 mm) x 2.92 x 1.97		

JOHNSON CONTROLS - Low Pressure Control

P67 Series

Selection Chart

DESCRIPTION

P67 pressure controls are used to close or open an electrical circuit, based on a predetermined air pressure signal. The operating point of the control and the differential, are easy to adjust with the externally-located adjustment screws on the top of the control enclosure. The pressure controls incorporate a non-metallic diaphragm that is positioned by air pressure changes. The diaphragm, in turn, actuates a heavy-duty electrical contact block using a lever mechanism.

FEATURES

- Long-life contact structure, high contact force
- Easy-to-adjust settings: single sight-set scales show both cut-in and cut-out settings

APPLICATIONS

Typical applications include the control of air compressors, fans, pilot lights, resistance heating elements, and other devices.

SELECTION CHART

PART NO	Control Action	Scale Range psig(a) (kPa)	Differential psi (kPa)	Temperature Range	MAXIMUM OVERPRESSURE psig (kPa)	Connector
P67AA-1C	DPST opens on pressure drop	3 to 30(21 to 207)	1 1/2-20(10 to 138)Adjustable	32 to 140°F 0 to 60°C	50 (345)	Angle Barbed Fitting
P67CA-1C	DPST opens on pressure rise	3 to 30(21 to 207)	1 1/2-20(10 to 138)Adjustable	32 to 140°F 0 to 60°C	50 (345)	Angle Barbed Fitting
P67EA-5C	L-M2 contacts connect on pressure rise and simultaneously the L-M1 contacts break	3 to 30(21 to 207)	1 1/2-20(10 to 138)Adjustable	32 to 140°F 0 to 60°C	50 (345)	1/8 in.Male NPT
P67FA-5C	L-M2 contacts break on pressure rise and simultaneously the L-M1 contacts make	3 to 30(21 to 207)	1 1/2-20(10 to 138)Adjustable	32 to 140°F 0 to 60°C	50 (345)	1/8 in.Male NPT

(a) Range is minimum cut-out to maximum cut-in on Open Low controls. It is minimum cut-in to maximum cut-out on Open High controls.

JOHNSON CONTROLS - Controls for High Pressure Applications

P70, P72, and P170 Series


P70CA-3 High Pressure Cutout Controll

DESCRIPTION

The P70, P72, and P170 controls for high pressure applications are designed primarily for high pressure cut-out control, head pressure control, and condenser fan cycling control on commercial refrigeration and air conditioning applications. 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. Ammonia compatible models are also available. Several different electrical ratings and switch configurations are available. The P72 models provide direct control of 208-240 volt single phase motors up to 3 hp, and 208-220 volt 3-phase motors up to 5 hp.

FEATURES

- All-steel case and cover provides 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 (on NEMA 1 enclosure models)
- Manual reset lockout option provides "tripfree" lockout that cannot be overridden or reset until pressure returns to specified level
- Variety of available pressure connection styles allows greater flexibility when mounting control and adapting pressure connections to field application requirements

APPLICATIONS

- **P70C, P70D P170C and P170D models**
  With Single-Pole Single-Throw (SPST) Open-high switch action are the most popular models, and are typically used for high-pressure cutout. The **C models** are automatic reset. The **D models** have a manual reset lockout mechanism. Some **P70C, P70D P170C and P170D models** are UL Listed as refrigeration pressure limiting controls.
- **P70A and P170A models** are available with SPST Open-low switch action, and typically are used for condenser fan cycling control.
- **P70 and P170 models** with Single-Pole Double-Throw (SPDT), or 4-wire, 2-circuit switch action allow users to install alarm devices or other control circuits.
- **P72 models** have a Double-Pole Single- Throw (DPST) switch with load-carrying contacts that can provide direct control of 208-240 V single-phase motors up to 3 hp, and 208-220 V 3-phase motors up to 5 hp Refer to *DPST Electrical Ratings (P72A, B, C, and D Models)* on Page 3.

NEMA 1 Enclosures are standard on most models. **NEMA 3R Enclosures** are also available.

SELECTION CHART - Condenser Fan Cycling Controls (for Non-Corrosive Refrigerants)

PART NO	SWITCH ACTION	Range psig (kPa)	Differential psi (kPa)	PRESSURE CONNECTION	Max Overpressure	Max Working Pressure
P70AA-118C	SPST Open-low	100 to 400 (690 to 2758)	Minimum 35 (241) Maximum 200 (1379)	36 in. Capillary with 1/4 in. Flare Nut	475 psig (3275 kPa)	400 psig (2758 kPa)
P70AA-2C	SPST Open-low	0 to 150	Minimum 12 (83) Maximum 70 (482)	36 in. Capillary with 1/4 in. Flare Nut	525 psig (3620 kPa)	150 psig (1034 kPa)
P72AA-27C	DPST Open-low	0 to 1034	Minimum 35 (241) Maximum 200 (1379)	36 in. Capillary with 1/4 in. Flare Nut	475 psig (3275 kPa)	400 psig (2758 kPa)
P170AA-118C	SPST Open-low	100 to 400 (690 to 2758)	Minimum 35 (241) Maximum 200 (1379)	1/4 in. Male Flare Connector	475 psig (3275 kPa)	400 psig (2758 kPa)

JOHNSON CONTROLS - Controls for High Pressure Applications

P70, P72, and P170 Series

All Range Controls (for Non-Corrosive Refrigerants)

PART NO	PRESSURE CONNECTION	Differential psi (kPa)	SWITCH ACTION	Max Working Pressure	Range psig (kPa)	Max Overpressure
P70CA-2(a)	1/4 in. Male Flare Connector	Minimum 60 (414) Maximum 150 (1034)	SPST Open-high	500 psig (3448 kPa)	50 to 500 (345 to 3448)	525 psig (3620 kPa)
P70CA-3(a)	36 in. Capillary with 1/4 in. Flare Nut	Minimum 60 (414) Maximum 150 (1034)	SPST Open-high	500 psig (3448 kPa)	50 to 500 (345 to 3448)	525 psig (3620 kPa)
P70DA-1C(a)	36 in. Capillary with 1/4 in. Flare Nut	Manual Reset Lockout	SPST Open-high	500 psig (3448 kPa)	50 to 500 (345 to 3448)	525 psig (3620 kPa)
P70KA-1C	36 in. Capillary with 1/4 in. Flare Nut	Manual Reset Lockout	4-wire, 2-circuit Line-M1 Close-high Line-M2 Open-high	500 psig (3448 kPa)	50 to 500 (345 to 3448)	525 psig (3620 kPa)
P72CA-2(a)	36 in. Capillary with 1/4 in. Flare Nut	Minimum 60 (414) Maximum 150 (1034)	DPST Open-high	500 psig (3448 kPa)	50 to 500 (345 to 3448)	525 psig (3620 kPa)
P72DA-1(a)	36 in. Capillary with 1/4 in. Flare Nut	Manual Reset Lockout	DPST Open-high	500 psig (3448 kPa)	50 to 500 (345 to 3448)	525 psig (3620 kPa)
P170CA-3C	SPST Open-high	50 to 500 (345 to 3448)	Minimum 60 (414) Maximum 150 (1034)	1/4 in. Male Flare Connector	500 psig (3448 kPa)	525 psig (3620 kPa)
P170DA-1C	SPST Open-high	50 to 500 (345 to 3448)	Manual Reset Lockout	1/4 in. Male Flare Connector	500 psig (3448 kPa)	525 psig (3620 kPa)
P170KA-1C	4-wire, 2-circuit Line-M1 Close-high, Line-M2 Open-high	50 to 500 (345 to 3448)	Manual Reset Lockout	1/4 in. Male Flare Connector	500 psig (3448 kPa)	525 psig (3620 kPa)

(a) UL Listed as Refrigeration Pressure Limiting Controls

Ammonia Compatible Models

PART NO	Differential psi (kPa)	Max Working Pressure	Range psig (kPa)	SWITCH ACTION	MaxOverrun Pressure	PRESSURE CONNECTION
P70AA-119C	Minimum 20 (138) Maximum 120 (827)	300 psig (2068 kPa)	50 to 300 (345 to 2068)	SPST Open Low	400 psig (2758 kPa)	1/4 in. SS Female NPT
P70CA-5C(a)	Minimum 60 (414) Maximum 150 (1034)	300 psig (2068 kPa)	50 to 500 (345 to 3448)	SPST Open-high	525 psig (3620 kPa)	1/4 in. SS Female NPT
P70DA-2C(a)	Lockout (requires manual reset)	300 psig (2068 kPa)	50 to 500 (345 to 3448)	SPST Open-high	525 psig (3620 kPa)	1/4 in. SS Female NPT

(a) UL Listed as Refrigeration Pressure Limiting Controls

JOHNSON CONTROLS - CONTROLS FOR DUAI PRESSURE APPLICATIONS

P70,P72,AND P170 SERIES

MICRO-SET CONTROLS FOR NON-CORROSIVE REFRIGERANTS

SELECTION CHART

The P70, P72, and P170 controls for dual pressure applications are designed primarily for use as combination high and low pressure controls on commercial refrigeration and air conditioning applications.

SELECTION CHART

		LOW PRESSURE psig (kPa)		HIGH PRESSURE psig (kPa)			
PART NO	**SWITCH ACTION**	**Range**	**Diff**	**Range**	**Diff (Non-Adj)**	**PRESSURE CONNECTOR**	**LIMITED KNOB ADJ**
P70LB-6	SPST	12 in. to 80 (–41 to 552)	Min 5 (34) Max 35 (241)	100 to 500	Fixed at 65 (448) orLockout requires, manual reset	36 in.Cap.With 1/4 in. Flare Nut	LOW CUT OUT
P70MA-18	SPST	12 in. to 80 (–41 to 552)	Min 5 (34) Max 35 (241)	100 to 500	Lockout(Requires Manual Reset)	36 in.Cap.With 1/4 in. Flare Nut	None
P70SA-1	Two IndependentSPDT	12 in. to 80 (–41 to 552)	Min 5 (34) Max 35 (241)	100 to 500 (690 to 3447)	Fixed at 65 (448) orLockout requires, manual reset	36 in.Cap.With 1/4 in. Flare Nut	None
P170LB-6	SPST	12 in. to 80 (–41 to 552)	Min 5 (34) Max 35 (241)	100 to 500 (690 to 3447)	Fixed Approx: 65 (448)	1/4 in.Male Flane Connector	LOW CUT OUT
P170MA-18	SPST	12 in. to 80 (–41 to 552)	Min 5 (34) Max 35 (241)	100 to 500 (690 to 3447)	Lockout(Requires Manual Reset)	1/4 in.Male Flane Connector	None
P170SA-1	Two IndependentSPDT	12 in. to 80 (–41 to 552)	Min 5 (34) Max 35 (241)	100 to 500 (690 to 3447)	Fixed at 65(448) or Lockout (Requires Manual Reset)	1/4 in.Male Flane Connector	None

ALL RANGE CONTROLS FOR NON-CORRISIVE REFRIGERANTS

SELECTION CHART

		LOW PRESSUREpsig (kPa)		HIGH PRESSURE psig (kPa)			
PART NO	**SWITCH ACTION**	**Range**	**Diff**	**Range**	**Diff (Non-Adj)**	**PRESSURE CONNECTOR**	**LIMITED KNOB ADJ**
P70LB-1	SPST	20 in. to 100 (–68 to 690)	Min 6 (41) Max 50 (345)	100 to 500 (690 to 3447)	Fixed Approx: 65 (448)	36 in. Cap. With 1/4 in. Flare Nut	LOW CUT OUT
P70MA-1	SPST	20 in. to 100 (–68 to 690)	Min 6 (41) Max 50 (345)	100 to 500 (690 to 3447)	Lockout (Requires Manual Reset)	36 in. Cap. With 1/4 in. Flare Nut	None
P70NA-1	SPST	20 in. to 100 (–68 to 690)	Fixed(Manual Reset)	100 to 500 (690 to 3447)	Lockout (Requires Manual Reset)	36 in. Cap. With 1/4 in. Flare Nut	None
P72LA-1	DPST	20 in. to 100 (–68 to 690)	Min 7 (48) Max 50 (345)	100 to 500 (690 to 3445)	Fixed Approx: 65 (448)	36 in. Cap. With 1/4 in. Flare Nut	None
P72LB-1	DPST	20 in. to 100 (–68 to 690)	Min 7 (48) Max 50 (345)	100 to 500 (690 to 3447)	Fixed Approx: 65 (448)	36 in. Cap. With 1/4 in. Flare Nut	LOW CUT OUT
P72MA-1	DPST	20 in. to 100 (–68 to 690)	Min 7 (48) Max 50 (345)	100 to 500 (690 to 3447)	Lockout (Requires Manual Reset)	36 in. Cap. With 1/4 in. Flare Nut	None
P72NA-1	DPST	20 in. to 100 (–68 to 690)	Fixed(Manual Reset)	100 to 500 (690 to 3447)	Lockout (Requires Manual Reset)	36 in. Cap. With 1/4 in. Flare Nut	None
P170LB-1	SPST	20 in. to 100 (–68 to 690)	Min 7 (48) Max 50 (345)	100 to 500 (690 to 3445)	Fixed Approx: 65 (448)	36 in. Cap. With 1/4 in. Flare Nut	LOW CUT OUT
P170MA-1	SPST	20 in. to 100 (–68 to 690)	Min 7 (48) Max 50 (345)	100 to 500 (690 to 3447)	Lockout (Requires Manual Reset)	36 in. Cap. With 1/4 in. Flare Nut	None
P170NA-1	SPST	20 in. to 100 (–68 to 690)	Fixed(Manual Reset)	100 to 500 (690 to 3447)	Lockout (Requires Manual Reset)	36 in. Cap. With 1/4 in. Flare Nut	None
P70MA-2	SPST	20 in. to 100 (–68 to 690)	Min 7 (48) Max 50 (345)	100 to 500(690 to 3445)	Lockout (3620 High) (Requires Manual Reset)	1/4 in. Female NPT Conn.	None

ALL RANGE AMMONIA COMPATABLE CONTROLS

SELECTION CHART

SELECTION CHART

		LOW PRESSUREpsig (kPa)		HIGH PRESSURE psig (kPa)			
PART NO	**SWITCH ACTION**	**Range**	**Diff**	**Range**	**Diff (Non-Adj)**	**PRESSURE CONNECTOR**	**LIMITED KNOB ADJ**
P70LA-2	SPST	20 in. to 100 (–68 to 690)	Min 7 (48) Max 50 (345)	100 to 500(690 to 3445)	65 psi < 300 psig 75 psi 300-400 psig 95 psi > 400 psig	1/4 in. Female NPT Conn.	None

JOHNSON CONTROLS - Electronic Pressure Control with Display

P470

Selection Chart

P470 Pressure Control with a P399 Transducer and WHA-P399 Wiring Harness (Control, transducer, and harness must be purchased separately.)

DESCRIPTION

The P470 Electronic Pressure Control with Display is a single-stage, On/Off, electronic pressure control with an SPDT (Single-Pole Double-Throw) output relay. The control may be field set to operate in one of three pressure ranges (0 to 100 psi, 0 to 500 psi, or 50 to 750 psi), as either an open-high or open-low control. The P470 control features a large LCD that displays the sensed pressure and other system-status indicators, as well as the adjustable set points in the programming mode. The P470 control has a lockable, 3-button touchpad for adjusting set points, and a front-panel LED (Light-Emitting Diode) that indicates the output relay status. The P470 control uses a P399 Electronic Pressure Transducer to generate a pressure signal and WHA-P399 Wiring Harness, which eliminates many of the constraints of capillary tube control applications.

FEATURES

- Easy-to-read liquid crystal display (LCD) clearly displays the sensed pressure (and other control information), and in many situations pressure may be monitored without applying gauges to the controlled equipment.
- Three field-selectable pressure ranges between 0-750 psi provide the flexibility to cover most HVAC/R pressure applications.
- 24 VAC, and 120 or 208/2 4 0VAC models increase application options, with two controls that cover most common voltages.
- Lockable, 3-button, front-panel touchpad deters tampering and over adjustment of control settings by unauthorized personnel.
- Built-in, adjustable, anti-short cycle time-delay reduces compressor short cycling and nuisance lockouts, which can extend compressor life.
- Economical, versatile transducer & wiring harness eliminate many constraints of capillary control applications & allow up to a 100ft (30.5m) cable between control & transducer

SELECTION CHART

PART NO	DESCRIPTION
P470FB-1C	Low Voltage (<30 VAC) Electronic Pressure Control with Display Supply Voltage: 24 VAC Class 2 Transformer
P470EB-1C	Line Voltage Electronic Pressure Control with Display Supply Voltage:120 or 208/240 VAC

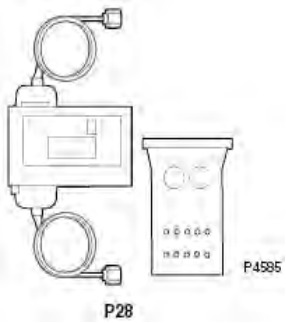
Note: P470 controls do not include a transducer or wiring harness. Transducer and wiring harness must be purchased separately. P399 transducer must be matched to the selected pressure range.

ACCESSORIES

PART NO	DESCRIPTION
P399AAA-1C	0 to 100 psi Pressure Transducer with 1/8 in. NPT Male Fitting
P399AAC-1C	0 to 100 psi Pressure Transducer with 1/4 in. SAE (Schrader) Female Fitting with integral valve depressor
P399BAA-1C	0 to 500 psi Pressure Transducer with 1/8 in. NPT Male Fitting
P399BAC-1C	0 to 500 psi Pressure Transducer with 1/4 in. SAE (Schrader) Female Fitting with integral valve depressor
P399CAA-1C	0 to 750 psi Pressure Transducer with 1/8 in. NPT Male Fitting
P399CAC-1C	0 to 750 psi Pressure Transducer with 1/4 in. SAE (Schrader) Female Fitting with integral valve depressor
WHA-P399-200C	6 ft 6-1/2 in. (2m) 3-Wire Cable with Plug-in Connector for P399 Transducer
WHA-P399-400C	13 ft 3 in. (4m) 3-Wire Cable with Plug-in Connector for P399 Transducer

JOHNSON CONTROLS - P28 SERIES LUBE OIL PRESSURE CUTOUT CONTROL (With Time Delay)

SELECTION CHART



P28

DESCRIPTION

The P28 series provides dependable shutdown on pressure of lubricated refrigeration compr by sensing low lube oil pressure. A built-in time Delay switch, accurately compensated for an temperature, allows for pressure pick up on start and avoids nuisance shutdowns on pressur of short duration during the running cycle.

APPLICATIONS

- Semi-hermetic compressors
- The P28 control measures pressure available to circulate oil through the lubrication syster (Net oil pressure is the difference between oil gauge and crankcase pressure.)

SPECIFICATIONS

- Maximum bellows pressure is 180 psig (2241 kPa)

SELECTION CHART

PART NO	TIME DELAY	TIME DELAY HEATERCIRCUIT VAC	TYPE OF RESET	REFRIGERANT ®	PRESSURE CONNECTION
P28AA-1C†	90 sec	120/240	Manual	Non-Corrosive**	36 in. Cap. With 1/4 in.Flare Nut
P28AA-2C††	60 sec	120/240	Manual	Non-Corrosive**	36 in. Cap. With 1/4 in.Flare Nut
P28AA-17C***	120 sec	120/240	Manual	Non-Corrosive**	36 in. Cap. With 1/4 in.Flare Nut
P28AA-18C	45 sec	120/240	Manual	Non-Corrosive**	36 in. Cap. With 1/4 in.Flare Nut
P28NA-1C	90 sec	120/240	Manual	Ammonia	1/4 in. Female NPT
P28DA-1C	90 sec with Runlight and Alarm Terminals	120/240	Manual	Non-Corrosive**	36 in. Cap. With 1/4 in.Flare Nut
P28GA-2C	90 sec	120/240	Automatic	Non-Corrosive**	36 in. Cap. With 1/4 in.Flare Nut
P28NA-5C	120 sec	24 VAC or VDC	Manual	Non-Corrosive**	36 in. Cap. With 1/4 in.Flare Nut

*Switch differential approximately 5 psi (34 kPa). Time Delay relay energizes @ 9 psi (61 kPa) pressure difference, de-energized @ 14psi (97 kPa) difference.

†Replaces Ranco P30-3701.

** Non-corrosive refrigerants include R-12, R-22, R-134a, R-500, R-502(R).

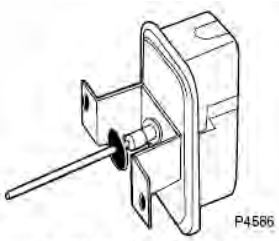
††Replaces Ranco P30-3601.

*** Replaces Ranco P30-3801.

• Universal Replacement.

JOHNSON CONTROLS - 32 SERIES SENSITIVE PRESSURE SWITCH

SELECTION CHART



The P32AC Differential Pressure Switch with "U" mounting bracket and a direct mounted sensing probe assembled.

DESCRIPTION

This differential pressure switch is used to sense airflow in ducts.

APPLICATIONS

- Airflow proving with electric duct heaters, humidifiers, and other equipment.
- Maximum airflow control for variable volume systems
- Reheat duct powered systems
- Clogged filter detection
- Detection of icing of air conditioning coils and initiation of defrost cycle

SELECTION CHART

PART NO	AMBIENT TEMPERATURE Min/Max	PRESSURE CONNECTOR	MAXIMUM OVERPRESSURE psig (kPa)	CONTACT ACTION	RANGE in WC (kPa)	SENSITIVITY AT MIN SET POINT in WC (kPa)	SET POINT	SCALE PLATE	MOUNTING BRACKET INCLUDED
P32AC-1	–40°F (–40° C) min.; 167°F (75° C) max.	High Pressure connectors are metal 1/8 in. female NPT inside, 1/2 in. NPSM outside for mounting.;Low Pressure connectors are molded, 1/8 in.female NPT	1 (6.895)	SPDT	0.15 to 12(0.037 to 2.99)	0.07 (0.017)	Adjustable	Yes	BKT182R
P32AC-2†	–40°F (–40° C) min.; 167°F (75° C) max.	High Pressure connectors are metal 1/8 in. female NPT inside, 1/2 in. NPSM outside for mounting.;Low Pressure connectors are molded, 1/8 in.female NPT	1 (6.895)	SPDT	0.05 to 5 (0.012 to 1.24)	0.04 (0.01)	Adjustable	Yes	BKT229-1R
P32AF-1	–40°F (–40° C) min.; 167°F (75° C) max.	Low Pressure connectors are molded ,1/8 in.female NPT	1 (6.895)	SPDT	0.05 to 5 (0.012 to 1.24)	0.025 (0.006)	Adjustable	Yes	BKT182-1R
P32AF-2†	–40°F (–40° C) min.; 167°F (75° C) max.	Low Pressure connectors are molded ,1/8 in.female NPT	1 (6.895)	SPDT	0.05 to 5 (0.012 to 1.24)	0.025 (0.006)	Adjustable	Yes	BKT229-1R

Supplied with 1/4 in. compressor fitting, 4 in. extension tube, two mounting screws, and 'O' gasket (angle bared fitting insulated)

JOHNSON CONTROLS - P45 SERIES

LUBE OIL PRESSURE CUTOUT CONTROL (With Time Delay)

Copeland compressors

P45NCA

DESCRIPTION

The P45 control provides dependable, low lube oil pressure protection for refrigeration compressors. The factory set pressure setting provides operation to the compressor manufacturer's specification. A built in time delay relay, compensated for ambient temperature, allows for pressure pick-up on short duration pressure losses during the running cycle.

SPECIFICATIONS

- For all non-corrosive refrigerants.

FEATURES

- Universal mounting.
- Trip-free manual reset
- Ambient compensated time delay

ACCESSORIES

These controls are supplied without mounting brackets but are required, order kit number BKT38A600R, which contains (5) 271-51 angle mounting brackets with screws.

APPLICATIONS

- Semi-hermetic compressors.
- The P45 control measures pressure available to circulate oil through the lubrication system. (net oil pressure is the difference between oil pump pressure and the crank case pressure).

SELECTION CHART

PART NO	FACTORY SET OPENING POINT psig (kpa)	TIME DELAY(a)	TYPE OF RESET	PRESSURE CONNECTION	HEATER CIRCUIT VAC	MAXIMUM ALLOWABLE PRESSURE, psig (kPa)
P45NCA-12C(b)	9(62)(c)	120 sec	Manual	36 in. Cap. With 1/4 in. Flare Nut	120/240	425(2360)
P145NCA-12C(d)	9(62)(c)	120 sec	Manual	style 5	120/240	425(2360)
P145NCB-12C(e)	9(62)(c)	120 sec	Manual	style 5	120/240	425(2360)

Carlyle compressors

PART NO	FACTORY SET OPENING POINT	TIME DELAY(a)	TYPE OF RESET	PRESSURE CONNECTION	HEATER CIRCUIT VAC (g)	MAXIMUM ALLOWABLE PRESSURE, psig (kPa)
P45NCA-82C(f)	6.5(45)(g)	45	Manual	36 in. Cap. With 1/4 in. Flare Nut	120/240	425(2360)
P145NCA-82C(h)	6.5(45)(g)	45	Manual	style 5	120/240	425(2360)
P145NCB-82C(I)	6.5(45)(g)	45	Manual	style 5	120/240	425(2360)

(a) Relay is not field replaceable
(b) Replaces Ranco P30-5826
(c) Switch differential is approximately 5 psi (34kpa). Time relay energizes at: 9 psi (61 kpa) pressure difference, de-energizes at 14 psi (97kpa) difference
(d) Replaces Ranco P30-5827
(e) Replaces Ranco P30-5827 (includes alarm wire)
(f) Replaces Carlyle/Carrier part no. HKA-600, 6342060
(g) Switch differential is approximately 4.5 psi (34kpa). Time delay relay energizes at: 6.5 psi (45kpa) pressure difference de-energizes at: 11 psi (76kpa) difference
(h) Replaces Carlyle/ Carrier paer no. HKA-600.6342060 36" SEC99A UltraCap
(i) Replaces Carlyle/ Carrier paer no. HKA-600.6342060 36" SEC99A UltraCap (includes alarm wire)

JOHNSON CONTROLS

P74 Series

Differential Pressure Control

Description

Series P74 measures the pressure difference between two sources: supply lines and return lines. A change in differential pressure will reposition the switching mechanism to cause corrective action of the supplementary control equipment.

Features

- field-proven Penn switch with a completely enclosed contact mechanism
- pressure differential setting is easily changed without removing the cover

Applications

- differential pressure sensing on chillers or water-cooled condensers
- lube oil failure cutout for refrigeration compressors (same as the P28, but does not incorporate time delay)
- positioning M100 Series motor-actuated valves (P74JA-2)
- to prove pump operation

Accessories

All models on this page include a universal mounting bracket.

P74EA-8

Selection Chart

Code Number	Switch Action	Range Pressure Differential psi (kPa) 1	Switch Differential	Pressure Connections	Bellows Material
FOR ALL NON-CORROSIVE LIQUIDS					
P74AA-1C	SPST Closes On Decreases in Pressure Difference	8 to 70 Adjustable (55 to 483)	8 to 30 Adjustable	36 in. Cap. with 1/4 in. Flare Nut	Stainless Steel
P74BA-1C	SPST Opens On Decrease in Pressure Difference				
P74EA-8C	SPDT (Snap-Acting)	2 to 26 Adjustable (14 to 207)	3.5 Fixed	36 in. Cap. with 1/4 in. Flare Nut	Brass
P74EA-10C				1/4 in. Male Flare	
P74FA-1C		8 to 60 Adjustable (55 to 414)	1.5 Fixed	1/4 in. FNPT	
P74FA-5C					
P74FA-10C		2 to 26 Adjustable (14 to 207)		36 in. Cap. with 1/4 in. Flare Nut	
P74JA-2C	SPDT (Floating)	8 to 60 Adjustable (55 to 414)	2.5 Fixed	1/4 in. Male Flare	

1. Maximum continuous pressure to low pressure bellows - 180 psig (1241 kPa)

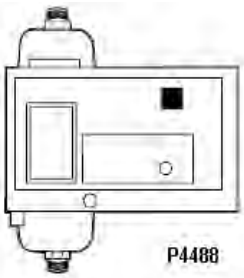
Technical Specifications

Electrical Ratings

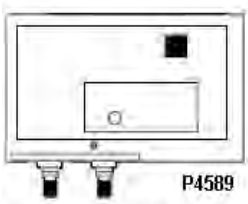
Motor Ratings	120 V	208 V	240 V	277 V
P74AA, P74BA - 1 Phase				
AC Full Load Amp	20.0	18.7	17.0	—
AC Locked Rotor Amp	120.0	112.2	102.0	—
AC Non-Inductive Amp	22.0	22.0	22.0	—
Pilot Duty	125 VA, 120 to 600 VAC; 57.5 VA, 120 to 300 VDC			
P74EA				
AC Full Load Amp	16.0	9.2	8.0	—
AC Locked Rotor Amp	96.0	55.2	48.0	—
AC Non-Inductive Amp	16.0	16.0	16.0	16.0
Pilot Duty	125 VA, 120 to 600 VAC			
P74FA				
AC Full Load Amp	6.0	3.4	3.0	—
AC Locked Rotor Amp	36.0	20.4	18.0	—
AC Non-Inductive Amp	10.0	10.0	10.0	10.0
Pilot Duty	125 VA, 120 to 277 VAC			
P74JA				
1 Amp; 24 VAC Class 2; 50/60 Hz				

JOHNSON CONTROLS - P128 AND P145 SERIES LUBE OIL PRESSURE CONTROLS

SELECTION CHART



P128AA



P145NCA

DESCRIPTION

The P128 and P145 Series controls provide dependable low pressure lube oil cut-out for pressure lubricated refrigeration compressors. The P128 Series offer adjustable range settings. The P128 and P145 controls feature a 1/4-in. male flare pressure connection which may be used with a refrigerant hose or cap tube such as SEC99 Ultra Cap.

FEATURES

- Ambient compensated time delay relay
- Trip-free manual reset
- Industry standard
- P128 is fully adjustable throughout its range
- P145 is factory set to compressor manufacturer's specifications

APPLICATIONS

Lube oil cutout on hermetic and semi-hermetic compressors used in commercial air conditioning and commercial and industrial refrigeration systems.

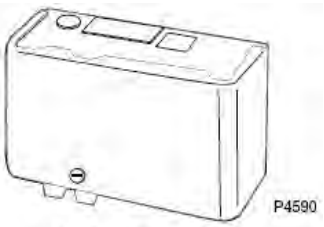
SELECTION CHART

PART NO	Range PSI (ICPA) Adjustable	Non-Adjustable	TIME DELAY	TYPE OF RESET	REFRIGERANT	PRESSURE CONNECTION	HEATER CIRCUIT VAC
P128AA-1C(a)	8 to 70 (55 to 483)	--	90 sec	Manual	Non-Corrosive	1/4 in. Male Flared Conn.	120/240
P128AA-2C(b)	8 to 70 (55 to 483)	--	60 sec	Manual	Non-Corrosive	1/4 in. Male Flared Conn.	120/240
P128AA-17C(c)	8 to 70 (55 to 483)	--	120 sec	Manual	Non-Corrosive	1/4 in. Male Flared Conn.	120/240
P145NCA-12C(d)	Factory Set 9 (62)	Factory Set 9 (62)	120 sec	Manual	Non-Corrosive	1/4 in. Male Flared Conn.	120/240
P145NCA-82C(e)	--	Factory Set 6.5 (45)	45 sec	Manual	Non-Corrosive	1/4 in. Male Flared Conn.	120/240
P145NCB-12C(f)	--	Factory Set 9 (62)	120 sec	Manual	Non-Corrosive	1/4 in. Male Flared Conn.	120/240
P145NCB-82C(g)	--	Factory Set 6.5 (45)	45 sec	Manual	Non-Corrosive	1/4 in. Male Flared Conn.	120/240

(a) Replacement for P28AA-1-. Replaces Ranco P30-3701.
(b) Replacement for P28AA-2-. Replaces Ranco P30-3601.
(c) Replacement for P28AA-17-. Replaces Ranco P30-3801.
(d) Replacement for P45NCA-12-. (Copeland Model). Replaces Ranco P30-5826.
(e) Replacement for P45NCA-82-.
(f) Copeland model with alarm circuit.
(g) Carlyle model alarm circuit.
NOTE: SEC99 UltraCap hose must be ordered separately.

JOHNSON CONTROLS - P12 SERIES DIFFERENTIAL PRESSURE CONTROLS

SELECTION CHART



P12AA Differential Pressure Control

DESCRIPTION

The P12 Series Differential Pressure Controls are suitable for use with oil and/or non-corrosive refrigerants. The switch is actuated by a difference in pressure between the two sensing elements. The control is factory-set to open the switch (COM to 1) at a differential pressure of 18 psi (124 kPa) and close the switch (COM to 1) at a differential pressure of 12 psig (82 kPa). The control is not field-adjustable. This control may be connected to a P28 oil failure cutout control, with time delay, to give complete monitoring of lubrication on two refrigeration compressors driven by one motor.

SELECTION CHART

	DIFFERENTIAL PRESSURE COM to 1		
PART NO	Opens	Closes	MAXIMUM ALLOWABLE PRESSURE, psig (kPa)
P12AA-3C	18 psi (124 kPa)	12 psi (821 kPa)	425 (2390)

JOHNSON CONTROLS

P545 SERIES ELECTRONIC LUBE OIL CONTROL


P545 Control with P400 Switch

DESCRIPTION

The P545 series electronic lube oil control is designed for refrigeration compressors equipped with an oil pump that accepts a single point differential pressure switch. The P400 switch continuously monitors net lube oil pressure and the P545 control locks out the compressor if lube oil pressure falls below the manufacturer's recommended net pressure for longer than the recommended lube oil time delay. Front-mount Light-Emitting diodes (LEDs) indicate the status of lubrication system, and can be set to minimize compressor short cycling. A Johnson Controls/PENN(R) R310AD current sensing switch, sold separately, may be used to disable the P545 control lockout circuit during abnormal compressor shutdowns.

FEATURES

- Single-pole double-throw (SPDT) relay contacts for liquid line solenoid and alarm application – allows liquid line solenoid to be closed if the P545 control shuts off the compressor due to low oil pressure; provides alarm indication, including circuits that use neon lights.
- Relay contact output for compressor - provides reliable, long-lasting operation.
- Build in test circuit - verifies proper control operation quickly, without additional tools or equipment.
- Improved noise immunity - exceeds immunity requirements of UL 991 for radiated Radio Frequency (RF) and (IEC) 6100-4-6 for RF-induced conducted disturbances.
- Selection of anti-short cycle time delay - allows choice of anti-short cycle strategy for a wide range of equipment. Requirements; possible elimination of external short-cycle timer.
- User-friendly display panel-display the status of the compressor lubrication system continuously.
- Backwards compatibility - allows easy replacement of existing electronic lube oil control.

SELECTION CHART

Product PART NO	Fit Compressors Manufactured by	Lube oil delay (second)	P400switch	Wiring Harness
P545NCB-22C1	copeland(R)	120	P400AD-2	WHA-P400-100
P545NCB-25C1	Bitzer	90	P400BD-1	WHA-P400-125
P545NCB-82C1	Carlyle(R)	120	P400AD-1	WHA-P400-100

1. Switch and wiring harness included

Control and Sensor/switch Compatibility

Test	P345 or P445 control with P300 sensor	P345 or P445 control with P300 sensor	P545 control and P300 sensor	P545 control and P400 sensor
Wiring Harness[1]	WHA-300-XXX only	WHA-300-XXX only or WHA-400-XXX	WHA-300-XXX only	WHA-300-XXX only or WHA-400-XXX
Test switch	6-8 second delay	Does not function[2]	Immediate	Immediate

1. WHA-P300-XXX is the 3-wire harness supplied with the P345 or P445 control and the P300 sensor. WHA-P400-XXX is the line 2-wire harness supplied with the P545 control and the P400 switch.
2. When the P445 control is wired to a P400 switch, the test button may operate when powered up; however, after a couple minutes of operation, the test switch function no longer works. All other control functions operate normally.

Accessories

PART NO	Open point(differential pressure)	Close point(Differential above open point)	Threads	Wiring Harness
P400AD-1C	7.0 ± 1.0 Psid	less than or equal to 2.0 Psid	3/4-16UNF	WHA-P400-100
P400AD-2C	12.75 ± 0.75 Psid	less than or equal to 1.5 Psid	3/4-16UNF	WHA-P400-100
P400BD-1C	10.0 ± 1.5 Psid	less than or equal to3.0 Psid	M20x1.5	WHA-P400-125

1. Wiring harness included.

P545 SERIES ELECTRONIC LUBE OIL CONTROL(continued)

wiring harness and other accessories

Product PART NO	DESCRIPTION
KITP545-82C*	CST29A-600C sensor block; P545NCB-82 control;P400AD-1C switch WHA-P400-100C wiring harness
WHA-P400-100C	3-1/3 ft(1m)length wiring harness
WHA-P400-125C	4 ft(1-1/4m)length wiring harness
WHA-P400-250C	8 ft(2-1/2m)length wiring harness
WHA-P400-430C	14 ft(4-1/3m)length wiring harness

JOHNSON CONTROLS

CST29A

Adapter Block for Carlyle® Compressors

Description

The Johnson Controls/PENN® CST29A Adapter Block is designed for use on Carlyle® compressors (models O6CC, O6D, and O6E) equipped with an oil pump. The adapter block allows for the installation of the P400 single point differential pressure switch for use with the P545NCB-82 electronic lube oil control.

Features

• simple installation - provides easy conversion of electromechanical lube oil control system to electronic equivalent
• designed specifically for Carlyle applications - applies to Carlyle compressor models O6CC, O6D, and O6E

Selection Chart

Part Number	Description
CST29A-600C	Adapter Block for Carlyle Compressor Series O6CC, O6D, and O6E; Includes Allen-head bolts.

Accessories

Part Number	Description
P545NCB-82C	Electronic Lube Oil Pressure Control, 120 Second Delay Before Lockout, with P400AD-1 switch and WHA-P400-100 switch cable
P400AD-1C	Replacement Differential Pressure Switch with WHA-P400-100 Wire Harness Open at 7 ±1.0 psid, Close Less than or Equal to 2.0 psi above Open Point
KITP545-82C	Single Pack P545 with Adapter Block and Allen-head Bolts
WHA-P400-100C	3 1/3 ft (1 m) Length Wiring Harness
WHA-P400-125C	4 ft (1 1/4 m) Length Wiring Harness
WHA-P400-250C	8 ft (2 1/2 m) Length Wiring Harness
WHA-P400-400C	14 ft (4 1/3 m) Length Wiring Harness
Carlyle Supplied Parts	
06DA680063	Adapter Block Gasket for Carlyle Compressor Series O6CC, O6D, and O6E
Note: . Order **06DA680063** from a Carlyle distributor. For information on the nearest Carlyle distributor, visit www.carlylecompressor.com.	

JOHNSON CONTROLS

P100 Series

Encapsulated Pressure Switches

Description

P100 Series switches are encapsulated, nonadjustable, SPST, direct mount switches for use with noncorrosive refrigerants. The switches are available with automatic reset in both open low and open high configurations and manual reset with open high action.

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

Applications

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

Technical Specifications

Electrical Ratings

Ratings	120 VAC	240 VAC
AC Full Load Amps (FLA)	5.8	2.9
AC Locked Rotor Amps (LRA)	34.8	15.0
Pilot Duty – 375 VA at 120/240/277 VAC; 2 amps at 28 VAC/VDC		

- 1/4 in. female flare fitting with built-in Schrader type depressor is standard

P100

- electrical connections are made to 48 in.

Selection Chart

Part Numbe	Switch Action	Application	Setting – psig (kPa)		Replaces:			
			Opens	Closes	Gemline	Ranco	Robertshaw	Saginomiya
P100AP-201C	Open On Pressure Drop	Low Cutout	10 (69)	32 (221)	–	MPL-7011	3100-050	–
P100AP-2C			35 (241)	60 (414)	–	MPF-7004	3100-004	–
P100AP-9C[1]			25 (172)	80 (52)	–	–	–	–
P100AP-3C		Fan Cycling	150 (1034)	225 (1551)	–	MPF-7008	–	ABC-AA01
P100AP-4C			170 (1172)	250 (1724)	–	–	–	–
P100AP-332C[2]			300 (2068)	400 (2758)	–	–	–	–
P100AC-1C[3]		Low Cutout	5 (34)	20 (138)	–	MPL-7001	–	–
P100AC-2C[3]			15 (103)	30 (207)	–	MPL-7002	–	–
P100CP-1C	Open On Pressure Rise	High Cutout	400 (2758)	300 (2068)	PC151	MPH-7107	3100-151	–
P100CP-2C			425 (2930)	325 (2241)	PC100	MPH-7108	3100-100	–
P100CC-9C[3]			275 (1896)	175 (1207)	–	–	3100-112	–
P100DA-1C		High Limit	410 (2827)	Lockout Manual Reset	PC103	–	3100-103	–
P100DA-2C			475 (3275)		–	–	3100-106	–
P100DA-35C			350 (2413)		–	–	–	–
P100DA-81C[2]			630 (4344)		–	–	–	–
P100DC-3C[4]			375 (2586)		–	–	–	–

1. 18 in. wire leads
2. Commpatible with R410A refrigerant
3. Includes conduit clamp (shown above)
4. In conduit box

JOHNSON CONTROLS

P399

Electronic Pressure Transducer

Description

The P399 Series Electronic Pressure Transducer is a compact, economical, rugged, direct-mount pressure transducer designed to produce a low voltage analog signal (0.5 to 4.5 VDC nominal) based on the sensed pressure. They are designed for use in commercial refrigeration and air-conditioning applications.

The P399 Transducer features welded stainless steel construction with environmentally sealed electronics. They are resistant to the effects of wide temperature swings, high humidity, condensation, and icing. They are suitable for use with all non-corrosive refrigerants as well as ammonia.

P399 Transducers are available in several pressure ranges (up to 750 psis), covering most common refrigeration and air conditioning applications.

Pressure connections are available in one of two standard styles:

- 1/4 in. SAE female flare fitting (with Schrader valve depressor)
- 1/8 in. NPT male fitting

The wiring harness is purchased separately or included with the P399xxx-1-200C.

Features

- affordable
- rugged stainless steel construction provides a durable assembly and eliminates potential refrigerant loss due to O-ring failures - resists Electromagnetic Interference (EMI) and damage due to shock, vibration, and pressure pulsations
- environmentally sealed electronics withstand the effects of adverse conditions found in typical equipment rooms

P399 Series
Electronic Pressure Transducers

- reliable, repeatable performance and long operating life minimizes service and replacement costs
- available in several pressure ranges (up to 750 psis) to provide a single line of transducers for all refrigeration and air conditioning application needs

Selection Chart

Part Number	Description
P399AAA-1C	Pressure Transducer, 0-100 psis, 1/8 in. NPTM pressure connection
P399AAC-1C	Pressure Transducer, 0-100 psis, 1/4 in. SAE female flare pressure connection with valve depressor
P399BAA-1C	Pressure Transducer, 0-500 psis, 1/8 in. NPTM pressure connection
P399BAC-1C	Pressure Transducer, 0-500 psis, 1/4 in. SAE female flare pressure connection with valve depressor
P399CAA-1C	Pressure Transducer, 0-750 psis, 1/8 in. NPTM pressure connection
P399CAC-1C	Pressure Transducer, 0-750 psis, 1/4 in. SAE female flare pressure connection with valve depressor
P399GAA-1C[1]	Pressure Transducer, 0-200 psis, 1/8 in. NPTM pressure connection
P399AAA-1-200C	Pressure Transducer, 0-100 psis, 1/8 in. NPTM pressure connection, with 6-1/2 ft (2m) wire harness with pigtails
P399AAC-1-200C	Pressure Transducer, 0-100 psis, 1/4 in. SAE female flare pressure connection with valve depressor, with 6-1/2 ft (2m) wire harness with pigtails
P399BAA-1-200C	Pressure Transducer, 0-500 psis, 1/8 in. NPTM pressure connection, with 6-1/2 ft (2m) wire harness with pigtails
P399BAC-1-200C	Pressure Transducer, 0-500 psis, 1/4 in. SAE female flare pressure connection with valve depressor, with 6-1/2 ft (2m) wire harness with pigtails
P399CAA-1-200C	Pressure Transducer, 0-750 psis, 1/8 in. NPTM pressure connection, with 6-1/2 ft (2m) wire harness with pigtails
P399CAC-1-200C	Pressure Transducer, 0-750 psis, 1/4 in. SAE female flare pressure connection with valve depressor, with 6-1/2 ft (2m) wire harness with pigtails

1. Not applicable to System 350™ Pressure Controls

Accessories

Part Number	Description
WHA-P399-200C	Wire Harness, 6 1/2 ft (2.0 m.) length with pigtails
WHA-P399-400C	Wire Harness, 13 ft (4.0 m.) length with pigtails
WHA-P399-600C	Wire Harness, 19-5/8 ft (6.0 m.) length with pigtails

Note: Wiring harness must be ordered separately.

Technical Specifications

P399 Electronic Pressure Transducer		
Overpressure		3x upper range limit, short term
Burst Pressure		5x upper range limit
Vacuum		30 microns max (0.03 mm Hg) short term
Media Compatibility		Noncorrosive refrigerants, refrigeration lubricating oils, ammonia
Supply Voltage		5.00 ± 0.25 VDC ratiometric range, 6.0 VDC maximum
Current Draw		5 mA maximum @ 5.0 VDC
Output Signal		Ratiometric, 10% to 90% of supply voltage (0.5 to 4.5 VDC nominal)
Pressure Connections		1/8 in. NPT male, direct mount 1/4 in. SAE female flare with Schrader valve depressor, direct mount
Temperature and Humidity	Storage	-40 to 257°F (-40 to 125°C)
	Ambient	-40 to 158°F (-40 to 70°C)
	Refrigerant	-40 to 300°F (-40 to 149°C); 0 to 100% RH
Accuracy		±1.5% Span, -4 to 212°F (-20 to 70°C); ±2.0% Span, -40 to -4 F (-40 to -20°C)
Materials	Connector	Nylon, 30% glass filled
	Main Body	Stainless steel all welded construction (304L)
Vibration		10G, 20-2000 Hz maximum

JOHNSON CONTROLS

JOHNSON CONTROLS - Current Sensing Switch


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.

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 used in low-voltage applications, such as with the P445 Electronic Lube Oil Control. The R310AE-2 switch is used 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 moto 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 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.

Selection Chart

PART NO	DESCRIPTION
R310AD-1C	Current Sensing Switch Voltage Switching Capacity: 0-30 VAC Used With: P445 Electronic Lube Oil Control
R310AE-2C	Current Sensing Switch Voltage Switching Capacity: 120-240 VAC Used With: P28 and P45 Electromechanical Lube Oil Controls

SPECIFICATIONS

R310A Series Current Sensing Switch	
Switch Action	SPST, Normally Open
Current Sensing Range	**R310AD-1C** 0.5-200 Amperes **R310AE-2C** 0.75-200 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 @ 30 VAC/DC **R310AE-2C** 0.5 @ 250 VAC/DC
Output Polarity	Non-polarity Sensitive Output
Enclosure	NEMA 1
Ambient Operating Conditions	5 to 140°F (-15 to 60°C); 0-95% RH, Non-condensing
Ambient Storage Conditions	-40 to 158°F (-40 to 70°C); 0-95% 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	0.70in. (17 mm) Diameter
Agency Listings	UL Guide NRNT cul Guide NRNT7

JOHNSON CONTROLS - UltraCap Armored Capillary

Schrader Depressor in One End

SEC99AB and SEC99AA UltraCap Armored Capillaries

DESCRIPTION

The SEC99A UltraCap Armored Capillary is designed for use as a pressure connection in refrigeration and A/C 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 male 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.

Schrader Depressor in One End

PART NO	DESCRIPTION
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. (1219 mm)
SEC99AA-60C	Two straight fittings Length: 60 in. (1524 mm)

Schrader Depressor in Both Ends

PART NO	DESCRIPTION
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. (1219 mm)
SEC99AB-60C	One straight and one 90° fitting Length: 60 in. (1524 mm)

SPECIFICATIONS

SEC99A UltraCap Armored Capillary	
Capillary Diameters	Inside: 0.062 in. (1.5 mm); Outside: 0.125 in. (3 mm)
Temperature Range	-50 to 350°F (-46 to 177°C)
Burst Pressure	3000 psig (20685 kPa)
Maximum Working Pressure	600 psig (4137 kPa)
Suggested Torque to Seal	8 to 10 Lb/ft (10.9 to 13.6 N.m)
Fittings: Straight **90° Elbow** **Material**	1/4 in. Female Flare Connector with Schrader Depressor 1/4 in. Female Flare Connector with Schrader Depressor Forged Brass Nut with Copper Stem
Agency Listings	UL Recognized: File SA9457, CCN SFCS2 UL Recognized for Canada: SA9457, CCN SFCS8

Selection Chart

Description

The 271-51 is the universal mounting bracket used with many Johnson Controls/PENN products.

PART NO	DESCRIPTION
271-51	Universal Mounting Bracket
BKT38A-601R	Universal Mounting Bracket with 2 screws
BKT38A-600R	5 Universal Mounting Brackets with 10 screws

JOHNSON CONTROLS - Refrigerant Leak Detector

RLD-H10PM

Selection Chart

RLD-H10PM Refrigerant Leak Detector

DESCRIPTION

The RLD-H10PM is a professional grade leak detector used by refrigeration and A/C technicians. This detector senses all CFC, HCFC, & HFC refrigerants and blends, such as R12, R502, R22, R404a, R507, and R134a among others. The RLD- H10PM is self-powered with a rechargeable battery & provides both manual and automatic compensation for background levels of refrigerant. A full line of accessories and maintenance kits are also available, including replacement sensors, tune-up kits, probe extensions, battery chargers, and leak vial bottles. The RLD-H10PM is a direct replacement for the RLD-H10P.

FEATURES

- Positive ion emission heated diode sensor provides the most sensitivity available today, while still detecting all halogenated refrigerant gases.
- Rechargeable battery w/low & full charge LED's enhances portability - no external power req.
- Switchable for manual or automatic balance to allow user to chose preferred method compensation for background refrigerant levels.
- Exceeds SAE J1627 moving probe specification, which minimizes call-backs because the leak is found the first time, is verifiable, and the fix can be confirmed.
- External calibration source and calibration indicators indicate when the sensor is working properly and serves as a reference point to judge leak size.

Repair Parts

Contact Johnson Controls application engineering at (414) 524-5535 for repair information.

PART NO	DESCRIPTION
RLD-H10PM-1	Refrigerant leak detector and charger

Accessories

PART NO	DESCRIPTION
RLD-H10-100	14 inch flexible probe extension
RLD-H10-101	120 VAC power supply adapter
RLD-H10-102	Cigarette lighter adapter
RLD-H10-103	Replacement battery charger
RLD-H10-104	Replacement battery pack recharger (included in RLD-H10-105)
RLD-H10-105	Rechargeable 12 V battery belt pack
RLD-H10-601R	Replacement sensor
RLD-H10-604R	Spare battery for RLD-H10P
RLD-H10-607R	Replacement probe assembly

SPECIFICATIONS

RLD-H10PM Refrigerant Leak Detector		
Power Requirements		12 VDC, charger 13.5 VDC. An adaptor is available to allow unit to run from 120 VAC power (RLDH10-101).
Sensing Element Type		Positive Ion Emission Heated Diode
	Switch Position	**Alarm Sensitivity (moving probe)**
Approximate Sensitivity	Small	>0.05 oz per year CFC and HCFC >0.5 oz per year HFC
	Medium	>0.5 oz per year CFC and HCFC >1.0 oz per year HFC
	Large	>2.0 oz per year CFC and HCFC >5.0 oz per year HFC
Leak Alarm		Audible alarm, visible lamp neon
Response Time		Approximately 1 second
Warmup Time		Approximately 2 minutes
Accuracy		Meets SAE J1627 test requirements
Probe Length		Approximately 4.5 ft (1.4m)
Ambient Operating Conditions		32 to 104°F (0 to 40°C); 5-90% RH, non-condensing
Ambient Storage Conditions		14 to 140°F (-10 to 60°C); 5-90% RH, non-condensing
Case		Rugged high-density polyethylene
Dimensions (H x W x D)		5.5 x 10.5 x 8.5 in. (140 x 267 x 216 mm)
Shipping Weight		5 lb (2.3 kg)
Agency Listings		UL and cUL Listed, File SA9717 CE Approved

JOHNSON CONTROLS - Refrigerant Leak Detector

RLD-H10G

Selection Chart

DESCRIPTION

The RLD-H10G is a professional grade leak detector for use by refrigeration and air conditioning technicians. This detector senses all CFC, HCFC, and HFC refrigerants and blends, such as R12, R502, R22, R404a, R507 and R134a, among others. The RLD-H10G plugs into a 120 VAC outlet.

FEATURES

- Positive ion emission heated diode sensor provides the most sensitivity available today, while still detecting all halogenated refrigerant gases.
- Halogen selective sensing eliminates many sources of possible false alarms due to background contamination.
- High quality air pump supplies constant air flow to sensor so it responds quickly to leaks; also helps sensor recover quickly after exposure to refrigerant so leak can be verified.
- Visual and audible signal facilitates sensing in noisy equipment rooms with 360° visibility and piercing tone; frequency of noise/light indicates magnitude of leak.
- Exceeds SAE J1627 moving probe specification; minimizes service time because the leak is found the first time, is verifiable, and the fix can be confirmed.
- External calibration source indicates when the sensor is working properly and serves as a reference point to judge leak size.

PART NO	DESCRIPTION
RLD-H10G-1	Refrigerant Leak Detector control unit with a manual balancing circuit, a probe with a 4.5 ft cable, and a 6 ft power cord

Accessories

PART NO	DESCRIPTION
RLD-H10-600R	Tune-up kit includes: sensor, 100 filters, 3 airflow indicator balls, 3 probe tips and leak vial
RLD-H10-602R	Maintenance kit includes:100 replacement filters,3 airflow indicator balls, and 3 probe tips
RLD-H10-603R	Replacement leak vial
RLD-H10-606R	Replacement clear plastic probe tip

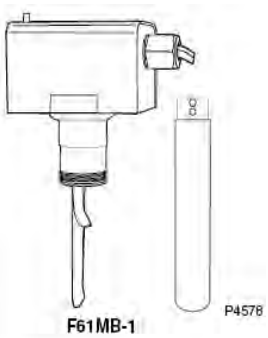
SPECIFICATIONS

RLD-H10G Refrigerant Leak Detector	
Power Requirements	120 VAC at 60 Hz
Sensing Element Type	Positive Ion Emission Heated Diode
Approximate Sensitivity	**Switch Position — Alarm Sensitivity (moving probe)** Small — >0.05 oz per year CFC or HCFC; >0.5 oz per year HFC Medium — >0.5 oz per year CFC or HCFC; >1.0 oz per year HFC Large — >3.0 oz per year CFC or HCFC; >5.0 oz per year HFC
Leak Alarm	Audible alarm, visible neon lamp
Response Time	Approximately 1 second
Warm-up Time	Approximately 2 minutes
Accuracy	Meets SAE J1627 test requirements
Probe Length	Approximately 4.5 ft (1.4 m)
Ambient Operating Conditions	32 to 113° F (0 to 45° C); 5 to 90% RH, non-condensing
Ambient Storage Conditions	14 to 140° F (-10 to 60° C); 5 to 90% RH, non-condensing
Case	Vinyl
Dimensions (H x W x D)	2.8 x 8.8 x 5.0 in. (71 x 224 x 127 mm)
hipping Weight	3.2 lbs (1.4 kg)
Agency Listings	UL listed, file SA 9717

JOHNSON CONTROLS - LIQUID LEVEL AND FLOW CONTROLS

F61 SERIES FLOW SWITCH (Standard Flow Rate — SPDT)

SELECTION CHART



F61MB-1

F61KB-11

DESCRIPTION

The F61 Series Flow Switches are Single-Pole, Double-Throw (SPDT) flow switches used on fluid lines carrying water, ethylene glycol, or other fluids not classified as hazardous. They can be wired to energize one device and de-energize another device powered from the same source when fluid flow either exceeds or drops below the set flow rate. The F61MG type flow switches are used for low- energy loads to operate small relays, solenoid valves, and electronic control circuits. These flow switches have gold-plated contacts for improved electrical performance in low voltage, low current circuits.

FEATURES

- Stainless steel paddle w/3 segments for use in pipes from 1” to 3” (25-75 mm) diameter
- Paddle segments can be removed or trimmed as needed
- F61KB-11 and F61MB-1 include a 6” (152 mm) paddle for pipes 4” to 6” (102-152 mm)
- Gold-plated contacts on F61MG-1 reduce intermittent contact problems in low-voltage and low-current circuits

APPLICATIONS

- Use on lines carrying water or ethylene glycol
- Not for use with hazardous fluids or in hazardous atmospheres

SELECTION CHART

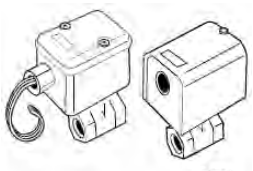
PART NO	ENCLOSURE	BELLOWS	PADDLE
F61KB-11C	NEMA 1	Phosphor Bronze	Stainless Steel; 3-piece Paddle (3 in., 2 in., and 1 in. Segments)Installed; 6 in. Paddle Supplied Uninstalled
F61LB-1C	NEMA 1	Phosphor Bronze	Stainless Steel; 3-piece Paddle (3 in., 2 in. and 1 in. Segments)Installed
F61MB-1C	NEMA 3R	Phosphor Bronze	Stainless Steel; 3-piece Paddle (3 in., 2 in., and 1 in. Segments)Installed; 6 in. Paddle Supplied Uninstalled
F61MB-5C	NEMA 3R	Stainless Steel	Stainless Steel; 3-piece Paddle (3 in., 2 in., and 1 in. Segments)Installed; 6 in. Paddle Supplied Uninstalled
F61MG-1*C	NAME 3R	Phosphor Bronze	Stainless Steel; 3-piece Paddle (3 in., 2 in., and 1 in. Segments)Installed; 6 in. Paddle Supplied Uninstalled

*Gold plated Contact

JOHNSON CONTROLS - LIQUID LEVEL AND FLOW CONTROLS

F61 SERIES FLOW SWITCH (Low Flow Rate — SPDT)

SELECTION CHART



F61MD (Left) and F61KD (Right) Sensitive Flow Switches

DESCRIPTION

For use on liquid lines using water, ethylene glycol solutions, or other liquids not injurious to the brass and phosphor bronze parts. The SPDT contact switch is activated by a low flow rate however, it has a large flow capacity with a minimum pressure drop.

APPLICATIONS

Typical applications include:

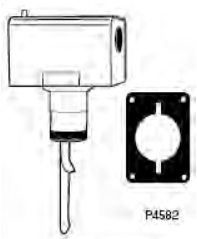
- Water purification and treatment systems
- Booster pumps
- Fast shutdown on high input boilers to guard against circulation failure
- Cooling systems for electronic tubes, bearings and compressors

SELECTION CHART

PART NO	INLET AND OUTLET SIZE FEMALE NPT	ENCLOSURE NEMA TYPE	ADJUSTMENT RANGE — GPM (L/Min) R to Y		LIQUID TEMP		MAXIMUM LIQUID PRESSURE
			Closes Flow Increase	Opens Flow Decrease	MAXIMUM	MINIMUM	
F61KD-3C	1/2 x 1/2 in. (13 x 13 mm)	1	Minimum 0.6 (2.27);Maximum 1.1 (4.17)	Minimum 0.3 (1.14);Maximum 0.9 (3.4)	250° F (121° C)	32° F (0° C)	150 psig (1034 kPa)
F61KD-4C	3/4 x 3/4 in. (19 x 19 mm)	1	Minimum 0.6 (2.27);Maximum 1.1 (4.17)	Minimum 0.3 (1.14);Maximum 0.9 (3.4)	250° F (121° C)	32° F (0° C)	150 psig (1034 kPa)
F61KD-8C	3/4 x 3/4 in. (19 x 19 mm)	1	Minimum 8.5 (32.2);Maximum 9.0 (34.1)	Minimum 4.5 (17.1);Maximum 6.3 (23.9)	250° F (121° C)	32° F (0° C)	150 psig (1034 kPa)
F61MD-1C	1/2 x 1/2 in. (13 x 13 mm)	3R	Minimum 0.6 (2.27);Maximum 1.1 (4.17)	Minimum 0.3 (1.14);Maximum 0.9 (3.4)	250° F (121° C)	–20° F (–29° C)	150 psig (1034 kPa)
F61MD-2C	3/4 x 3/4 in. (19 x 19 mm)	3R	Minimum 0.6 (2.27);Maximum 1.1 (4.17)	Minimum 0.3 (1.14);Maximum 0.9 (3.4)	250° F (121° C)	–20° F (–29° C)	150 psig (1034 kPa)

F62 SERIES AIRFLOW SWITCH (SPDT — Contact Unit)

SELECTION CHART



Airflow Control

DESCRIPTION

This control detects airflow or the absence of airflow in ducts, responding only to the velocity of air movement. The one-piece stainless steel paddle can be trimmed, if necessary. The control is supplied with mounting plate gasket. The range adjusting screw permits field adjustment of flow rate setting.

SELECTION CHART

PART NO	PADDLE SIZE (in)	DIMENSION	MAX AMBIENTTEMP °F (°C)	MAX AIR VELOCITY
F62AA-8C	2-1/8 in. x 6-7/8 in	10-3/8 in. H (including paddle),4 in. W, 2-13/16 in. D	100 (40)	2000 FPM (10 m/sec.)
F62AA-9C	3-1/8 in. x 6-7/8 in.	10-3/8 in. H (including paddle),4 in. W, 2-13/16 in. D	100 (40)	2000 FPM (10 m/sec.)

JOHNSON CONTROLS - LIQUID LEVEL AND FLOW CONTROLS

F63 SERIES LIQUID LEVEL FLOAT SWITCH

SELECTION CHART (For Closed Tanks)

F63BF Float Switch

DESCRIPTION

The F63 can be wired to close one circuit and open another circuit when liquid level rises above or falls below the required level. The F63AC-1 has a NEMA 1 general purpose enclosure. The F63BF-1 has a NEMA 3R rain tight enclosure. Not for use with hazardous fluids or in hazardous atmosphere.

FEATURES

- SPDT snap-acting switch
- Rugged steel enclosure

SELECTION CHART (For Closed Tanks)

PART NO	SWITCH ACTION	TYPE OF ENCLOSURE	MAXIMUM LIQUID PRESSURE	MAX AMBIENT TEMP °F (°C)	LIQUID TEMP MAXMUM	LIQUID TEMP MINIMUM
F63AC-1C	SPDT	250 (121)	General Purpose NEMA 1	180 (40)	32 (0)*	100 (690)
F63BF-1C	SPDT	250 (121)	Vaportight/ Raintight NEMA 3R	180 (40)	–20 (–29)**	100 (690)

*Or Ambient Dew Point.
**Or Liquid Freezing Point.

F92 SERIES AIR VOLUME CONTROL (For Shallow Wells)

SELECTION CHART (For Shallow Wells)

F92B

DESCRIPTION

Shallow well air volume control prevents water logged or air bound tanks by maintaining proper air volume.

FEATURES

- Internal parts are constructed of brass to minimize corrosion
- High impact plastic body is resistant to mechanical damage and corrosion

APPLICATIONS

- Air volume control for shallow well tanks

SELECTION CHART (For Shallow Wells)

PART NO	GAUGE TAPPING	TANK CONNECTOR	SUPPLY TANK
F92B-1C	1/4 in. Tap for Gauge 0.016 in. Brass Orifice	1-1/4 in. (32 mm) Male NPT	80 lbs (552 kPa) Max Pressure Min Diameter 9 in. (229 mm)
F92B-1C	1/4 in. Tap for Gauge 0.016 in. Brass Orifice	1-1/4 in. (32 mm) Male NPT	80 lbs (552 kPa) Max Pressure Min Diameter 9 in. (229 mm)
F92B-9C	1/4 in. Tap for Gauge	1-1/4 in. (32 mm) Male NPT	80 lbs (552 kPa) Max Pressure Min Diameter 9 in. (229 mm)

JOHNSON CONTROLS - LIQUID LEVEL AND FLOW CONTROLS

F93 Series

Air Volume Control (For Deep Wells)

Description

This Deep Well Air Volume Control prevents tanks from becoming air bound by maintaining proper air volume. Float operation opens the air valve on water level drop (increase in tank air), and permits air to bleed from the tank to the atmosphere as the tank refills.

Features

- internal parts are constructed of brass to minimize corrosion
- high impact plastic body is resistant to mechanical damage and corrosion

Applications

The F93 Series controls are designed for air volume control for deep well tanks.

F93B-1

Selection Chart (For Deep Wells)

Part Number	Gauge Tapping	Minimum Pressure Release	Tank Connector	Supply Tank
F93B-1C	1/4 in. Tap for Gauge	—	1 1/4 in. National Pipe Thread	80 lb Maximum Pressure Minimum Diameter 9 inches
F93H-1C		Set at 25 lb Non adjust.		

JOHNSON CONTROLS - P66 SERIES ELECTRONIC FAN SPEED CONTROL

SELECTION CHART

P66AAB High-Pressure Models

P66BAB-1

DESCRIPTION

The P66 is a pressure-actuated electronic motor speed controller. By directly sensing pressure, this device electronically varies the speed of a fan motor. This control can be used with a single-phase permanent split capacitor and shaded pole motors that are approved by the motor and equipment manufacturer for speed control applications. To prevent overheating, use a ball bearing motor with a service factor of at least 1.25.

FEATURES

- Exclusive Johnson Controls/Penn pressure sensor rapidly responds to changes in air delivery requirements.
- Soft start provides a smooth start-up. This significantly reduces motor starting noise and abrupt changes in motor speed that could occur between zero and full output voltage time delay and bypass circuitry are not required because of the soft start feature.
- This universal model can be used on a wide range of voltage applications (208-240/277/480 volt, 60 Hz motor control)
- Available with one or two pressure sensors for single and dual compressor systems the control selects the input with the greatest demand.
- Choice of two effective throttling ranges (ETR)= 30 or 60 psi (207 or 414 kpa).
- NEMA 1 case for versatile mounting.
- Built in radio frequency interference (RFI) Suppression 60 psi
- Built in voltage surge protection.

APPLICATIONS

- Air conditioning for computer rooms, head pressure control.
- Commercial air conditioning, head pressure control
- Commercial air refrigeration, head pressure control.
- Use only with ball bearing motors that have a service factor of 1.25 or greater

This control is designed to replace on/off fan cycling controls, multiple speed motors, condenser flood back systems, temperature fan speed controls, and modulating louver systems.

ELECTRICAL RATING

Motor Rating VAC	208	240	277	480
AC Full Loading Amp	8.0	8.0	6.9	4.0
AC locked Rotor Amp	16.5	16.5	14.3	10.5

PART NO	OPERATING RANGE psig (kPa) (Factory Setting)	EFFECTIVE THROTTLING RANGE psig (kPa) (Fixed)	PRESSURE RANGE (Adjustable)	MAXIMUM OVERPRESSURE psig (kPa)	CONTROL VOLTAGE	START VOLTAGE % OF LINE	CAPILLARY LENGTH (in)
P66AAB-1C	190-250 (1310-1724)	60 (414)	140-350 (965-2413)	450 (3103)	24 VAC, 1 VA, Class 2	10	60
P66AAB-3C	180-240 (1241-1655)	60 (414)	140-350 (965-2413)	450 (3103)	24 VAC, 1 VA, Class 2	16	60
P66AAB-6C	170-230 (1172-1586)	60 (414)	140-350 (965-2413)	450 (3103)	24 VAC, 1 VA, Class 2	16	60
P66AAB-9C	170-230 (1172-1586)	60 (414)	140-350 (965-2413)	450 (3103)	24 VAC, 1 VA, Class 2	40	60
P66AAB-10C	190-250 (1310-1724)	60 (414)	140-350 (965-2413)	450 (3103)	24 VAC, 1 VA, Class 2	16	120
P66AAB-11C	140-200 (965-1379)	60 (414)	140-350 (965-2413)	450 (3103)	24 VAC, 1 VA, Class 2	16	60
P66AAB-12C	220-280 (1517-1931)	60 (414)	140-350 (965-2413)	450 (3103)	24 VAC, 1 VA, Class 2	16	120
P66AAB-14C	220-280 (1517-1931)	60 (414)	140-350 (965-2413)	450 (3103)	24 VAC, 1 VA, Class 2	40	120
P66AAB-15C	190-250 (1310-1724)	60 (414)	140-350 (965-2413)	450 (3103)	24 VAC, 1 VA, Class 2	40	60
P66AAB-25C	180-240 (1241-1655)	60 (414)	140-350 (965-2413)	450 (3103)	24 VAC, 1 VA, Class 2	10	120
P66AAB-26C	220-280 (1517-1931)	60 (414)	140-350 (965-2413)	450 (3103)	24 VAC, 1 VA, Class 2	40	60

P66AAB Low Pressure Models

PART NO	OPERATING RANGE psig (kPa) (Factory Setting)	EFFECTIVE THROTTLING RANGE psig (kPa) (Fixed)	PRESSURE RANGE (Adjustable)	MAXIMUM OVERPRESSURE psig (kPa)	CONTROL VOLTAGE	START VOLTAGE % OF LINE	CAPILLARY LENGTH (in)
P66AAB-4C	135-165 (931-1138)	30 (207)	80-200	450 (3103)	24 VAC, 1 VA, Class 2	10	60
P66AAB-7C	85-115 (586-793)	30 (207)	80-200	450 (3103)	24 VAC, 1 VA, Class 2	16	60
P66AAB-13C	60-90 (414-621)	30 (207)	60-180	450 (3103)	24 VAC, 1 VA, Class 2	16	60
P66AAB-19C	115-145 (9793-998)	30 (207)	80-200	450 (3103)	24 VAC, 1 VA, Class 2	40	60

P66ABB All General Application Models

PART NO	OPERATING RANGE psig (kPa) (Factory Setting)	EFFECTIVE THROTTLING RANGE psig (kPa) (Fixed)	PRESSURE RANGE (Adjustable)	MAXIMUM OVERPRESSURE psig (kPa)	CONTROL VOLTAGE	START VOLTAGE % OF LINE	CAPILLARY LENGTH (in)
P66ABB-21C	220-280 (1517-1931)	60 (414)	140-350(965-2413)	450 (3103)	24 VAC, 1 VA Class 2	16	120
P66ABB-24C	190-250 (1172-1724)	60 (414)	140-350(965-2413)	450 (3103)	24 VAC, 1 VA Class 2	16	60
P66BAB-1C	190-250(1310-1724)	60(414)	140-350(965-2413)	450 (3103)	24 VAC, 1 VA Class 2	10	80
P66BAB-3C	170-230(1172-1586)	60(414)	140-350(965-2413)	450 (3103)	24 VAC, 1 VA Class 2	16	60
P66BAB-4C	190-250(1310-1724)	60(414)	140-350(965-2413)	450 (3103)	24 VAC, 1 VA Class 2	16	120
P66BAB-5C	190-250(1310-1724)	60(414)	140-350(965-2413)	450 (3103)	24 VAC, 1 VA Class 2	40	60

JOHNSON CONTROLS - Condenser Fan Speed Control

VFD66

VFD66 Condenser Fan Speed Control

Description

The VFD66 Series Condenser Fan Speed Controls are designed for speed control of 3-phase condenser fan motors in refrigeration and HVAC systems. The VFD66 controls regulate condenser fan motor speed by varying the frequency and voltage of the power supplied to the motor the VFD66 controls use input signals from various devices to adjust fan speed and optimize condenser head pressure, especially during low ambient conditions. Condenser fan speed may be controlled by pressure or temperature. The VFD66 controls accept input signals from the P35 Pressure Transducer, P399 Electronic Pressure Transducer, System 350™ controls or any other device that provides a 0-5 VDC or 0-10 VDC analog input signal. The VFD66 controls have a simple interface, and are easy to understand and use. Minimal end-user setup is required because of the application-specific design.

Features

- Permits application with 0-5 VDC or 0-10 VDC controllers, sensors, and transducers including Johnson Controls System 350TM
- Allows use on dual refrigeration circuits cooled by a single fan
- Provides installation ease and flexibility
- Handles 3-phase motors ranging from fractional to multiple hp at 208/230 VAC or 400/460 VAC
- Provides fast, easy installation and setup
- NEMA 1 or NEMA 4 enclosures

Applications

The VFD66 controls are intended for air-cooled condenser fan speed control in refrigeration and HVAC applications:

- Commercial air-cooled condensers
- Cooling tower fans
- Fans in evaporative condensing units.

The VFD66 controls allow the system to:

- Maintain optimum condenser head pressure in low ambient temperature conditions
- Eliminate short cycling in low ambient or changing load conditions
- Match the condenser fan speed to the load on the condenser, which increases the efficiency of the refrigeration system, reduces electricity cost, and helps maintain a constant evaporator temperature.

Other advantages of using the VFD66 controls are:

- Stabilized condenser head pressures help optimize compressor operation, which may reduce wear & extend compressor life
- Eliminating condenser fan short cycling may result in reduced motor repair and replacement costs
- Stable evaporator temperatures extend refrigerated product life and provide more consistent comfort cooling

Selection Chart

NEMA 1 Enclosure without Alarm Output		NEMA 1		
VFD66 Model	Kit = VFD66 Model Packaged with P35AG-9200	Enclosure with Alarm Output	Voltage	Max Amp
VFD66AAA-1C	VFD66AAA-100C	VFD66AAE-1C	230 VAC 50 Hz, 208/230 VAC 60 Hz	4.0
VFD66BAA-1C	VFD66BAA-100C	VFD66BAE-1C	400 VAC 50 Hz, 460 VAC 60 Hz	1.8
VFD66CAA-1C	VFD66CAA-100C	VFD66CAE-1C	230 VAC 50 Hz, 208/230 VAC 60 Hz	7.5
VFD66DAA-1C	VFD66DAA-100C	VFD66DAE-1C	400 VAC 50 Hz, 460 VAC 60 Hz	3.6
VFD66EBA-1C	VFD66EBA-100C	VFD66EBE-1C	230 VAC 50 Hz, 208/230 VAC 60 Hz	10.6
VFD66FBA-1C	VFD66FBA-100C	VFD66FBE-1C	400 VAC 50 Hz, 208/230 VAC 60 Hz	5.5

ACCESSORIES

PART NO	DESCRIPTION
P35AG-9200R	Pressure Transducer, 0-350 psi range
VFD66-CVR-1C	External Potentiometer Replacement Cover (NEMA 1 models only)
A350PS-1C	Proportional Plus Integral Temperature Control
P352PN-3C	Proportional Plus Integral Pressure Control
P399AAA-1-200C	Pressure Transducer, 0-100 psis, 1/8 in. NPTM pressure connection, with 6-1/2 ft (2m)wire harness with pigtails
P399AAC-1-200C	Pressure Transducer, 0-100 psis, 1/4 in. SAE female flare pressure connection with valve depressor, with 6-1/2 ft (2m) wire harness with pigtails
P399BAA-1-200C	Pressure Transducer, 0-500 psis, 1/8 in. NPTM pressure connection, with 6-1/2 ft (2m)wire harness with pigtails
P399BAC-1-200C	Pressure Transducer, 0-500 psis, 1/4 in. SAE female flare pressure connection with valve depressor, with 6-1/2 ft (2m) wire harness with pigtails
P399CAA-1-200C	Pressure Transducer, 0-750 psis, 1/8 in. NPTM pressure connection, with 6-1/2 ft (2m)wire harness with pigtails

JOHNSON CONTROLS - Condenser Fan Speed Control

VFD66 Condenser Fan Speed Control (Continued)

Accessories (Continued)

PART NO	DESCRIPTION
P399CAC-1-200C	Pressure Transducer, 0-750 psis, 1/4 in. SAE female flare pressure connection with valve depressor, with 6-1/2 ft (2m) wire harness with pigtails
P399AAA-1C	Electronic Pressure Transducer, 0-100 psi range; 1/8 in. NPT male connector
P399AAC-1C	Electronic Pressure Transducer, 0-100 psi range; 1/4 in. SAE female connector
P399BAA-1C	Electronic Pressure Transducer, 0-500 psi range; 1/8 in. NPT male connector
P399BAC-1C	Electronic Pressure Transducer, 0-500 psi range; 1/4 in. SAE female connector
P399CAA-1C	Electronic Pressure Transducer, 0-750 psi range; 1/8 in. NPT male connector
P399CAC-1C	Electronic Pressure Transducer, 0-750 psi range; 1/4 in. SAE female connector
WHA-P399-200C	Wire Harness, 6 1/2 ft (2.0 m.) length with pigtails
WHA-P399-400C	Wire Harness, 13 ft (4.0 m.) length with pigtails
WHA-P399-600C	Wire Harness, 19-5/8 ft (6.0 m.) length with pigtails

SPECIFICATIONS

VFD66 Condenser Fan Speed Control	
Input Power Voltage/Frequency	230 VAC 50 Hz, 208/230 VAC 60Hz, or 400 VAC 50 Hz / 460 VAC, 60 Hz, continuous duty
Input Devices	**Johnson Controls/PENN**(A350P, P35, P352P, P399, Performer Rack Controllers) **Johnson Controls/Metasys**(AHU, DME, DX9100, UNT, VAV) Also works with rack controllers, electronic pressure transducers, and other 0-5 VDC or 0-10 VDC input signal devices made by various manufacturers.
Output Voltage/Frequency	230 VAC 50 Hz, 208/230 VAC 60Hz, or 400 VAC 50 Hz / 460 VAC, 60 Hz, continuous duty
Pulse Width Modulation Carrier Frequency	2.3 kHz
Motor Requirements	Service Factor 1.0, VFD rated motors required
Overload Capacity	110% of ampere rating for 1 minute
Maximum Output Ampere Limit	110% of ampere rating, non-adjustable
Start/Stop	Line starting with single auto-restart 30 seconds after fault (500 second cycle)
Storage Temperature	-40 to 158°F (-40 to 70°C)
Operating Temperature	-40 to 140°F (-40 to 60°C) (a)
Altitude	3300 feet (1,000 meters) maximum without derating (a)
Relative Humidity	0 to 95% non-condensing (storage and operating)
	NEMA 1, UL Type 1 convection cooled (3 hp is fan cooled).
Available Enclosures	NEMA 4 convection and internal fan cooled Enclosures have three 1/2 in. trade size conduit openings.
Lead Length	Maximum lead length between motor and VFD66 is 50 ft (15 meters)
Agency Listings	UL Listed, File E184521, Guide NMMS cUL Listed, File E184521, Guide NMMS7
Emissions Compliance	FCC (US), DOC (Canada), CE (With additional components, see product literature)
Dimensions (H x W x D)	NEMA 1, 1-3 hp 7-1/2 x 7-1/4 x 6-1/4 in. (190 x 184 x 159 mm) NEMA 4, 1 hp 8-13/16 x 7-7/16 x 9-1/16 in. (224 x 189 x 230 mm) NEMA 4, 2 hp 11-13/16 x 7-7/16 x 9-1/16 in. (300 x 189 x 230 mm) NEMA 1 Enclosure models – 5.6 lb (2.5 kg)
Shipping Weight	NEMA1 Enclosure models with Optional Alarm Board – 5.8 lb (2.6 kg) NEMA 4 Enclosure (1 hp nominal) models – 5.6 lb (2.5 kg) NEMA 4 Enclosure (2 hp nominal) models – 7.2 lb (3.3 kg)

(a) Maximum Output Ampere Ratings affected by altitudes over 3300 ft (1000m) and by temperatures over 122°F (50°C). See Product Literature for more information.

JOHNSON CONTROLS - Pressure Actuated Water Valve

Repair Parts

V43 Series

Description

The V43 is a pilot pressure actuated modulating valve for use on water cooled condensers that require a large flow capacity. Valves open on pilot pressure increase.

Features

- **field proven to give long lasting, trouble-free service on the job**
- **easy to adjust and service**
- **simple and efficient manual flushing**

Applications

- water cooled refrigeration condensers that require a large flow capacity

V43AS-2

Selection Charts

V43 Series Pressure Actuated Water Valves (except NAVSEA valves, see below)

Part Number[1]	Pipe Size (in.)	Inlet and Outlet	Opening Point Adjustment Range psig (kPa)	Ship Wt. Lb.
Commercial Type – Non-Corrosive RefrigerantsS (R)				
V43AS-1C	2	4 Hole ASME Flanged	70 to 150 (483 to 1034)	59
V43AS-2C			160 to 260 (1103 to 1793)	
V43AT-1C	2 1/2		70 to 150 (483 to 1034)	65
V43AT-2C			160 to 260 (1103 to 1793)	
V43AV-1C	3		70 to 150 (483 to 1034)	90
V43AV-2C			160 to 260 (1103 to 1793)	90
V43AW-2C	4	8 Hole ASME Flanged		142
Commercial Type - Ammonia (R)				
V43AV-5C	3		160 to 260 (1103 to 1793)	90
Maritime Type – Non-Corrosive Refrigerants (R)				
V43BS-6C	2	4 Hole ASME Flanged	70 to 150 (483 to 1034)	59
V43BS-7C			160 to 260 (1103 to 1793)	
V43BT-6C	2 1/2		70 to 150 (483 to 1034)	65
V43BT-7C			160 to 260 (1103 to 1793)	
V43BV-10C	3		70 to 150 (483 to 1034)	90
V43BV-7C			140 to 260 (1103 to 1793)	

1. Refer to the *V43 Valve Capacity and Selection Diagrams* on the following page.

V43 Series Pressure Actuated Water Valves, Navy NAVSEA Certified

Part Number	Pipe Size (in.)	Inlet and Outlet	Pressure Connector	Opening Point Adjustment Range – psig (kPa)	Ship Wt. Lb.
Navy NAVSEA Certified – Non-Corrosive Refrigerants (R)					
V43BS-3C	2	4 Hole ASME Flange	1/4 in. Male Flared Conn.	70 to 150 (483 to 1034)	59
V43CS-1C		6 Hole Navy Flange			
V43CS-2C			Female Sweat Conn.		
V43BT-3C	2 1/2	4 Hole ASME Flange	1/4 in. Male Flared Conn.		65
V43CT-2C		6 Hole Navy Flange			
V43BV-4C	3	4 Hole ASME Flange	Female Sweat Conn.		90
V43CV-1C		8 Hole Navy Flang	1/4 in. Male Flared Conn.		
V43CV-2C			Female Sweat Conn.		
V43BW-7C	4	8 Hole ASME Flange	1/4 in. Male Flared Conn.		142
V43BW-2C				160 to 260 (1103 to 1793)	

Note: Flanges have NPT (National Pipe Thread)

JOHNSON CONTROLS - Pressure Actuated Water Valve

Selection Charts

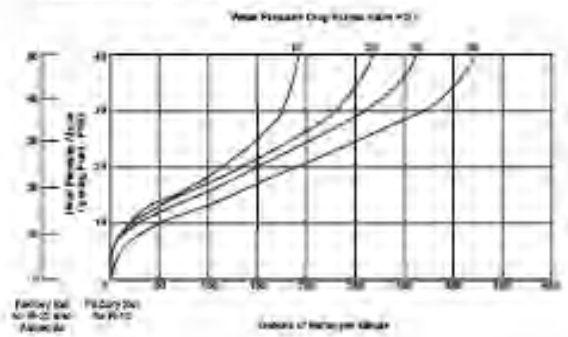
COMMERCIAL TYPE – NON-CORROSIVE REFRIGERANTS (R)

Pressure Actuated Water Valve (Continued)

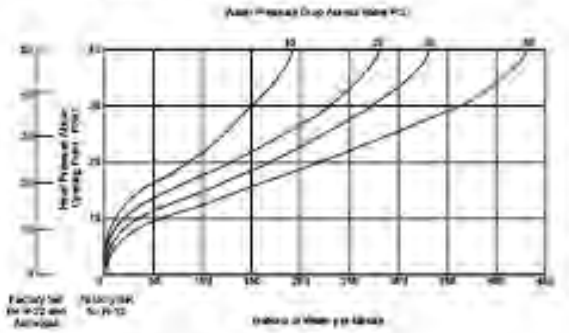
Selection Charts (Continued)

Valve Capacity and Selection

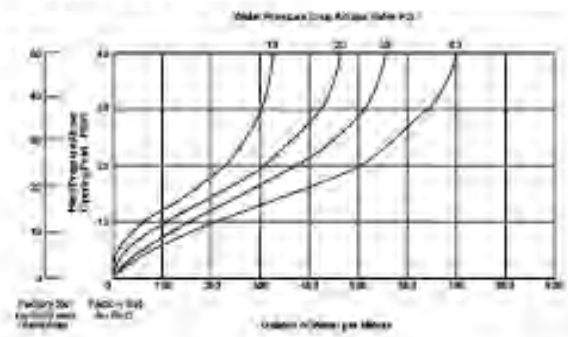
Capacity Chart for 2 Inch Valve



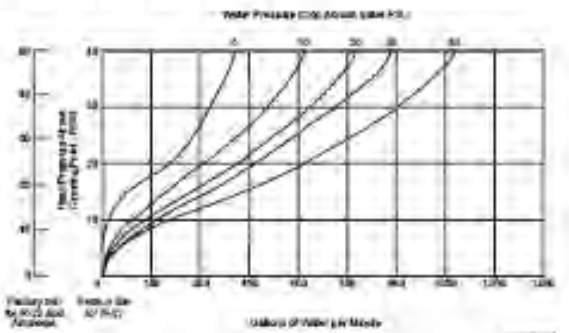
Capacity Chart for 2-1/2 Inch Valve



Capacity Chart for 3 Inch Valve



Capacity Chart for 4 Inch Valve

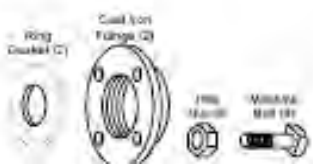


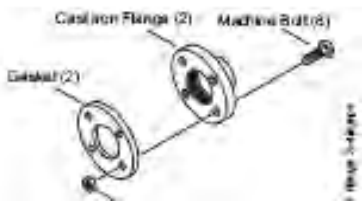
V43 Series Capacity Diagrams
(See the V43 Product Bulletin for more information on selecting the proper valve size.)

Accessories

(Companion Flanges and Gaskets)

Kit Code Number	Water Valve Size (in.)	Ship Wt. lb (kg)
KIT14A-813 [1]	2	11.8 (5.4)
KIT14A-814 [1]	2 1/2	16.5 (7.5)
FLG16A-800 [1]	3	20 (9.1)





JOHNSON CONTROLS - Pressure Actuated Water Valve

Selection Charts

MARITIME TYPE – NON-CORROSIVE REFRIGERANTS (R)

Pressure Actuated Water Valve (Continued)

Selection Charts (Continued)

Repair Parts[1]

Model	Diaphragm Kit	Seat Disc and Diaphragm Kit	Seat Repair Kit	Screen Repair Kit	Push Rod Kit [2]	Sensing Element Kit	Disc Body Kit
V41AS-1C	CPM18A-603F	DSC18A-600R	STT19A-603F	SCN10A-600F	ROD18A-600R	SEP88A-600R	DBK11A-600R
V41AS-2C						SEP88A-601R	
V41AT-1C	CPM18A-601F	DSC18A-601R	STT19A-603F		ROD18A-601R	SEP88A-600R	DBK11A-601R
V41AT-2C						SEP88A-601R	
V41AW-1C	CPM18A-602F	DSC18A-602R	STT19A-606R			SEP88A-600R	DBK11A-602R
V41AW-2C						SEP88A-601R	
V41AW-1C	CPM18A-603F	DSC18A-603R	STT19A-606R		ROD18A-603R	SEP88A-600R	DBK11A-603R
V41AW-2C						SEP88A-601R	
V41AS-3C	CPM18A-600R	DSC18A-600R	STT19A-602R		ROD18A-600R	SEP87A-600R	DBK11A-600R
V41AT-3C	CPM18A-601R	DSC18A-601R	STT19A-603R		ROD18A-601R		DBK11A-601R
V41AW-3C	CPM18A-602R	DSC18A-602R	STT19A-606R				DBK11A-602R
V41AW-3C	CPM18A-603R	DSC18A-603R	STT19A-606R				DBK11A-603R
V41BS-1C (1)	CPM18A-603R	DSC18A-600R	STT19A-602R	SCN10A-601F	ROD18A-602R	SEP88A-600R	DBK11A-602R
V41BS-2C (1)						SEP88A-601R	
V41BS-3C			STT19A-200R			SEP88A-600R	DBK10A-600R
V41BS-6C							
V41BS-7C						SEP88A-601R	
V41BT-1C (1)	CPM18A-601R	DSC18A-601R	STT19A-603R		ROD18A-603R	SEP88A-600R	DBK11A-601R
V41BT-2C (1)						SEP88A-601R	
V41BT-3C			STT19A-605R			SEP88A-600R	DBK10A-602R
V41BT-6C							
V41BT-7C						SEP88A-601R	
V41BV-1C (1)	CPM18A-602F	DSC18A-603R	STT19A-606R			SEP88A-600R	DBK11A-602R
V41BV-2C (1)						SEP88A-601R	
V41BV-4C			STT19A-607R			SEP88A-600R	DBK10A-601R
V41BV-5C (1)			STT19A-200R				DBK11A-602R
V41BV-6C (1)						SEP88A-601R	DBK10A-601R
V41BV-7C			STT19A-607R				
V41BV-8C							
V41BV-9C							
V41BV-10C						SEP88A-600R	DBK10A-601R
V41BW-2C	CPM18A-603F	DSC18A-603R	STT19A-606R		ROD18A-602R	SEP88A-601R	DBK10A-603R
V41BW-6C							DBK10A-602R
V41BW-7C						SEP88A-600R	
V41CS-1C	CPM18A-603F	DSC18A-600R	STT19A-200R		ROD18A-602R		DBK10A-600R
V41CS-2C					ROD18A-604R		
V41CS-3C							
V41CT-1C	CPM18A-601R	DSC18A-601R	STT19A-606R		ROD18A-603R		DBK10A-602R
V41CT-2C						SEP88A-600R	
V41CV-1C	CPM18A-602R	DSC18A-602R	STT19A-607R				DBK10A-601R
V41CV-2C						SEP88A-600R	

1. Repair parts are supplied in kits only and include all parts required to recondition that portion of the valve. To order, specify code number only.
2. Replacement push rod kit requires a seat repair kit and/or a diaphragm kit when required.

The following valves, manufactured after date code 8702, contain monel interior trim. Order replacement parts kits as listed below:

Valve Model	Order Parts Kits for:
V43BS-1C	V43BS-6
V43BS-2C	V43BS-7
V43BT-1C	V43BT-6

Valve Model	Order Parts Kits for:
V43BT-2C	V43BT-7
V43BV-1C	V43BV-10
V43BV-2C	V43BV-7

Valve Model	Order Parts Kits for:
V43BV-5C	V43BV-10
V43BV-6C	V43BV-9

JOHNSON CONTROLS - Pressure Actuated Water Valve

Selection Charts

NAVY NAVSEA Certified – NON-CORROSIVE REFRIGERANTS (R)

Pressure Actuated Water Valve (Continued)

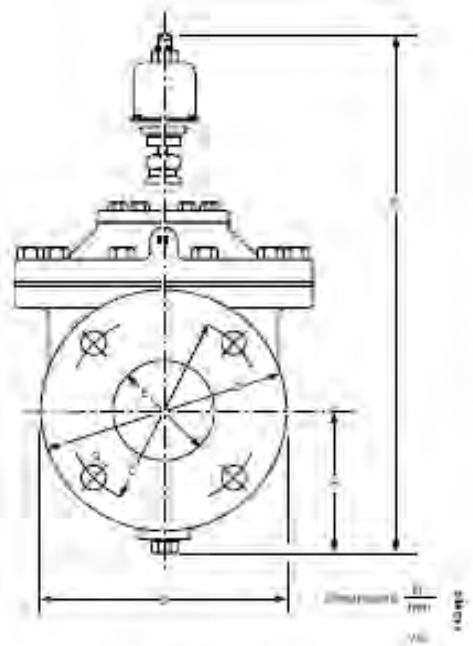
Technical Specifications

V43 Series Pressure Actuated Water Valves	
Maximum Static Water Pressure	150 psig (1034 kPa)
Maximum Water Pressure Drop Across Valve	60 psig
Maximum Bellows Pressure	300 psig (2068 kPa)
Maximum Water Supply Temperature	160°F (71°C)
Valve Body Material	Commercial–cast iron; Maritime–red brass
Pressure Connector	Non-corrosive–1/4 in. SAE male flare; Ammonia–1/4 in. FIP

Dimensions

Symbol	2 Inch	2 1/2 Inch	3 Inch	4 Inch
A[1]	9.5 in. (241 mm)	10.75 in. (273 mm)	11.75 in. (298 mm)	14.0 in. (356 mm)
B	7.5 in. (191 mm)	9.0 in. (229 mm)	9.0 in. (229 mm)	10.75 in. (273 mm)
C	4.75 in. (121 mm)	5.50 in. (140 mm)	6.0 in. (152 mm)	7.5 in. (191 mm)
D	6.0 in. (152 mm)	7.0 in. (178 mm)	7.5 in. (191 mm)	9.0 in. (229 mm)
E	2.13 in. (54 mm)	2.63 in. (67 mm)	3.13 in. (80 mm)	4.13 in. (105 mm)
F	15.25 in. (387 mm)	16.56 in. (396 mm)	16.56 in. (421 mm)	18.19 in. (462 mm)
G	0.750 in. (19.05 mm) Dia. (4)	0.750 in. (19.05 mm) Dia. (4)	0.750 in. (19.05 mm) Dia. (4)	0.750 in. (19.05 mm) Dia. (8)
H	3.63 in. (92 mm)	3.94 in. (100 mm)	4.25 in. (108 mm)	5.03 in. (128 mm)

1. Flange face to flange face.

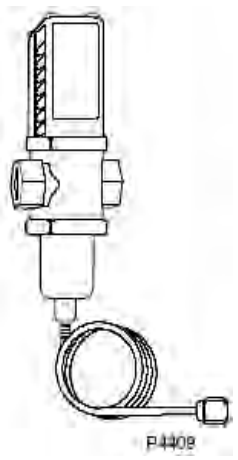


V43 Dimensions

JOHNSON CONTROLS - V46 SERIES PRESSURE ACTUATED WATER REGULATING VALVE

SELECTION CHART

COMMERCIAL TYPE, LOW FLOW — NON-CORROSIVE REFRIGERANTS (R)**



DESCRIPTION

The V46 is a pressure actuated, modulating valve that is suitable for use either on closed or open systems. Direct acting valves open on pressure increase. This type of valve is primarily used to regulate the flow of water or glycol to a water cooled condenser on refrigeration system. Reverse acting valves open on pressure decrease and are generally used in parallel with a direct-acting valve or for bypass operation.

FEATURES

- no close fitting or sliding parts in water passages
- minimizes chatter or water hammer
- free movement of all parts provides smooth pressure modulation
- refrigerant adjustment is not affected by water pressure
- withstands high hydraulic shock without damage
- range spring does not come in contact with cooling water
- easy manual flushing, if required
- 3/8, 1/2, and 3/4-in. valves may be disassembled and reassembled without detaching from the refrigeration system or without pumping down

APPLICATIONS

Modulates flow of water or glycol to a water cooled condenser on a refrigeration system. Examples include:

- Ice machines
- Computer room air conditioning units
- Ice cream machines
- Refrigeration cases

SPECIFICATIONS

V46 SERIES PRESSURE ACTUATED WATER REGULATING VALVES	
Maximum Water Temperature	170° F (77° C)
Valve Commercial:	3/8 to 3/4-in. cast brass1 in. and larger cast iron with a special finish
Body Navy and Maritime:	Cast naval bronze with monel interior parts

COMMERCIAL TYPE, LOW FLOW – NON CORROSIVE REFRIGERANTS (R)**

PART NO	PIPE SIZE (in)	INLET AND OUTLET	OPENING POINT RANGE psig (kPa)	PRESSURE ELEMENT STYLE	SEAT REPAIR KIT	REPLACEMENT POWER ELEMENTS
V46AA-1C	3/8 NPT	Threaded	70 to 250 (483 to 1793)	30 in. Capillary 1/4-in. Flare Nut (Style 45)	STT14A-600R	SEP91A-600R and SEC37A-601R*
V46AB-1C	1/2 NPT	Threaded	70 to 250 (483 to 1793)	30 in. Capillary 1/4-in. Flare Nut (Style 45)	STT15A-602R	SEP91A-602R and SEC37A-602R*
V46AC-1C	3/4 NPT	Threaded	70 to 250 (483 to 1793)	30 in. Capillary 1/4-in. Flare Nut (Style 45)	STT16A-601R	SEP91A-601R and SEC37A-602R*
V46AD-1C	1 NPT	Threaded	70 to 250 (483 to 1793)	30 in. Capillary 1/4-in. Flare Nut (Style 45)	STT17A-609R	SEP91A-603R and SEC37A-600R*
V46AE-1C	1-1/4 NPT	Threaded	70 to 250 (483 to 1793)	30 in. Capillary 1/4-in. Flare Nut (Style 45)	STT17A-610R	SEP91A-603R and SEC37A-600R*
V46AJ-2C	1/2	Union	70 to 250 (483 to 1793)	30 in. Capillary 1/4-in. Flare Nut (Style 45)	STT15A-602R	SEP77A-605R
V46EK-2C	3/4	Union	70 to 250 (483 to 1793)	30-in. Capillary 1/4in. Flare Nut (Style 46)	STT16A-601R	SEP127A-600R
V46AL-2C	1	Union	70 to 250 (483 to 1793)	30-in. Capillary 1/4in. Flare Nut (Style 46)	STT17A-609R	SEP107A-602R
V46AM-2C	1-1/4	Union	70 to 250 (483 to 1793)	30-in. Capillary 1/4in. Flare Nut (Style 46)	STT17A-610R	SEP107A-602R
V46AR-1C	1-1/2	4-Hole ASME Flange	70 to 250 (483 to 1793)	30-in. Capillary 1/4-in. Flare Nut (Style 45)	STT17A-610R	SEP91A-603R and SEC37A-600R*
V46AS-1C	2	4-Hole ASME Flange	70 to 170 (483 to 1172)	1/4-in. Male Flare Fitting (Style 5)	STT18A-600R	SEP81A-602R
V46AS-2C	2	4-Hole ASME Flange	160 to 250(1103 to 1793)	1/4-in. Male Flare Fitting (Style 5)	STT18A-600R	SEP81A-601R
V46AT-1C	2-1/2	4-Hole ASME Flange	70 to 170 (483 to 1172)	1/4-in. Male Flare Fitting (Style 5)	STT81A-601R	SEP81A-602R
V46AT-2C	2-1/2	4-Hole ASME Flange	160 to 260(1103 to 1793)	(Note 1)	STT81A-601R	SEP81A-601R
V46DA-2C	3/8 NPT	Threaded	70 to 260 (483 to 1793)	30-in. Capillary 1/4-in. Flare Nut (Style 45)	STT14A-630R	SEP91A-600R and SEC37A-601R†

JOHNSON CONTROLS - V46 SERIES PRESSURE ACTUATED WATER REGULATING VALVE

SELECTION CHART

COMMERCIAL TYPE — AMMONIA (R)

PART NO	PIPE SIZE (in)	INLET AND OUTLET	OPENING POINT RANGE psig (kPa)	PRESSURE ELEMENT STYLE	SEAT REPAIR KIT	REPLACEMENT POWER ELEMENTS
V46AC-8C	3/4 NPT	Threaded	100 to 200 (690 to 1379)	1/4-in. Female NPT (Style 15)	STT16A-601R	SEP70A-601R
V46AD-4C	1 NPT	Threaded	100 to 200 (690 to 1379)	1/4-in. Female NPT (Style 15)	STT17A-609R	SEP70A-604R
V46AE-4C	1-1/4 NPT	Threaded	100 to 200 (690 to 1379)	1/4-in. Female NPT (Style 15)	STT17A-610R	SEP70A-604R
V46AR-2C	1-1/2	4 Hole ASME Flange	100 to 200 (690 to 1379)	1/4-in. Female NPT (Style 15)	STT18A-610R	SEP70A-604R
V46AS-3C	2	4 Hole ASME Flange	100 to 200 (690 to 1379)	1/4-in. Female NPT (Style 15)	STT18A-600R	SEP70A-605R
V46AT-3C	2-1/2	4 Hole ASME Flange	100 to 200 (690 to 1379)	1/4-in. Female NPT (Style 15)	STT18A-601R	SEP70A-605R

MARITIME TYPE — NON-CORROSIVE REFRIGERANTS (R)

PART NO	PIPE SIZE (in)	INLET AND OUTLET	OPENING POINT RANGE psig (kPa)	PRESSURE ELEMENT STYLE	SEAT REPAIR KIT	REPLACEMENT POWER ELEMENTS
V46BA-2C	3/8 NPT	Threaded	70 to 260 (483 to 1793)	30-in. Capillary with Sweat Connection (Style 34)	STT14A-601R	SEP13A-602R
V46BB-2C	1/2 NPT	Threaded	70 to 260 (483 to 1793)	30-in. Capillary with Sweat Connection (Style 34)	STT15A-603R	SEP13A-600R
V46BC-2C	3/4 NPT	Threaded	70 to 260 (483 to 1793)	30-in. Capillary with Sweat Connection (Style 34)	STT17A-613R	SEP13A-603R
V46BD-2C	1 NPT	Threaded	70 to 260 (483 to 1793)	30-in. Capillary with Sweat Connection (Style 34)	STT17A-611R	SEP50A-600R
V46VE-2C	1-1/4 NPT	Threaded	70 to 260 (483 to 1793)	30-in. Capillary with Sweat Connection (Style 34)	STT17A-612R	SEP50A-600R
V46BS-4C	2	4 Hole ASME Flange	160 to 260 (1103 to 1793)	30-in. Capillary with Sweat Connection (Style 34)	STT18A-602R	SEP50A-601R
V46BT-4C	2-1/2	4 Hole ASME Flange	160 to 260 (1103 to 1793)	30-in. Capillary with Sweat Connection (Style 34)	STT18A-602R	SEP50A-601R

NAVSEA CERTIFIED — NON-CORROSIVE REFRIGERANTS (R)

PART NO	PIPE SIZE (in)	INLET AND OUTLET	OPENING POINT RANGE psig (kPa)	PRESSURE ELEMENT STYLE	SEAT REPAIR KIT	REPLACEMENT POWER ELEMENTS
V46CJ-2C	1/2	Sweat Connector	70 to 260 (483 to 1793)	30-in. Capillary with Sweat Connection (Style 34)	STT15A-603R	SEP13A-600R
V46CN-2C	3/4	4 Hole Navy Flange	70 to 260 (483 to 1793)	30-in. Capillary with Sweat Connection (Style 34)	STT17A-613R	SEP13A-603R
V46CP-2C	1	4 Hole Navy Flange	70 to 260 (483 to 1793)	30-in. Capillary with Sweat Connection (Style 34)	STT17A-611R	SEP50A-600R
V46CQ-2C	1-1/4	4 Hole Navy Flange	70 to 260 (483 to 1793)	30-in. Capillary with Sweat Connection (Style 34)	STT17A-612R	SEP50A-600R
V46BR-2C	1-1/2	4 Hole ASME Flange	70 to 260 (483 to 1793)	30-in. Capillary with Sweat Connection (Style 34)	STT17A-612R	SEP50A-600R
V46CR-2C	1-1/2	6 Hole Navy Flange	70 to 260 (483 to 1793)	30-in. Capillary with Sweat Connection (Style 34)	STT17A-612R	SEP50A-600R
V46BS-3C	2	4 Hole ASME Flange	70 to 170 (483 to 1172)	30-in. Capillary with Sweat Connection (Style 34)	STT18A-602R	SEP50A-601R
V46CS-3C	2	6 Hole Navy Flange	70 to 170 (483 to 1172)	30-in. Capillary with Sweat Connection (Style 34)	STT18A-602R	SEP50A-601R
V46CS-4C	2	6 Hole Navy Flange	160 to 260 (1103 to 1793)	30-in. Capillary with Sweat Connection (Style 34)	STT18A-602R	SEP50A-601R
V46BT-3C	2-1/2	4 Hole ASME Flange	70 to 170 (483 to 1172)	30-in. Capillary with Sweat Connection (Style 34)	STT18A-602R	SEP50A-601R
V46CT-3C	2-1/2	6 Hole Navy Flange	70 to 170 (483 to 1172)	30-in. Capillary with Sweat Connection (Style 34)	STT18A-602R	SEP50A-601R
V46CT-4C	2-1/2	6 Hole Navy Flange	150 to 260 (1103 to 1793)	30-in. Capillary with Sweat Connection (Style 34)	STT18A-602R	SEP50A-601R

*Replacement element supplied with ¼" male SAE connector. Order SEC37A capillary kit w/2 flare nuts separately, if needed.

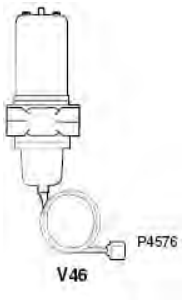
**Low water flow valve — 2.5 GPM max.

†Maximum opening point: 70 - 300 psi (483 to 2068 kPa), maximum permissible pressure: 440 psi (3034 kPa).

NOTES: 1. Use only on valves specified. 2. Standard capillary length: Style 45 & Style 34 elements is 30".

JOHNSON CONTROLS - V46N SERIES REVERSE ACTING VALVE

SELECTION CHART



DESCRIPTION

The V46N Series are reverse acting pressure actuated modulating valves used on either open or closed loop coolant systems. Reverse acting valves open on a refrigerant pressure decrease. They are generally used in parallel with a direct acting valve for heat pump applications or for bypass operation.

APPLICATIONS

- Bypass systems
- Water cooled heat pumps in parallel with direct acting valve

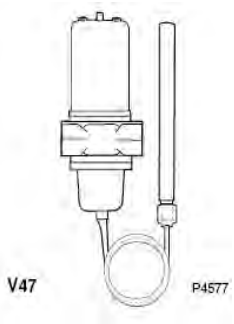
SELECTION CHART

PART NO	PIPE SIZE (in)	INLET AND OUTLET	OPENING POINT RANGE psig (kPa)	PRESSURE ELEMENT STYLE	SEAT REPAIR KIT	REPLACEMENT POWER ELEMENTS
V46NA-1C	3/8 NPT	Threaded	90 to 280 (621 to 1931)	30-in. Capillary with 1/4-in.Flare Nut + Schrader Valve Depressor(Style 45)	STT14A-600R	SEP91A-600R & SEC37A-601R*
V46NB-1C	1/2 NPT	Threaded	90 to 280 (621 to 1931)	30-in. Capillary with 1/4-in.Flare Nut + Schrader Valve Depressor(Style 45)	STT15A-602R	SEP91A-602R & SEC37A-602R*
V46NB-2C	1/2 NPT	Threaded	40 to 100** (276 too 690)	30-in. Capillary with 1/4-in.Flare Nut + Schrader Valve Depressor(Style 45)	STT15A-602R	SEP91A-602R & SEC37A-602R*
V46NC-1C	3/4 NPT	Threaded	90 to 280 (621 to 1931)	30-in. Capillary with 1/4-in.Flare Nut + Schrader Valve Depressor(Style 45)	STT16A-601R	SEP91A-601R & SEC37A-602R*
V46NC-2C	3/4 NPT	Threaded	40 to 100** (276 to 690)	30-in. Capillary with 1/4-in.Flare Nut + Schrader Valve Depressor(Style 45)	STT16A-601R	SEP91A-601R & SEC37A-602R*
V46ND-1C	1 NPT	Threaded	90 to 280 (621 to 1931)	30-in. Capillary with 1/4-in.Flare Nut + Schrader Valve Depressor(Style 45)	STT17A-609R	SEP91A-601R & SEC37A-602R*
V46ND-2C	1 NPT	Threaded	40 to 100** (276 to 690)	30-in. Capillary with 1/4-in.Flare Nut + Schrader Valve Depressor(Style 45)	STT17A-609R	SEP91A-601R & SEC37A-602R*
V46NE-1C	1-1/4 NPT	Threaded	90 to 280 (621 to 1931)	30-in. Capillary with 1/4-in.Flare Nut + Schrader Valve Depressor(Style 45)	STT17A-610R	SEP91A-603R & SEC37A-600R*
V46NE-2C	1-1/4 NPT	Threaded	40 to 100** (276 to 690)	30-in. Capillary with 1/4-in.Flare Nut + Schrader Valve Depressor(Style 45)	STT17A-610R	SEP91A-603R & SEC37A-600R*

*Maximum bellows overpressure is 320 psig. Replacement element provided with 1/4 in. male SAE connector. Order SEC 37A capillary kit with 2 flare nuts, separately if needed. Use only on valves specified.
** For heat pump application.

JOHNSON CONTROLS - V47 SERIES TEMPERATURE ACTUATED MODULATING VALVE

SELECTION CHART



DESCRIPTION

The V47 is a temperature actuated modulating valve that regulates the flow of water or glycol to maintain a desired temperature. Three Temperature ranges for each valve size are available. Many valves come with a removable bypass plug that can be replaced by the bypass Orifice provided separately with each valve. Valve action is open on temperature increase. For open on temperature decrease models, Contact Application Engineering.

SELECTION CHART

PART NO	PIPE SIZE (in)	SEAT REPAIR KIT	RANGE (Opening Point) °F	BULB SIZE (in) (Dia Length)	STD BYPASS ORIFICE DIA (in)	REPLACEMENT SENSING ELEMENT	BULB WELL NUMBER (Order Separately)
V47AA-1C	3/8	STT14A-600R	115 to 180 Heating	11/16 x 3-1/4	0.062	SET29A-622R	WEL18A-602R
V47AA-2C	3/8	STT14A-600R	160 to 230 Heating	11/16 x 3-1/4	0.062	SET29A-623R	WEL18A-602R
V47AA-3C	3/8	STT14A-600R	75 to 135 Cross Ambient	11/16 x 6	0.062	SET29A-601R	WEL17A-601R
V47AB-2C	1/2	STT15A-602R	75 to 135 Cross Ambient	11/16 x 10*	—	SET29A-602R	WEL17A-600R
V47AB-3C	1/2	STT15A-602R	115 to 180 Heating	11/16 x 3-1/4	0.062	SET29A-624R	WEL18A-602R
V47AB-4C	1/2	STT15A-602R	160 to 230 Heating	11/16 x 3-1/4	0.062	SET29A-625R	WEL18A-602R
V47AB-5C	1/2	STT15A-602R	75 to 135 Cross Ambient	11/16 x 10	0.062	SET29A-602R	WEL17A-600R
V47AC-3C	3/4	STT16A-601R	115 to 180 Heating	11/16 x 3-1/4	0.062	SET29A-627R	WEL18A-602R
V47AC4C	3/4	STT16A-601R	160 to 230 Heating	11/16 x 3-1/4	0.062	SET29A-627R	WEL18A-602R
V47AC-6C	3/4	STT16A-601R	75 to 135 Cross Ambient	11/16 x 10	0.062	SET29A-604R	WEL17A-600R
V47AC-8C	3/4**	STT16A-601R	75 to 135 Heating	11/16 x 3-1/4	—	SET98A-621R	WEL18A-602R
V47AD-1C	1	STT17A-609R	75 to 135 Cross Ambient	11/16 x 16-1/4	0.093	SET29A-605R	—
V47AD-2C	1	STT17A-609R	115 to 180 Heating	11/16 x 6	0.093	SET29A-629R	WEL17A-601R
V47AD-3C	1	STT17A-609R	160 to 230 Heating	11/16 x 6	0.093	SET29A-630R	WEL17A-601R
V47AE-1C	1-1/4	STT17A-610R	75 to 135 Cross Ambient	11/16 x 16-1/4	0.093	SET29A-605R	—
V47AE-2C	1-1/4	STT17A-610R	115 to 180 Heating	11/16 x 6	0.093	SET29A-629R	WEL17A-601R
V47AE-3C	1-1/4	STT17A-610R	160 to 230 Heating	11/16 x 6	0.093	SET29A-630R	WEL17A-601R
V47AR-1C	1-1/2**	STT17A-610R	75 to 135 Cross Ambient	11/16 x 16-1/4	0.093	SET29A-605R	—
V47AR-2C	1-1/2**	STT17A-610R	115 to 180 Heating	11/16 x 6	0.093	SET29A-629R	WEL17A-601R
V47AR-3C	1-1/2**	STT17A-610R	160 to 230 Heating	11/16 x 6	0.093	SET29A-630R	WEL17A-601R
V47AS-1C	2**	STT18A-600R	115 to 160 Heating	11/16 x 10	0.125	SET29A-632R	WEL17A-600R
V47AS-2C	2**	STT18A-600R	160 to 205 Heating	11/16 x 10	0.125	SET19A-633R	WEL17A-600R
V47AS-3C	2**	STT18A-600R	75 to 115 Cross Ambient	11/16 x 43	0.125	SET29A-606R	—
V47AT-1C	2-1/2**	STT18A-601R	15 to 160 Heating	11/16 x 10	0.125	SET29A-632R	WEL17A-600R
V47AT-2C	2-1/2**	STT18A-601R	160 to 205 Heating	11/16 x 10	0.125	SET29A-633R	WEL17A-600R
V47AT-3C	2-1/2**	STT18A-601R	75 to 115 Cross Ambient	11/16 x 43	0.125	SET29A-606R	—

*Style 1 bulb (does not include 1/2-in. male NPT fitting).
**ASME Flange.

JOHNSON CONTROLS - V47N SERIES REVERSE ACTING VALVE

SELECTION CHART

DESCRIPTION

The V47N Series are reverse-acting, temperature-actuated, modulating valves that regulate the flow of water or glycol to maintain a desired temperature. Reverse-acting valves open on a drop in temperature. They are generally used in parallel with direct-acting valves for hand pump applications or for bypass operation.

APPLICATIONS

- Bypass systems
- Water-cooled heat pumps in parallel with a direct-acting valve

SELECTION CHART

PART NO	BULB SIZE (in) (Dia Length)	PIPE SIZE & CONNECTOR	OPENING POINT RANGE	FACTORY SET OPENING POINT	STANDARD BYPASS ORIFICE
V47NA-2C	11/16 x 3-1/4	3/8-in. Screw	85 to 155° F	105° F	—
V47NA-8C	1-1/4 x 5	3/8-in. Screw	215 to 265° F	240° F	0.04 in.
V47NB-1C	11/16 x 3-1/4	1/2-9n. Screw	85 to 155° F	105° F	—
V47NC-1C	11/16 x 3-1/4	3/4-in. Screw	85 to 155° F	105° F	—
V47NR-1C	11/16 x 16-1/4	1-1/2-in. Flange	45 to 85° F	55° F	—

REPAIR PARTS AND ACCESSORIES

PARTS FOR:	P/N Seat Repair Kit	P/N Replacement Sensing Element	P/N Bulb Well Number (Order Separately)
V47NA-2	V47NA-2	—	WEL18A-601R (Monel)
V47NA-8	V47NA-8	—	—
V47NB-1	V47NB-1	—	WEL18A-601R (Monel) WEL18A-602R (Brass)
V47NC-1	V47NC-1	—	WEL18A-601R (Monel) WEL18A-602R (Brass)
V47NR-1	V47NR-1	SET29A-605R	—

JOHNSON CONTROLS - V48 SERIES THREE-WAY WATER REGULATING VALVE

DESCRIPTION

V48 Series valves are designed specifically for condensing units cooled either by atmospheric or forced draft cooling towers.

APPLICATIONS

V48 Series valves are used on single or multiple condenser hook-ups to the tower to provide the most economical and efficient use of the tower.

SELECTION CHART

PART NO	PIPE SIZE (in)	INLET AND OUTLET	PRESSURE ELEMENT STYLE	SEAT REPAIR KIT	REPLACEMENT SENSING ELEMENT	RANGE OPENING POINT OF NORMALLY CLOSED SIDE (psig (kPa)	WATER SUPPLY PRESSURE	MAX BELLOWS OVERPRESSURE
V48AB-1C	1/2	Threaded	30-in. Capillary with 1/4-in.Flare Nut (Style 45)	STT15A-605R	SEP91A-602R SEC37A-602R*	85 to 110 (586 to 758)	150 psig (1034 kPa)	230 psig(1586 kPa)
V48AB-2C	1/2	Threaded	30-in. Capillary with 1/4-in.Flare Nut (Style 45)	STT15A-605R	SEP91A-602R SEC37A-602R*	145 to 190 (1000 to 1310)	150 psig (1034 kPa)	320 psig(2206 kPa)
V48AC-1C	3/4	Threaded	30-in. Capillary with 1/4-in.Flare Nut (Style 45)	STT16A-604R	SEP91A-602R SEC37A-602R*	85 to 110 (586 to 758)	150 psig (1034 kPa)	230 psig(1586 kPa)
V48AC-2C	3/4	Threaded	30-in. Capillary with 1/4-in.Flare Nut (Style 45)	STT16A-604R	SEP91A-602R SEC37A-602R*	145 to 190 (1000 to 1310)	150 psig (1034 kPa)	320 psig(2206 kPa)
V48AD-1C	1	Threaded	30-in. Capillary with 1/4-in.Flare Nut (Style 45)	STT17A-616R	SEP91A-602R SEC37A-602R*	85 to 110 (586 to 758)	150 psig (1034 kPa)	230 psig(1586 kPa)
V48AD-2C	1	Threaded	30-in. Capillary with 1/4-in.Flare Nut (Style 45)	STT17A-616R	SEP91A-602R SEC37A-602R*	145 to 190 (1000 to 1310)	150 psig (1034 kPa)	320 psig(2206 kPa)
V48AE-1C	1-1/4	Threaded	30-in. Capillary with 1/4-in.Flare Nut (Style 45)	STT17A-617R	SEP91A-602R SEC37A-602R*	85 to 110 (586 to 758)	150 psig (1034 kPa)	230 psig(1586 kPa)
V48AE-2C	1-1/4	Threaded	30-in. Capillary with 1/4-in.Flare Nut (Style 45)	STT17A-617R	SEP91A-602R SEC37A-602R*	145 to 190 (1000 to 1310)	150 psig (1034 kPa)	320 psig(2206 kPa)
V48AF-1C	1-1/2	Threaded	1/4-in. Male Flare Fitting(Style 5)	STT17A-604R	SEP81A-602R	85 to 110 (586 to 758)	150 psig (1034 kPa)	230 psig(1586 kPa)
V48AF-2C	1-1/2	Threaded	1/4-in. Male Flare Fitting(Style 5)	STT17A-604R	SEP81A-601R	145 to 190 (1000 to 1310)	150 psig (1034 kPa)	320 psig(2206 kPa)
V48AJ-2C	1/2	Union	30-in. Capillary with 1/4-in.Flare Nut (Style 45)	STT15A-605R	SEP77A-605R	145 to 190 (1000 to 1310)	150 psig (1034 kPa)	320 psig(2206 kPa)
V48EK-2C	3/4	Union	30-in. Capillary with 1/4-in.Flare Nut (Style 45)	STT16A-604R	SEP77A-605R	145 to 190 (1000 to 1310)	150 psig (1034 kPa)	370 psig(2551 kPa)
V48AL-2C	1	Union	30-in. Capillary with 1/4-in.Flare Nut (Style 45)	STT17A-616R	SEP127A-600R	145 to 190 (1000 to 1310)	150 psig (1034 kPa)	320 psig(2206 kPa)
V48AM-2C	1-1/4	Union	30-in. Capillary with 1/4-in.Flare Nut (Style 45)	STT17A-617R	SEP107A-602R	145 to 190 (1000 to 1310)	150 psig (1034 kPa)	320 psig(2206 kPa)

*Replacement element supplied with 1/4-in male SAE connector,
Order SEC37A capacity lot with two nuts separately if needed. Use only on valves specified.

NOTE: Standard capacity length on Style 45 and Style 34 elements is 30 inches.

JOHNSON CONTROLS - High Water Pressure Two-Way Pressure-Actuated Water-Regulating Valves

V146 Series


V146 Series Valve

DESCRIPTION

The V146 Series 2-Way Pressure-Actuated Water-Regulating Valves are designed to regulate water flow and control refrigerant head pressure in systems with water-cooled condensers. The V146 valves are ideal for applications with system water pressures of up to 350 psi (2413 kPa), such as high-rise buildings. V146 valves may be used with standard non-corrosive refrigerants. V146 valves have a monel (nickel-copper alloy) seat and disc holder.

FEATURES

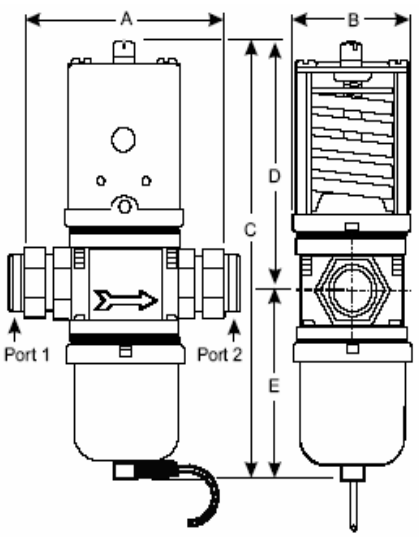
- No close-fitting or sliding parts in water passages provides control in less-than ideal water conditions
- High-pressure design allows use in systems with up to 350 psi (2413 kPa) water pressure
- Pressure-balanced design resists changes to setpoint caused by gradual or sudden water pressure changes
- Corrosion-resistant material for internal parts promotes long valve life
- Accessible range spring allows easy manual flushing
- Take-apart construction allows access to valve interior without removing valve from refrigeration system or pumping down

APPLICATIONS

V146 valves are designed to regulate flow in systems with water pressures up to 350 psi (2413 kPa). The valves have an adjustable opening point in a refrigerant pressure range of 70-260 psi (483-1793 kPa). V146 valves may be used with standard non-corrosive refrigerants. Internal valve parts that come into contact with water are constructed of monel (nickel-copper alloy) and brass to resist corrosion.

SELECTION CHART

PART NO	Inlet and Outlet Ports	Nominal Valve Size	Pressure Connection Style
V146AL-1C	Union(Sweat)	1 in.	46



Pressure connection and capillary as specified.

SPECIFICATIONS

V146 Series 2-Way Pressure-Actuated Water-Regulating Valves		
Nominal Valve Size		1 in.
Maximum Refrigerant Pressure at Bellows		320 psig (2206 kPa)
Opening Point Adjustment Range		70-260 psig (483-1793 kPa)
Factory-Set Opening Point		165 psig (1138 kPa)
Maximum Water Pressure		350 psi (2413 kPa)
Temperature	**Maximum** 170°F (77°C)	
	Minimum 40°F (4°C)	
Material	**Body** 1 in. - Cast Iron with Corrosion-resistant Finish	
	Disc Stud, Valve Stem Brass	
	Disc Cup, Valve Seat Model (Nickel-Copper Alloy)	
	Valve Disc Buna-N	
	Sensing Element Brass and Phosphor Bronze Bellow in Brass Cup	
	Diaphragm Nylon Reinforced Buna-N	

V146 Valve Dimensions, inches (Millimeters) and Shipping Weight, pounds (kilograms)

Valve Code Number	Nominal Valve Size	Callout					Shipping Weight
		A	B	C	D	E	
V146AL-1C	1 in.	4-3/4 (121)	2-3/4 (71)	10 (254)	5-5/16 (151)	4-1/16 (103)	9.3 (4.0)

JOHNSON CONTROLS - High Water Pressure 3-Way Pressure-Actuated Water-Regulating Valves

V148 Series

DESCRIPTION

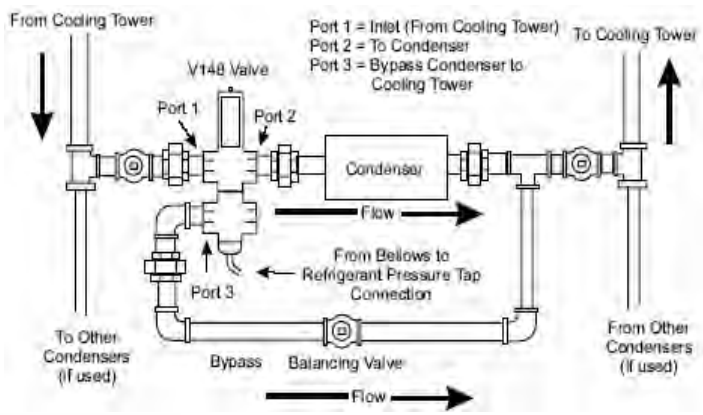
V148 Series 3-Way Pressure-Actuated Water-Regulating Valves are designed to regulate water flow and control refrigerant head pressure in systems with single or multiple water-cooled condensers. The V148 valves are ideal for applications with system water pressures of up to 350 psi (2413 kPa), such as high-rise buildings. V148 valves may be used with standard non-corrosive refrigerants. V148 valves have a monel (nickel-copper alloy) seat and disc holder.

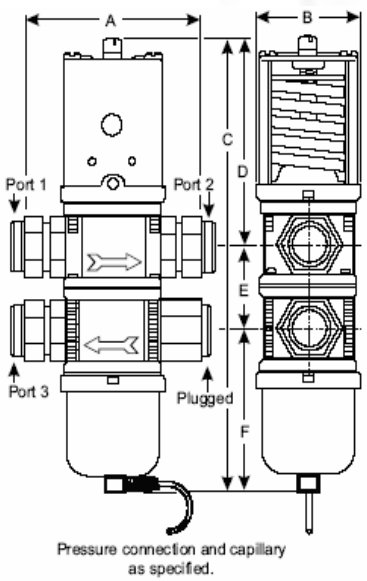
FEATURES

- No close-fitting or sliding parts in water passages provides control in less-than ideal water conditions
- High-pressure design allows use in systems with up to 350 psi (2413 kPa) water pressure
- Pressure-balanced design resists changes to setpoint caused by gradual or sudden water pressure changes
- Corrosion-resistant material for internal parts promotes long valve life
- Accessible range spring allows easy manual flushing
- Take-apart construction allows access to valve interior without removing valve from refrigeration system or pumping down

APPLICATIONS

V148 valves regulate water flow to water cooled condensers (and may be applied to hydronic systems) with water pressures up to 350 psi (2413 kPa). The V148 valves have an adjustable opening point in a refrigerant pressure range of 145-190 psi (1000-1310 kPa). V148 valves may be used with standard non-corrosive refrigerants. Internal valve parts that come into contact with water are constructed of monel (nickel copper alloy) and brass to resist corrosion.





SPECIFICATIONS

V148 Series 3-Way Pressure-Actuated Water-Regulating Valves	
Nominal Valve Size	1 in.
Maximum Refrigerant Pressure at Bellows	320 psi (2206 kPa)
Opening Point Adjustment Range	145-190 psi (1000-1310 kPa)
Factory-Set Opening Point Port 1 to Port 2)	165 psi (1138 kPa)
Throttling Range	70 psi (483 kPa)
Maximum Pressure	350 psi (2413 kPa)
Minimum Temperature	40°F (4°C)
Maximum Temperature	170°F (77°C)
Material	**Body** 1 in. - Cast Iron with Corrosion-resistant Finish
	Disc Stud, Valve Stem Brass
	Disc Cup, Valve Seat Monel (Nickel-Copper Alloy)
	Valve Disc Buna-N
	Sensing Element Brass Bellows in Brass Cup
	Diaphragm Nylon-Reinforced Buna-N

V148 Valve Dimensions, inches (millimeters), and Shipping Weight, pounds (kilograms)

Valve Code Number	Nominal Valve Size	Callout						Shipping Weight
		A	B	C	D	E	F	
V148AL-1C	1in.	4-3/4 (121)	2-3/4 (71)	12 (305)	5-15/16 (151)	2 (51)	4-1/16 (103)	12 (5.4)

JOHNSON CONTROLS - Transformers

Y63, Y64, Y65, Y66 and Y69 Series

DESCRIPTION:

The series Y63, Y64, Y65, Y66, and Y69 transformers handle 24 VAC power requirements from 40 VA through 300 VA. These transformers are designed for use with digital controllers, gas controls, ignition systems, motor actuators, staging controls, and most other 24 VAC Heating, Ventilating, Air Conditioning (HVAC) and Refrigeration control systems. The Y6x Series meets the national requirements of the United States and Canada. The Y63, Y64, Y65, and Y66 transformers are Underwriters Laboratories Inc. (UL) listed as Class 2 transformers (UL 1585, CSA C22.2 No. 66). The Y69 is listed as a general-purpose transformer (UL 506, CSA C22.2 No. 66).

FEATURES:

- Split-bobbin design provides best primary/secondary isolation.
- Mutate primaries reduce stocking requirements and offer application flexibility.
- Choice of plate, foot, or conduit hub mounting provides mounting flexibility.
- Choice of primary voltages meets a wide range of power requirements from 24 VAC through 480 VAC.
- Color-coded lead wires for simplicity and standardization.
- Built-in circuit breakers allow for easy reset, and avoid the replacement cost after a burnout (Y63, Y64, Y66, and Y69)

To Order

Specify the code number from the following selection chart.

Specifications:

Y63, Y64, Y65, Y66, Y69 SERIES TRANSFORMERS		
Input Power Requirements	24-480 VAC at 60 Hz	
Full Load Secondary Voltage	23.5 VAC (Nominal)	
Open Circuit Secondary Voltage (No Load)	27.0 VAC (Nominal)	
Full Load Secondary VA Rating	**Series** Y63 Y64 Y65 Y66 Y69	**Volt-Amperes** 50 VA 92 VA 40 VA 75 VA 300 VA
Finish	Endbells, frame, feet, and mounting plates are zinc plated.	
Ambient Operating Temperature	-40 to 104°F (-40 to 40°C)	
Ambient Storage Temperature	-40 to 140°F (-40 to 60°C)	
Shipping Weight	Y63 Y64 Y65 Y66 Y69	3.0 lb/1.4 kg 4.0 lb/1.8 kg 2.0 lb/0.9 kg 3.0 lb/1.4 kg 11.0 lb/5.0 kg
Agency Compliance	UL Listed Y63, Y64, Y65, Y66; File E25482 or E95575, CCN's XOKV (US) and XOKV7 (Canada) UL Recognized Y63, Y64, Y65, Y66; File E25482 or E95575, CCN's XOKV2 (US) and XOKV8 (Canada) UL Listed Y69; File E37177 or E95138, CCN's XPTQ (US) and XPTQ7 (Canada) All transformers are Class 2 except the Y69 (300 VA), which is listed as a power transformer.	

JOHNSON CONTROLS - Transformers

Y63, Y64, Y65, Y66 and Y69 Series Transformers (Continued)

Selection Chart

40 VA Capacity Transformers with Energy Limiting Type Overload Protection

		Primary		Secondary		
PART NO	**Agency Requirement**	**Voltage VAC**	**Connection**	**Voltage VAC**	**Connection**	**MOUNTING**
Y65G13-0	UL, cUL Class 2	24	Male Fitting 8 in. prim. leads	24	Male Fitting 30 in. sec. leads	Foot
Y65A13-0	UL, cUL Class 2	120	Male Fitting 8 in. prim. leads	24	Male Fitting 30 in. sec. leads	Foot
Y65A21-0	UL, cUL Class 2	120	Endbell holes 8 in. prim. leads	24	Three screw terminals (one is blind)	4 in. x 4 in. plate
Y65T31-0	UL, cUL Class 2	120/208/240	Male Fitting 8 in. prim. leads	24	Three screw terminals (one is blind)	Foot 4 in. x 4 in. plate (a)
Y65T42-0	UL, cUL Class 2	120/208/240	Male Fitting 8 in. prim. leads	24	Male Fitting 8 in. sec. leads	Hub 4 in. x 4 in. plate (a)
Y65T54-0	UL, cUL Class 2	120/208/240	8 in. primary leads	24	8 in. secondary leads	Foot-skeleton
Y65S13-0	UL, cUL Class 2	208/240	Male Fitting 8 in. prim. leads	24	Male Fitting 30 in. sec. leads	Foot
Y65F13-0	UL, cUL Class 2	277/480	Male Fitting 8 in. prim. leads	24	Male Fitting 30 in. sec. leads	Foot
Y65F42-0	UL, cUL Class 2	277/480	Male Fitting 8 in. prim. leads	24	Male Fitting 8 in. sec. leads	Hub 4 in. x 4 in. plate (a)

50 VA Capacity Transformers with Circuit Breakers

		Primary		Secondary		
PART NO	**Agency Requirement**	**Voltage VAC**	**Connection**	**Voltage VAC**	**Connection**	**MOUNTING**
Y63T22-0	UL, cUL Class 2	120/208/240	End Bell Hole 8 in. prim. leads	24	End Bell Hole 8 in. sec. leads	4 in. x 4 in. plate
Y63T31-0	UL, cUL Class 2	120/208/240	Male Fitting 8 in. prim. leads	24	Three screw terminals (one is blind)	Foot 4 in. x 4 in. plate (a)
Y63F22-0	UL, cUL Class 2	277/480	End Bell Hole 8 in. prim. leads	24	End Bell Hole 8 in. sec. leads	4 in. x 4 in. plate

75 VA Capacity Transformers with Circuit Breakers

		Primary		Secondary		
PART NO	**Agency Requirement**	**Voltage VAC**	**Connection**	**Voltage VAC**	**Connection**	**MOUNTING**
Y66T12-0	UL, cUL Class 2	120/208/240	Male Fitting 8 in. prim. leads	24	Male Fitting 30 in. sec. leads	Foot
Y66T13-0	UL, cUL Class 2	120/208/240	Male Fitting 8 in. prim. leads	24	Male Fitting 30 in. sec. leads	Foot
Y66F12-0	UL, cUL Class 2	277/480	Male Fitting 8 in. prim. leads	24	Male Fitting 8 in. sec. leads	Foot
Y66F13-0	UL, cUL Class 2	277/480	Male Fitting 8 in. prim. leads	24	Male Fitting 30 in. sec. leads	Foot

92 VA Capacity Transformers with Circuit Breakers

		Primary		Secondary		
PART NO	**Agency Requirement**	**Voltage VAC**	**Connection**	**Voltage VAC**	**Connection**	**MOUNTING**
Y64T15-0	UL, cUL Class 2	120/208/240	Male Fitting 8 in. prim. leads	24	Female Fitting 30 in. sec. leads	Foot
Y64T21-0	UL, cUL Class 2	120/208/240	Endbell holes 8 in. prim. leads	24	Three screw terminals (one is blind)	Plate
Y64T22-0	UL, cUL Class 2	120/208/240	End Bell Hole 8 in. prim. leads	24	End Bell Hole 8 in. sec. leads	Plate

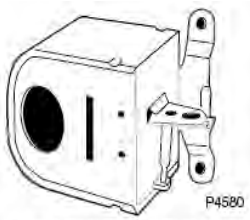
300 VA Capacity Transformers with Circuit Breakers

		Primary		Secondary		
PART NO	**Agency Requirement**	**Voltage VAC**	**Connection**	**Voltage VAC**	**Connection**	**MOUNTING**
Y69T15-0	cULus Power Trans	120/208/240	Male Fitting 8 in. prim. leads	24	Female Fitting 30 in. sec. leads	Foot

(a) 4 in. x 4 in. plate and nut packed with transformer

JOHNSON CONTROLS - F59 SERIES SUMP PUMP SWITCH

SELECTION CHART



F59-1 Switch with Fixed Mounting Bracket for Drop Cord Wiring

DESCRIPTION

The F59 Series controls are designed to start an electric motor on liquid level rise and stop th motor on liquid level drop. The control cuts in when upper weight is submerged approximately halfway, and cuts out when lower weight is approximately half-exposed. Each switch includes 36 in. cable and (2) two weights.

FEATURES

F59D-5 is equipped with a power cord and a piggyback style plug. The male prongs plug into the wall outlet, and the sump pump cord plugs into the female end of the plug.

APPLICATIONS

On/Off control of sump pumps.

SELECTION CHART

PART NO	MOUNTING	CONTACT ACTION	RANGE ADJUSTER
F59A-1C	External mounting bracket	DPST	Drop cord wiring
F59A-2C*	External mounting — includes universal mounting bracket and 24 in. strap for quick, easy mounting on the motor, on the pedestal or on the discharge pipe.	DPST	Drop cord wiring
F59D-5C*	External mounting — includes clamp for mounting on the pedestal or on the discharge pipe.	SPST	8 ft power cord with 3-prong piggyback plug
F59H-1C	External mounting bracket	DPST	Conduit Wiring — 7/8-in. conduit openings in case.

*Universal Replacement

JOHNSON CONTROLS - DPC

(a) Relay is not field-replaceable
(b) Replaces Ranco P30-5826
(c) Switch differential is approximately 5 psi (34 kpa). Time delay relay energizes at: 9 psi (61 kpa) pressure difference, de-energizes at: 14 psi (97 kpa) difference.
(d) Replaces Ranco P30-5827.
(e) Replaces Ranco P30-5827(includes alarm wire).
(f) Replaces Carlyle/Carrier part no. HKA-600, 6342060
(g) Switch differential is approximately 4.5 psi (34 kpa). Time delay relay energizes at: 6.5 psi (45 kpa) pressure difference de-energizes at: 11 psi (76 kpa) difference.
(h) Replaces Carlyle/Carrier part no. HKA-600.6342060 with 36” SEC99A Ultracap
(i) Replaces Carlyle/Carrier part no. HKA-600.6342060 with 36” SEC99A Ultracap (includes alarm wire).