Pneumatic Controls Manual

Catalog, Cross-Reference, Engineering Guide

Honeywell

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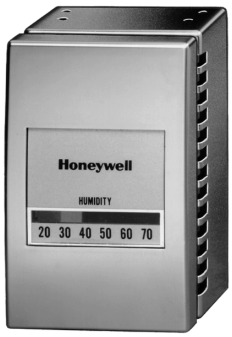
Subject Index

Humidistats and Thermostats

Humidistats

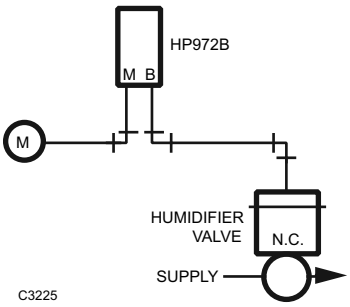
HP970 Pneumatic Humidistat



Two-pipe, single setpoint, pneumatic humidistat used to provide proportional control of pneumatic valves on humidification or dehumidification systems.

- Durable HP970 series humidistat.
- Pilot operated for high capacity.
- Direct Acting (DA) and Reverse Acting (RA) models are available.
- Vertical or horizontal mounting.
- Backplate has molded air connections; no separate fittings needed.
- Variety of cover finishes and display styles available.

HP970 Typical Piping



Application: Humidity
Dimensions, Approximate: 3 1/4 in. high x 2 in. wide x 1 5/8 in. deep (83 mm high x 51 mm wide x 41 mm deep)
Airflow Usage: 0.011 scfm (5.2 mL/s)
Maximum Operating Temperature: 45 F to 125 F (7 C to 52 C)
Maximum Storage Temperature: -30 to +150 F (-34 to +66 C)
Maximum Operating Pressure: 25 psi (170 kPa)

Accessories:

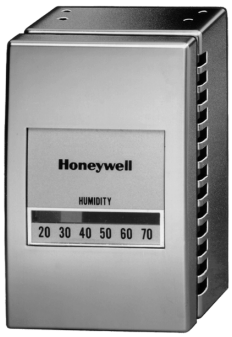
14002362-001 Duct Sampling Chamber
14002374-004 Restrictor Block Assembly,.005 in., For TP970A-D; TP971A-E except C; TP972A; TP973A-B; TP9600 family; HP970A-B; and HP972B
14002430-001 Thermostat Guard
14003192-001 Wallplate adapter kit. Adapts HP970 or TP970 series stats to HP900 and TP900 flush mounted and TP910 series flush or surface mounted installations
14004406-124 Humidistat Cover assembly Satin Chrome with setpoint display and Honeywell logo for vertical mounting, scale range 15 to 75% RH
305965 1-1/2 in. diameter, 1/8 NPT center stem back mount Pressure Indicating gauge (0 to 30 psi scale) with +/- 4% accuracy
AK3863 Honeywell Thermostat Tool Kit, TP970/TP900
CCT729A Gauge Adapter for Calibration. Add 305965 0 to 30 psi gauge for Complete Tool.
CCT735A Thermostat Calibration Tool includes Allen wrench for cover installation.
For additional covers, see Humidistat Cover Assemblies

Replacement Parts:

14001865-001 Filter Cartridge Assembly
14002053-001 Back Plate Assembly
14002374-004 Restrictor Block Assembly, 0.005 in., For TP970A-D; TP971A-E except C; TP972A; TP973A-B; TP9600 family; HP970A-B; and HP972B
14002573-001 Modernization Kit to convert all 1 & 2 pipe Honeywell & competitive pneumatic stats to TP970, TP971A, TP972, TP973, TP974, TP9600 family; HP970, HP971 and HP972

Product Number	Action	Number of Pipes	Scale Range (% RH)	Throttling Range (% RH)	Setpoint	Comments
HP970A1009	Direct Acting	2	15 to 75% RH	3 to 15% RH	Single	Order Cover Separately
HP970B1007	Reverse Acting	2	15 to 75% RH	3 to 15% RH	Single	Order Cover Separately
HP970B1015	Reverse Acting	2	65 to 95% RH	3 to 15% RH	Single	Order Cover Separately

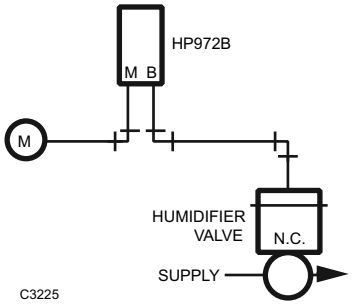
HP972 Pneumatic Humidistat



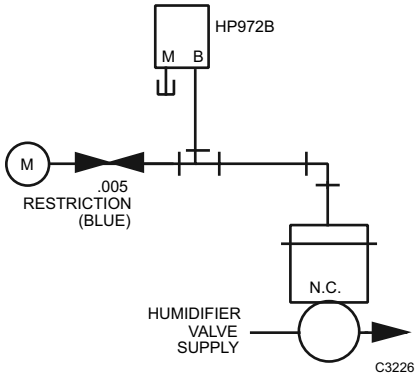
A proportioning pneumatic humidistat used on one- or two-pipe installations for controlling actuators on valves and dampers in air conditioning systems for humidification or dehumidification control.

- Durable HP970 series humidistat.
- Snap-on mounting to backplate.
- Vertical or horizontal mounting.
- Backplate has molded air connections; no separate fittings needed.
- Variety of cover finishes and display styles available.
- Wide throttling range.

Typical Two-Pipe HP972B Hook-up



Typical One-pipe HP972B Hook-up



Application: Humidity
Dimensions, Approximate: 3 1/4 in. high x 2 in. wide x 1 5/8 in. deep (83 mm high x 51 mm wide x 41 mm deep)
Airflow Usage: 0.011 scfm (5.2 mL/s)
Maximum Operating Temperature: 45 F to 125 F (7 C to 52 C)
Maximum Storage Temperature: -30 to +150 F (-34 to +66 C)
Maximum Operating Pressure: 25 psi (170 kPa)

Accessories:

14002430-001 Thermostat Guard
14002362-001 Duct Sampling Chamber
14004406-124 Humidistat Cover assembly Satin Chrome with setpoint display and Honeywell logo for vertical mounting, scale range 15 to 75% RH
14003192-001 Wallplate adapter kit. Adapts HP970 or TP970 series stats to HP900 and TP900 flush mounted and TP910 series flush or surface mounted installations
305965 1-1/2 in. diameter, 1/8 NPT center stem back mount Pressure Indicating gauge (0 to 30 psi scale) with +/- 4% accuracy
AK3863 Honeywell Thermostat Tool Kit, TP970/TP900
CCT729A Gauge Adapter for Calibration. Add 305965 0 to 30 psi gauge for Complete Tool.
CCT735A Thermostat Calibration Tool includes Allen wrench for cover installation.
For additional covers, see Humidistat Cover Assemblies

Replacement Parts:

14001865-001 Filter Cartridge Assembly
14002496-003 Nylon element assembly, with Spring
14002573-001 Modernization Kit to convert all 1 & 2 pipe Honeywell & competitive pneumatic stats to TP970, TP971A, TP972, TP973, TP974, TP9600 family; HP970, HP971 and HP972
14002374-004 Restrictor Block Assembly,.005 in., For TP970A-D; TP971A-E except C; TP972A; TP973A-B; TP9600 family; HP970A-B; and HP972B
14002053-001 Back Plate Assembly

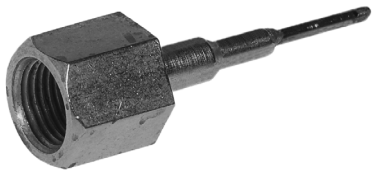
Product Number	Action	Number of Pipes	Scale Range (% RH)	Throttling Range (% RH)	Setpoint	Comments
HP972B1005	Reverse Acting	1 or 2	15 to 75% RH	7 to 35% RH	Single	Order Cover Separately

Humidistats

Humidistat Cover Assemblies

Product Number	Scale Range (% RH)	Description	Used With
14004406-124	15 to 75% RH	Humidistat Cover assembly Satin Chrome with setpoint display and Honeywell logo for vertical mounting, scale range 15 to 75% RH	HP970; HP972
14004406-224	15 to 75% RH	Humidistat Cover assembly Satin Chrome with setpoint display and Honeywell logo for horizontal mounting. Scale Range 15 to 75% RH	HP970; HP972
14004406-300	—	Humidistat Cover assembly Satin Chrome with no setpoint display and Honeywell logo for vertical mounting	HP970; HP972
14004406-400	—	Humidistat Cover assembly Satin Chrome with no setpoint display and Honeywell logo for horizontal mounting	HP970; HP972
14004406-800	—	Humidistat Cover assembly Satin Chrome with no setpoint display and no logo for vertical or horizontal mounting	HP970; HP972
14004407-124	15 to 75% RH	Humidistat Cover assembly Beige with setpoint display and Honeywell logo for vertical mounting. Scale Range 15 to 75% RH	HP970; HP972

Humidistat Accessories

Product Number	Description	Used With	
CCT729A	Gauge Adapter for Calibration. Add 305965 0 to 30 psi gauge for Complete Tool.	HP970, HP972	
CCT735A	Thermostat Calibration Tool includes Allen wrench for cover installation.	HP970, HP972	

Replacement Parts

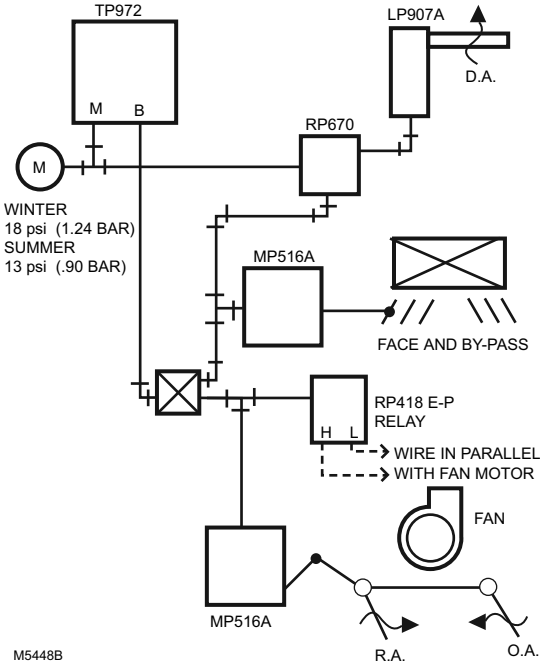
Product Number	Description	Used With
14002496-001	Nylon element assembly, with Spring	HP970A; HP970B1007
14002496-003	Nylon element assembly, with Spring	HP970B1005; HP972B
14002641-001	15 to 75% RH Scaleplate assembly mounted on guard plate	HP970A; HP970B; HP972B

LP907 Airstream Insertion Pneumatic Thermostat

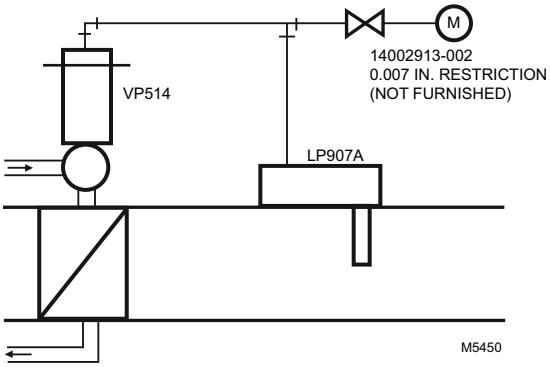
One-pipe, single setpoint, pneumatic thermostat used to provide proportional control of pneumatic valves and damper actuators in heating and air conditioning systems. Commonly used as discharge controllers for unit ventilators.

- Rod and tube insertion sensing element.
- Wide throttling range.
- Gage tee and tank valve facilitate checking line pressures.

Typical Heating/Cooling Application.



Typical Duct Mounted Application.



Application Type: Low Limit controller
Dimensions, Approximate: 5 7/16 in. high x 1 1/16 in. wide x 2 1/4 in. deep (138 mm high x 27 mm wide x 57 mm deep)
Airflow Usage: 0.011 scfm (5.2 mL/s)
Air Connections: Barb fittings 1/4 in. (6 mm) poly tubing
Mounting: Insertion with locknut on boss of insertion shank
Operating Temperature: 40 F to 140 F (4 C to 60 C)
Storage Temperature: 150 F maximum (66 C maximum)
Remote Bulb: Yes
Sensor Element: Invar rod and seamless brass tube, 18 3/4 in. (476 mm) long and 11/32 in. (9 mm) diameter
Maximum Operating Pressure: 25 psi (170 kPa)

Accessories:

14002913-002 .0.007 in. Red In-line Filtered Restriction Assembly; Inlet: 1/4 in., Outlets: 1/4 in. and 1/4 in.; Order in Quantities of 10
14002913-003 External Restriction Assembly. 0.007 in. Restriction, Red, Inlet 1/4 in; Outlet 1/4 in. and 5/32 in.
CCT2085 Pneumatic Fitting - Gauge Adapter fits any standard 1/8 in. NPT gauge,

Product Number	Action	Number of Pipes	Setpoint	Setpoint Temperature Range (F)	Capacity	Throttling Range (F)	Includes
LP907A1002	Direct Acting	1	Single	40 F to 140 F	Low	10 F to 70 F	Fittings for mounting on sheet metal duct. Order restrictor separately.
LP907A1044	Direct Acting	1	Single	40 F to 140 F	Low	5 F to 35 F	Fittings for mounting on sheet metal duct. Order restrictor separately.

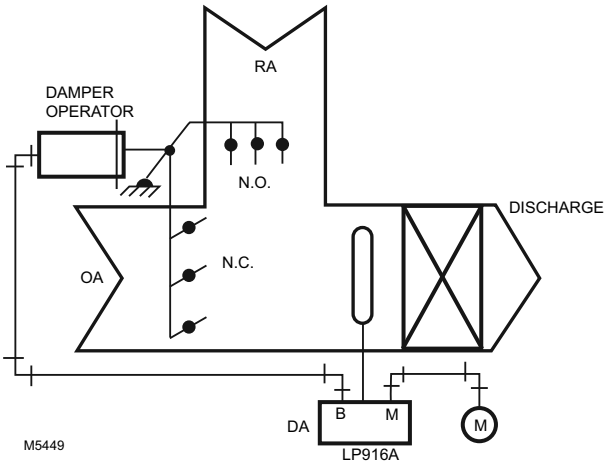
Thermostats

LP916 Pneumatic Thermostat

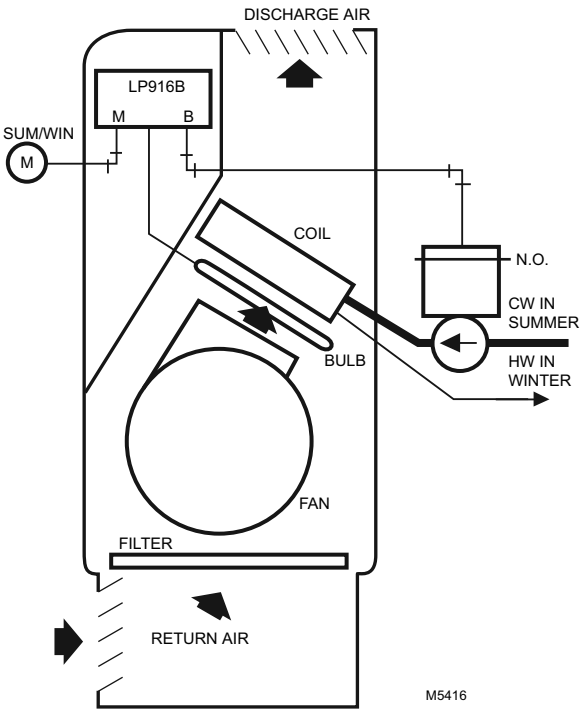
Two-pipe, single temperature, unit mounted, remote bulb pneumatic thermostat used to provide proportional control of pneumatic valves and damper actuators in heating and air conditioning systems.

- Liquid filled remote bulb.
- Direct Acting (DA), Reverse Acting (RA) and Heating/Cooling (DA/RA) models are available.

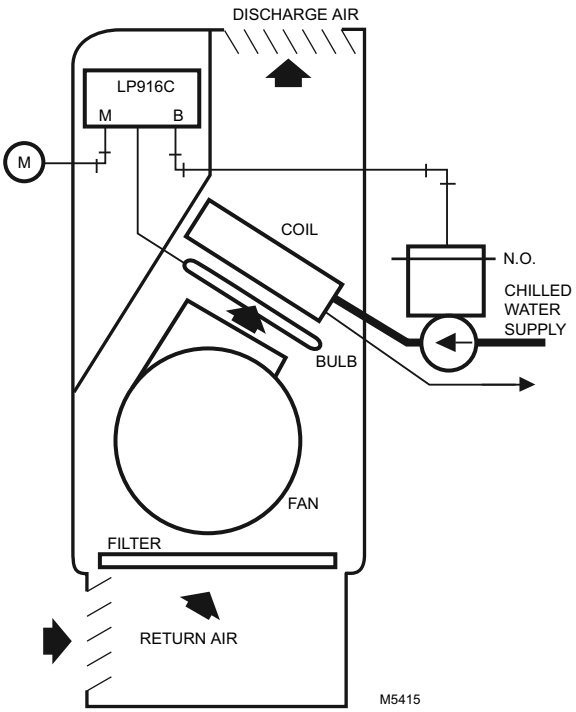
Typical LP916A Mixed Air Application



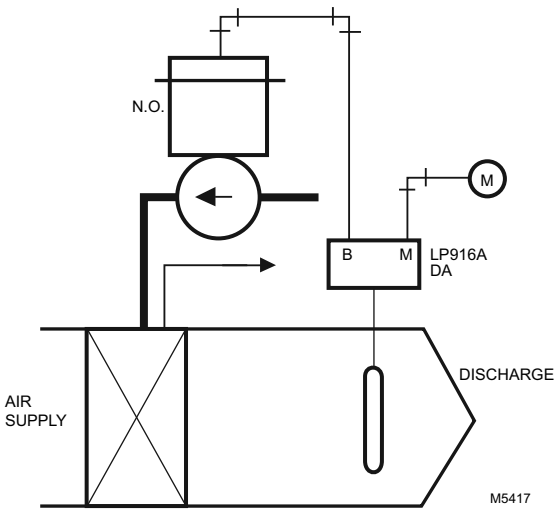
Typical LP916B Fan Coil Application, Heating/Cooling with Seasonal Changeover



Typical LP916C Fan Coil Application, Cooling Only



Typical LP916A Duct Mounted Heating Application



Application Type: Unit Ventilator
Dimensions, Approximate: 4 3/4 in. high x 3 3/4 in. wide x 3 in. deep (121 mm high x 95 mm wide x 76 mm deep)
Airflow Usage: 0.022 scfm (10.4 mL/s) with 0.007 in. restriction
Air Connections: Barb fittings 1/4 in. (6 mm)
Mounting: In compartment of a unit ventilator
Operating Temperature: 135 F maximum (57 C maximum)
Storage Temperature: 150 F maximum (66 C maximum)
Remote Bulb: Yes
Sensor Element: Bulb 1/2 x 5 7/8 in., capillary 36 in. (914 mm) long
Setpoint: Single
Number of Pipes: 2

Maximum Operating Pressure: 25 psi (170 kPa)

Accessories:
107324A Capillary Holder Assembly for duct insertion, 8 3/8 in. long
14004376-001 Gasket for 14004378 Connector Assembly
14004378-002 Connector Assembly, with integral 0.005 in. restriction and filters for post 1984 units

Replacement Parts:
14003113-002 Repair kit containing 0.007 in. restrictor plate, filters, and gaskets for pre-1984 units

Product Number	Action	Sensor Element	Setpoint Temperature Range (F)	Setpoint Temperature Range (C)	Changeover (psi)	Changeover (kPa)	Throttling Range (F)	Throttling Range (C)	Includes	Comments
LP916A1019	Direct Acting	Bulb 1/2 x 5 7/8 in., capillary 36 in. (914 mm) long	65 F to 85 F	19 C to 30 C	—	—	3.5 F	2 C	Integral Mounting Bracket and 304528A Bag Assembly (mounting hardware). Order bulb hangers (316297-00021) separately.	—
LP916A1134	Direct Acting	Bulb 3/8 x 7 in., capillary 36 in. (914 mm) long	65 F to 85 F	19 C to 30 C	—	—	3.5 F	2 C	Integral Mounting Bracket, (2) 316297-00021 Bulb Hangers and 304528A Bag Assembly (mounting hardware).	—
LP916A1175	Direct Acting	Bulb 3/8 x 7 in., capillary 36 in. (914 mm) long	40 F to 80 F	—	—	—	7 F	—	Integral Mounting Bracket, (2) 316297-00021 Bulb Hangers and 304528A Bag Assembly (mounting hardware).	—
LP916B1017	Direct Acting Heating, Reverse Acting Cooling	Bulb 1/2 x 5 7/8 in., capillary 36 in. (914 mm) long	65 F to 85 F	19 C to 30 C	Heat 18 psi, Cool 13 psi	Heat 124 kPa, Cool 90 kPa	3.5 F	2 C	Integral Mounting Bracket and 304528A Bag Assembly (mounting hardware). Order bulb hangers (316297-00021) separately.	—
LP916B1058	Direct Acting Heating, Reverse Acting Cooling	Bulb 1/2 x 5 7/8 in., capillary 36 in. (914 mm) long	65 F to 85 F	19 C to 30 C	Heat 18 psi, Cool 9 psi	Heat 124 kPa, Cool 62 kPa	3.5 F	2 C	Integral Mounting Bracket and 304528A Bag Assembly (mounting hardware). Order bulb hangers (316297-00021) separately.	—
LP916B1074	Direct Acting Heating, Reverse Acting Cooling	Bulb 3/8 x 7 in., capillary 36 in. (914 mm) long	65 F to 85 F	19 C to 30 C	Heat 18 psi, Cool 13 psi	Heat 124 kPa, Cool 90 kPa	3.5 F	2 C	Order Mounting Bracket, Knob, Bulb Hangers, and Scale Plate separately.	—
LP916B1082	Direct Acting Heating, Reverse Acting Cooling	Bulb 3/8 x 7 in., capillary 36 in. (914 mm) long	65 F to 85 F	19 C to 30 C	Heat 18 psi, Cool 13 psi	Heat 124 kPa, Cool 90 kPa	3.5 F	2 C	Integral Mounting Bracket, (2) 316297-00021 Bulb Hangers and 304528A Bag Assembly (mounting hardware).	New installation model
LP916B1090	Direct Acting Heating, Reverse Acting Cooling	Bulb 3/8 x 9 in., capillary 36 in. (914 mm) long	65 F to 85 F	19 C to 30 C	Heat 18 psi, Cool 13 psi	Heat 124 kPa, Cool 90 kPa	3.5 F	2 C	Integral Mounting Bracket, (2) 316297-00021 Bulb Hangers and 304528A Bag Assembly (mounting hardware).	—
LP916C1023	Reverse Acting	Bulb 3/8 x 9 in., capillary 36 in. (914 mm) long	60 F to 80 F	—	—	—	3.5 F	—	Integral Mounting Bracket, (2) 316297-00021 Bulb Hangers and 304528A Bag Assembly (mounting hardware).	—

Thermostats

TP9600 Pneumatic Thermostat

Pneumatic thermostat for proportional control of pneumatic valves and actuators with one- or two-pipe systems. Available with two cover options, the TP9600 is not only affordable and easy to install, but it controls temperature with the reliability that only Honeywell can provide.

- TP9600 delivers the Honeywell TP970s unparalleled sensing and control.
- Redesigned models fit your high-volume pneumatic applications.
- Backplate mounts quickly.
- Thermostat snaps onto backplate.
- Cover is mounted and locked into place with concealed setscrews.
- Attractive Euro-contoured design comes with choice of two cover options.
- Neutral taupe color blends with today's commercial interiors.
- Adapter kits are available to retrofit most pneumatic jobs.
- Branchline capacity Low for TP9630 and TP9633 Branchline capacity High for TP9600, TP9610, TP9603, TP9620.

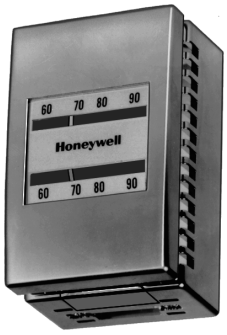
Application Type: Wall Thermostat
Dimensions, Approximate: 3 1/4 in. high x 2 in. wide x 1 5/8 in. deep (83 mm high x 51 mm wide x 41 mm deep)
Airflow Usage: 0.011 scfm (5.2 mL/s)
Air Connections: Barb fittings 5/32 in. (4 mm)
Mounting: Vertical Wall Mounting
Operating Temperature: 50 F to 100 F (10 C to 38 C)
Storage Temperature: 150 F maximum (66 C maximum)
Remote Bulb: No
Sensor Element: Bimetal
Maximum Operating Pressure: 25 psi (170 kPa)

Accessories:
14002913-001 .005 in. Blue Filter Restriction Assembly; Inlet: 1/4 in., Outlets: 1/4 in. and 5/32 in.; Order in Quantities of 10
14002362-001 Duct Sampling Chamber
14002913-004 0.005 in. Blue In-line Filtered Restriction Assembly; Inlet: 1/4 in., Outlets: 5/32 in. and 5/32 in
14002430-001 Thermostat Guard
14004439-001 Setpoint Extension
14004911-001 Taupe Converastat wall plate with 2 screws
14003192-001 Wallplate adapter kit. Adapts HP970 or TP970 series stats to HP900 and TP900 flush mounted and TP910 series flush or surface mounted installations
305965 1-1/2 in. diameter, 1/8 NPT center stem back mount Pressure Indicating gauge (0 to 30 psi scale) with +/- 4% accuracy
AK3863 Honeywell Thermostat Tool Kit, TP970/TP900
CCT729A Gauge Adapter for Calibration. Add 305965 0 to 30 psi gauge for Complete Tool.
CCT735A Thermostat Calibration Tool includes Allen wrench for cover installation.

Replacement Parts:
14001865-001 Filter Cartridge Assembly
14002053-001 Back Plate Assembly
14002573-001 Modernization Kit to convert all 1 & 2 pipe Honeywell & competitive pneumatic stats to TP970, TP971A, TP972, TP973, TP974, TP9600 family; HP970, HP971 and HP972
14002374-004 Restrictor Block Assembly, 0.005 in., For TP970A-D; TP971A-E except C; TP972A; TP973A-B; TP9600 family; HP970A-B; and HP972B

Product Number	Action	Number of Pipes	Setpoint	Setpoint Temperature Range	Changeover		Throttling Range	Includes
				(F)	(psi)	(kPa)	(F)	
TP9600A1007	Direct Acting	2	Single	60 F to 90 F	—	—	2 F to 10 F	Cover, Setpoint, and Thermometer are Visible
TP9600B1006	Reverse Acting	2	Single	60 F to 90 F	—	—	2 F to 10 F	Cover, Setpoint, and Thermometer are Visible
TP9603A1001	Direct Acting	2	Single	60 F to 90 F	—	—	2 F to 10 F	Blank Cover, Setpoint, and Thermometer are Not Visible
TP9610A1006	Direct Acting	2	Day/Night	Day: 60 F to 90 F, Night: 50 F to 75 F	Day 13 psi, Night 18 psi	Day 90 kPa, Night 124 kPa	2 F to 10 F	Cover, Setpoint, and Thermometer are Visible
TP9620A1005	Direct Acting Heating, Reverse Acting Cooling	2	Single	60 F to 90 F	Heat 18 psi, Cool 13 psi	Heat 124 kPa, Cool 90 kPa	2 F to 10 F	Cover, Setpoint, and Thermometer are Visible
TP9630A1004	Direct Acting	1 or 2	Single	60 F to 90 F	—	—	2 F to 10 F	Cover, Setpoint, and Thermometer are Visible
TP9630B1003	Reverse Acting	1 or 2	Single	60 F to 90 F	—	—	2 F to 10 F	Cover, Setpoint, and Thermometer are Visible

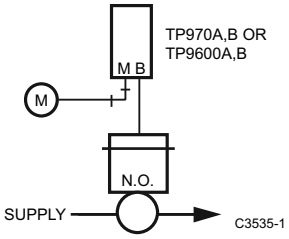
TP970 Pneumatic Thermostat



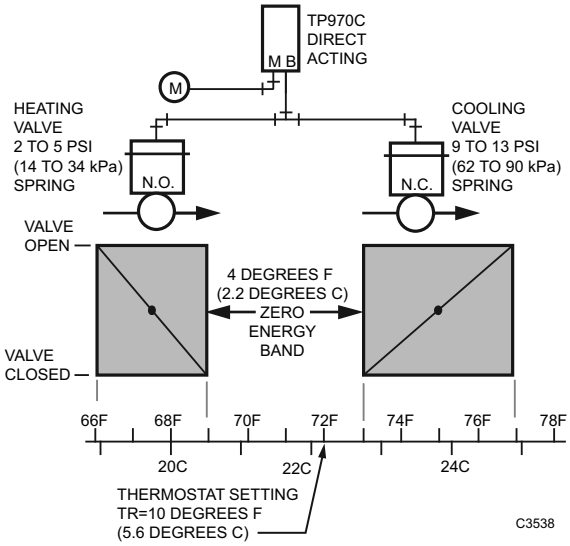
Two-pipe, single setpoint, pneumatic thermostat used to provide proportional control of pneumatic valves and damper actuators in heating and air conditioning systems. Replacement kits are available for Johnson, Powers, Robertshaw, Barber-Colman, and older Honeywell two-pipe pneumatic thermostats.

- Honeywell's best pneumatic thermostat-TP970 series.
- Shock-resistant, suspension-mounted thermostats provide dependable performance and responsiveness year in and year out.
- Pilot operated for high capacity.
- Direct Acting (DA) and Reverse Acting (RA) models are available.
- Wide throttling range models for Zero Energy Band (ZEB) operation are available.
- Adapter plate in Convertastat and Modernization kits covers existing thermostat wallmark.
- Backplate has molded air connections-no separate fittings needed.
- Universal locking cover with satin chrome finish and horizontal, vertical, or blank window options.
- Typical Wide Throttling Range Application.

Typical Standard Throttling Range Piping



Typical Wide Throttling Range Piping



Application Type: Heating
Dimensions, Approximate: 3 1/4 in. high x 2 in. wide x 1 5/8 in. deep (83 mm high x 51 mm wide x 41 mm deep)
Airflow Usage: 0.011 scfm (5.2 mL/s)
Mounting: Wall
Operating Temperature: 100 F maximum
Storage Temperature: 150 F maximum (66 C maximum)
Remote Bulb: No
Sensor Element: Bimetal
Setpoint: Single
Number of Pipes: 2
Maximum Operating Pressure: 25 psi (170 kPa)

Accessories:

14004439-001 Setpoint Extension
14002430-001 Thermostat Guard
14002362-001 Duct Sampling Chamber
14003192-001 Wallplate adapter kit. Adapts HP970 or TP970 series stats to HP900 and TP900 flush mounted and TP910 series flush or surface mounted installations
14004447-001 Setpoint Cam Assembly for TP970A1004, A1012, A1020, A1038, A1046, A1053, A1095, A2004, A2012, A2020, A2038, A2053, A2095; TP970C; TP972A1143, A2143; TP973A1001, A1019, A1127
14004447-002 Setpoint Cam Assembly for TP970B1002, B1010, B1028, B1036, B2002, B2010, B2028, B2036; TP970D; TP972A1002, A1010, A1028, A1044, A2002, A2010, A2028, A2044; TP973B1009, B1017, B1025, B1108
14004447-005 Setpoint Cam Assembly for TP970B1044; TP972A1051, A1101
305965 1-1/2 in. diameter, 1/8 NPT center stem back mount Pressure Indicating gauge (0 to 30 psi scale) with +/- 4% accuracy
AK3863 Honeywell Thermostat Tool Kit, TP970/TP900
CCT729A Gauge Adapter for Calibration. Add 305965 0 to 30 psi gauge for Complete Tool.
CCT735A Thermostat Calibration Tool includes Allen wrench for cover installation.

Replacement Parts:

14001865-001 Filter Cartridge Assembly
14002053-001 Back Plate Assembly
14002374-004 Restrictor Block Assembly,.005 in., For TP970A-D; TP971A-E except C; TP972A; TP973A-B; TP9600 family; HP970A-B; and HP972B
14002573-001 Modernization Kit to convert all 1 & 2 pipe Honeywell & competitive pneumatic stats to TP970, TP971A, TP972, TP973, TP974, TP9600 family; HP970, HP971 and HP972
14004459-001 Repair kit consisting of a thermometer assembly, a thermometer post and a 60 to 90F Aluminum Scaleplate
14004460-001 Nozzle, Throttling Plate and Bimetal Assembly, DA, Left side

Thermostats

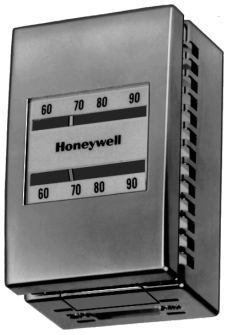
Product Number	Action	Setpoint Temperature Range		Throttling Range		Includes	Comments**
		(F)	(C)	(F)	(C)		
TP970A2004	Direct Acting	60 F to 90 F	—	2 F to 10 F (factory set 4 F)	—	Order Cover Separately	—
TP970A2012	Direct Acting	40 F to 70 F	—	2 F to 10 F (factory set 4 F)	—	Order Cover Separately	—
TP970A2020	Direct Acting	—	15 C to 30 C	—	1 C to 5 C (factory set 2 C)	Order Cover Separately	—
TP970A2038	Direct Acting	60 F to 90 F	—	2 F to 10 F (factory set 4 F)	—	Thermostat, large wall plate and satin chrome cover.	Modernization kit used to convert older Honeywell Thermostats.
TP970A2053	Direct Acting	60 F to 90 F	—	2 F to 10 F (factory set 4 F)	—	Thermostat, large wall plate and satin chrome cover.	Modernization kit used to convert older Honeywell Thermostats and competitive thermostats.
TP970A2145	Direct Acting	60 F to 90 F	—	2 F to 10 F (factory set 4 F)	—	Thermostat, small wall plate and satin chrome cover.	Convertastat Kit
TP970A2234	Direct Acting	—	15 C to 30 C	—	1 C to 5 C (factory set 2 C)	Thermostat, small wall plate and satin chrome cover.	Convertastat Kit
TP970A2242	Direct Acting	60 F to 90 F	—	2 F to 10 F (factory set 4 F)	—	Thermostat, small wall plate and beige cover.	Convertastat Kit
TP970A2259	Direct Acting	60 F to 90 F	—	2 F to 10 F (factory set 4 F)	—	Thermostat and satin chrome cover.	Tradeline Kit
TP970A2283	Direct Acting	60 F to 90 F	—	2 F to 10 F (factory set 4 F)	—	Thermostat and beige cover.	Tradeline Kit
TP970B2002	Reverse Acting	60 F to 90 F	—	2 F to 10 F (factory set 4 F)	—	Order Cover Separately	—
TP970B2010	Reverse Acting	—	15 C to 30 C	—	1 C to 5 C (factory set 2 C)	Order Cover Separately	—
TP970B2077	Reverse Acting	60 F to 90 F	—	2 F to 10 F (factory set 4 F)	—	Thermostat, small wall plate and satin chrome cover.	Convertastat Kit
TP970B2150	Reverse Acting	—	15 C to 30 C	—	1 C to 5 C (factory set 2 C)	Thermostat, small wall plate and satin chrome cover.	Convertastat Kit
TP970B2166	Reverse Acting	60 F to 90 F	—	2 F to 10 F (factory set 4 F)	—	Thermostat, small wall plate and beige cover.	Convertastat Kit
TP970B2182	Reverse Acting	60 F to 90 F	—	2 F to 10 F (factory set 4 F)	—	Thermostat and satin chrome cover.	Tradeline Kit
TP970B2216	Reverse Acting	60 F to 90 F	—	2 F to 10 F (factory set 4 F)	—	Thermostat and beige cover.	Tradeline Kit
TP970C2000	Direct Acting	60 F to 90 F	—	5 F to 25 F	—	Order Cover Separately	Wide Throttling Range 5-25 F

A **Tradeline Kit includes a TP970 Series thermostat with either a Satin Chrome or Beige Universal Cover, Windows (horizontal (F), vertical (F) and blank) for new installations or to convert newer, small size Honeywell or competitor thermostat, not requiring a wall plate adapter.

A **Convertastat Kit**™ includes a TP970 Series thermostat with either a Satin Chrome or Beige Universal Cover, Windows (horizontal (F), vertical (F) and blank) and a small Universal Wall Plate Adapter to convert newer, small size Honeywell or competitor thermostats.

A **Modernization Kit** includes a TP970 Series thermostat with Satin Chrome Universal Cover, Windows (horizontal (F), vertical (F) and blank) and a large Universal Wall Plate Adapter to convert older thermostats.

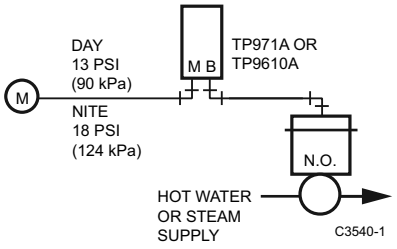
TP971 Pneumatic Day/Night Thermostat



Pneumatic thermostat with night setback used to provide proportional control of pneumatic valves and damper actuators in heating and air conditioning systems. Replacement kits are available for Johnson, Powers, Robertshaw, Barber-Colman, and older Honeywell two-pipe pneumatic thermostats.

- Durable TP970 series thermostat Pilot operated for high capacity.
- Direct Acting (DA) and Reverse Acting (RA) models are available.
- Three-pipe thermostats are available for unit ventilator applications where the outdoor damper must operate when the thermostat is manually set to day operation.
- Adapter plate in thermostat kits covers existing thermostat watermark.
- Backplate has molded air connections-no separate fittings needed.
- Universal Locking cover with satin chrome finish and horizontal, vertical, or blank window options-other covers available.

TP971 Typical Piping



Application Type: Wall Thermostat, Day/Night operation
Dimensions, Approximate: 3 1/4 in. high x 2 in. wide x 1 5/8 in. deep (83 mm high x 51 mm wide x 41 mm deep)
Airflow Usage: 0.011 scfm (5.2 mL/s)
Mounting: Wall
Operating Temperature: 100 F maximum
Storage Temperature: 150 F maximum (66 C maximum)
Remote Bulb: No
Setpoint: Day/Night
Sensor Element: Bimetal
Maximum Operating Pressure: 25 psi (170 kPa)

Accessories:
14002362-001 Duct Sampling Chamber
14002430-001 Thermostat Guard
14004439-001 Setpoint Extension
14004447-003 Setpoint Cam Assembly for TP971A, C, D; TP972A1168, A2168, A2176
14003192-001 Wallplate adapter kit. Adapts HP970 or TP970 series stats to HP900 and TP900 flush mounted and TP910 series flush or surface mounted installations
305965 1-1/2 in. diameter, 1/8 NPT center stem back mount Pressure Indicating gauge (0 to 30 psi scale) with +/- 4% accuracy
AK3863 Honeywell Thermostat Tool Kit, TP970/TP900
CCT729A Gauge Adapter for Calibration. Add 305965 0 to 30 psi gauge for Complete Tool.
CCT735A Thermostat Calibration Tool includes Allen wrench for cover installation.

Replacement Parts:
14001865-001 Filter Cartridge Assembly
14002053-001 Back Plate Assembly
14002374-004 Restrictor Block Assembly,.005 in., For TP970A-D; TP971A-E except C; TP972A; TP973A-B; TP9600 family; HP970A-B; and HP972B
14002573-001 Modernization Kit to convert all 1 & 2 pipe Honeywell & competitive pneumatic stats to TP970, TP971A, TP972, TP973, TP974, TP9600 family; HP970, HP971 and HP972
14004460-001 Nozzle, Throttling Plate and Bimetal Assembly, DA, Left side
14004460-002 Nozzle, Throttling plate and Bimetal Assembly, reverse acting, left side

Product Number	Action	Number of Pipes	Setpoint Temperature Range		Changeover		Throttling Range		Includes	Comments**
			(F)	(C)	(psi)	(kPa)	(F)	(C)		
TP971A2003	Direct Acting Heating, two temp.	2	Day: 60 F to 90 F, Night: 50 F to 80 F	—	Day 13 psi, Night 18 psi	Day 90 kPa, Night 124 kPa	2 F to 10 F	—	Order Cover Separately	—
TP971A2011	Direct Acting Heating, two temp.	2	—	Day: 15 C to 30 C, Night: 10 C to 27 C	Day 13 psi, Night 18 psi	Day 90 kPa, Night 124 kPa	—	1 C to 5 C	Order Cover Separately	—
TP971A2029	Direct Acting Heating, two temp.	2	Day: 60 F to 90 F, Night: 50 F to 80 F	—	Day 16 psi, Night 21 psi	Day 110 kPa, Night 144 kPa	2 F to 10 F	—	Order Cover Separately	—
TP971A2052	Direct Acting Heating, two temp.	2	—	Day: 15 C to 30 C, Night: 10 C to 27 C	Day 16 psi, Night 21 psi	Day 110 kPa, 144 kPa	—	1 C to 5 C	Order Cover Separately	—
TP971A2086	Direct Acting Heating, two temp.	2	Day: 60 F to 90 F, Night: 50 F to 80 F	—	Day 20 psi, Night 25 psi	Day 137 kPa, Night 172 kPa	2 F to 10 F	—	Order Cover Separately	—

Thermostats

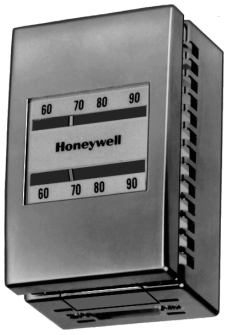
Product Number	Action	Number of Pipes	Setpoint Temperature Range		Changeover		Throttling Range		Includes	Comments**
			(F)	(C)	(psi)	(kPa)	(F)	(C)		
TP971A2102	Direct Acting Heating, two temp.	2	Day: 60 F to 90 F, Night: 50 F to 80 F	—	Day 13 psi, Night 18 psi or 16-20 psi	Day 90 kPa, Night 124 kPa	2 F to 10 F	—	Thermostat, small wall plate and satin chrome cover.	Convertastat Kit
TP971A2183	Direct Acting Heating, two temp.	2	Day: 60 F to 90 F, Night: 50 F to 80 F	—	Day 13 psi, Night 18 psi or 16-20 psi	Day 90 kPa, Night 124 kPa	2 F to 10 F	—	Thermostat, small wall plate and beige cover.	Convertastat Kit
TP971A2191	Direct Acting Heating, two temp.	2	Day: 60 F to 90 F, Night: 50 F to 80 F	—	Day 13 psi, Night 18 psi or 16-21 psi	Day 90 kPa, Night 124 kPa	2 F to 10 F	—	Thermostat and satin chrome cover.	Tradeline Kit
TP971B2001	Reverse Acting Heating, two temp.	2	Day: 60 F to 90 F, Night: 50 F to 80 F	—	Day 13 psi, Night 18 psi	Day 90 kPa, Night 124 kPa	2 F to 10 F	—	Order Cover Separately	—
TP971B2019	Reverse Acting Heating, two temp.	2	Day: 60 F to 90 F, Night: 50 F to 80 F	—	Day 16 psi, Night 21 psi	Day 110 kPa, Night 144 kPa	2 F to 10 F	—	Order Cover Separately	—
TP971B2043	Reverse Acting Heating, two temp.	2	Day: 60 F to 90 F, Night: 50 F to 80 F	—	Day 20 psi, Night 25 psi	Day 137 kPa, Night 172 kPa	2 F to 10 F	—	Order Cover Separately	—
TP971B2068	Reverse Acting Heating, two temp.	2	Day: 60 F to 90 F, Night: 50 F to 80 F	—	Day 13 psi, Night 18 psi or 16-21 psi	Day 90 kPa, Night 124 kPa	2 F to 10 F	—	Thermostat and satin chrome cover.	Tradeline Kit
TP971C2009	Direct Acting Heating, two temp.	3	Day: 60 F to 90 F, Night: 50 F to 80 F	—	Day 13 psi, Night 18 psi	Day 90 kPa, Night 124 kPa	2 F to 10 F	—	Order Cover Separately	Has secondary branchline
TP971C2017	Direct Acting Heating, two temp.	3	—	Day: 15 C to 30 C, Night: 10 C to 27 C	Day 13 psi, Night 18 psi	Day 90 kPa, Night 124 kPa	—	1 C to 5 C	Order Cover Separately	Has secondary branchline
TP971C2025	Direct Acting Heating, two temp.	3	Day: 60 F to 90 F, Night: 50 F to 80 F	—	Day 16 psi, Night 21 psi	Day 110 kPa, Night 144 kPa	2 F to 10 F	—	Order Cover Separately	Has secondary branchline
TP971C2058	Direct Acting Heating, two temp.	3	Day: 60 F to 90 F, Night: 50 F to 80 F	—	Day 13 psi, Night 18 psi or 16-21 psi	Day 90 kPa, Night 124 kPa	2 F to 10 F	—	Thermostat and Satin Chrome Cover	Tradeline Kit. Has secondary branchline.

A **Tradeline Kit includes a TP970 Series thermostat with either a Satin Chrome or Beige Universal Cover, Windows (horizontal (F), vertical (F) and blank) for new installations or to convert newer, small size Honeywell or competitor thermostat, not requiring a wall plate adapter.

A **Convertastat Kit**™ includes a TP970 Series thermostat with either a Satin Chrome or Beige Universal Cover, Windows (horizontal (F), vertical (F) and blank) and a small Universal Wall Plate Adapter to convert newer, small size Honeywell or competitor thermostats.

A **Modernization Kit** includes a TP970 Series thermostat with Satin Chrome Universal Cover, Windows (horizontal (F), vertical (F) and blank) and a large Universal Wall Plate Adapter to convert older thermostats.

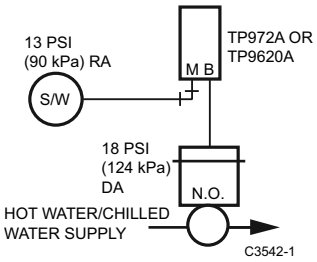
TP972 Pneumatic Heating/Cooling Thermostat



Two-pipe, one- or two-temperature, pneumatic thermostat used to provide proportional control of pneumatic valves and damper actuators in heating and air conditioning systems. Replacement kits are available for Johnson, Powers, Robertshaw, Barber-Colman, and older Honeywell two-pipe pneumatic thermostats.

- Durable TP970 Series Thermostat. Pilot operated for high capacity.
- Two-temperature energy conservation model available.
- Adapter plate in Convertastat kits covers existing thermostat wallmark.
- Backplate has molded air connections-no separate fittings needed.
- Universal locking cover with satin chrome finish and horizontal, vertical, or blank window options with Tradeline model-other covers available.

TP972 Typical Piping



Application Type: Wall Thermostat, Heat/Cool Operation
Dimensions, Approximate: 3 1/4 in. high x 2 in. wide x 1 5/8 in. deep (83 mm high x 51 mm wide x 41 mm deep)
Action: Direct Acting Heating, Reverse Acting Cooling
Airflow Usage: 0.011 scfm (5.2 mL/s)
Mounting: Wall
Operating Temperature: 100 F maximum
Storage Temperature: 150 F maximum (66 C maximum)
Remote Bulb: No
Sensor Element: Bimetal
Maximum Operating Pressure: 25 psi (170 kPa)

Accessories:

14002362-001 Duct Sampling Chamber
14002430-001 Thermostat Guard
14003923-001 20 to 25 psi spring
14004439-001 Setpoint Extension
14003192-001 Wallplate adapter kit. Adapts HP970 or TP970 series stats to HP900 and TP900 flush mounted and TP910 series flush or surface mounted installations
14004447-001 Setpoint Cam Assembly for TP970A1004, A1012, A1020, A1038, A1046, A1053, A1095, A2004, A2012, A2020, A2038, A2053, A2095; TP970C; TP972A1143, A2143; TP973A1001, A1019, A1127
14004447-002 Setpoint Cam Assembly for TP970B1002, B1010, B1028, B1036, B2002, B2010, B2028, B2036; TP970D; TP972A1002, A1010, A1028, A1044, A2002, A2010, A2028, A2044; TP973B1009, B1017, B1025, B1108
14004447-003 Setpoint Cam Assembly for TP971A, C, D; TP972A1168, A2168, A2176
14004447-005 Setpoint Cam Assembly for TP970B1044; TP972A1051, A1101
305965 1-1/2 in. diameter, 1/8 NPT center stem back mount Pressure Indicating gauge (0 to 30 psi scale) with +/- 4% accuracy
AK3863 Honeywell Thermostat Tool Kit, TP970/TP900
CCT729A Gauge Adapter for Calibration. Add 305965 0 to 30 psi gauge for Complete Tool.
CCT735A Thermostat Calibration Tool includes Allen wrench for cover installation.

Replacement Parts:

14001865-001 Filter Cartridge Assembly
14002374-004 Restrictor Block Assembly,.005 in., For TP970A-D; TP971A-E except C; TP972A; TP973A-B; TP9600 family; HP970A-B; and HP972B
14002573-001 Modernization Kit to convert all 1 & 2 pipe Honeywell & competitive pneumatic stats to TP970, TP971A, TP972, TP973, TP974, TP9600 family; HP970, HP971 and HP972
14004460-001 Nozzle, Throttling Plate and Bimetal Assembly, DA, Left side
14004460-002 Nozzle, Throttling plate and Bimetal Assembly, reverse acting, left side

Product Number	Number of Pipes	Set-point	Setpoint Temperature Range		Changeover		Throttling Range		Includes	Comments**
			(F)	(C)	(psi)	(kPa)	(F)	(C)		
TP972A2002	2	Single	60 F to 90 F	—	Heat 18 psi, Cool 13 psi	Heat 124 kPa, Cool 90 kPa	2 F to 10 F	—	Order Cover Separately	—
TP972A2010	2	Single	—	15 C to 30 C	Heat 18 psi, Cool 13 psi	Heat 124 kPa, Cool 90 kPa	—	1 C to 5 C	Order Cover Separately	—
TP972A2036	2	Dual	Heating 50 F to 75 F, Cooling 60 F to 90 F	—	Heat 18 psi, Cool 13 psi	Heat 124 kPa, Cool 90 kPa	2 F to 10 F	—	Energy Conservation Model, Order Cover Separately	Two concealed setpoint knobs

Thermostats

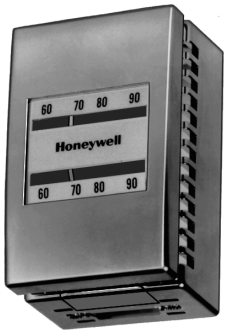
Product Number	Number of Pipes	Set-point	Setpoint Temperature Range		Changeover		Throttling Range		Includes	Comments**
			(F)	(C)	(psi)	(kPa)	(F)	(C)		
TP972A2143	2	Single	60 F to 90 F	—	Heat 14 psi, Cool 19 psi	Heat 96 kPa, Cool 131 kPa	2 F to 10 F	—	Order Cover Separately	—
TP972A2192	2	Single	60 F to 90 F	—	Heat 18 psi, Cool 13 psi	Heat 124 kPa, Cool 90 kPa	2 F to 10 F	—	Thermostat, small wall plate and satin chrome cover	Convertastat Kit
TP972A2226	2	Single	60 F to 90 F	—	Heat 14 psi, Cool 19 psi	Heat 96 kPa, Cool 131 kPa	2 F to 10 F	—	Thermostat and satin chrome cover.	Tradeline Kit
TP972A2242	2	Single	60 F to 90 F	—	Heat 18 psi, Cool 13 psi	Heat 124 kPa, Cool 90 kPa	2 F to 10 F	—	Thermostat and satin chrome cover.	Tradeline Kit

A **Tradeline Kit includes a TP970 Series thermostat with either a Satin Chrome or Beige Universal Cover, Windows (horizontal (F), vertical (F) and blank) for new installations or to convert newer, small size Honeywell or competitor thermostat, not requiring a wall plate adapter.

A **Convertastat Kit**™ includes a TP970 Series thermostat with either a Satin Chrome or Beige Universal Cover, Windows (horizontal (F), vertical (F) and blank) and a small Universal Wall Plate Adapter to convert newer, small size Honeywell or competitor thermostats.

A **Modernization Kit** includes a TP970 Series thermostat with Satin Chrome Universal Cover, Windows (horizontal (F), vertical (F) and blank) and a large Universal Wall Plate Adapter to convert older thermostats.

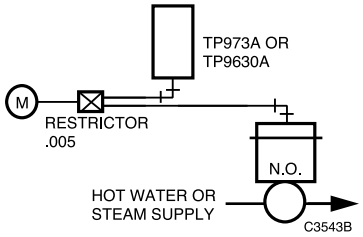
TP973 Pneumatic Thermostat



One- or two-pipe, single temperature, low capacity, pneumatic thermostat used to provide proportional control of pneumatic valves and damper actuators in heating and air conditioning systems. Replacement kits are available for Johnson, Powers, Robertshaw, Barber-Colman, and older Honeywell pneumatic thermostats.

- Durable TP970 Series Thermostat. Direct Acting (DA) and Reverse Acting (RA) models are available.
- Backplate has molded air connections-no separate fittings needed.
- Universal locking cover with satin chrome finish and horizontal, vertical, or blank window options available.
- Other Covers Available.
- Low capacity thermostat.
- Built in restrictor for two-pipe applications.

TP973 Typical Piping (One-pipe)



Application Type: Wall Thermostat, Single Temperature
Dimensions, Approximate: 3 1/4 in. high x 2 in. wide x 1 5/8 in. deep (83 mm high x 51 mm wide x 41 mm deep)
Airflow Usage: 0.011 scfm (5.2 mL/s)
Mounting: Wall
Operating Temperature: 100 F
Storage Temperature: 150 F maximum (66 C maximum)
Setpoint: Single
Number of Pipes: 1 or 2
Remote Bulb: No
Sensor Element: Bimetal
Maximum Operating Pressure: 25 psi (170 kPa)

Accessories:

14002913-004 0.005 in. Blue In-line Filtered Restriction Assembly; Inlet: 1/4 in., Outlets: 5/32 in. and 5/32 in
14002430-001 Thermostat Guard
14002362-001 Duct Sampling Chamber
14003192-001 Wallplate adapter kit. Adapts HP970 or TP970 series stats to HP900 and TP900 flush mounted and TP910 series flush or surface mounted installations
14004447-001 Setpoint Cam Assembly for TP970A1004, A1012, A1020, A1038, A1046, A1053, A1095, A2004, A2012, A2020, A2038, A2053, A2095; TP970C; TP972A1143, A2143; TP973A1001, A1019, A1127
14004447-002 Setpoint Cam Assembly for TP970B1002, B1010, B1028, B1036, B2002, B2010, B2028, B2036; TP970D; TP972A1002, A1010, A1028, A1044, A2002, A2010, A2028, A2044; TP973B1009, B1017, B1025, B1108
14004439-001 Setpoint Extension
305965 1-1/2 in. diameter, 1/8 NPT center stem back mount Pressure Indicating gauge (0 to 30 psi scale) with +/- 4% accuracy
AK3863 Honeywell Thermostat Tool Kit, TP970/TP900
CCT729A Gauge Adapter for Calibration. Add 305965 0 to 30 psi gauge for Complete Tool.
CCT735A Thermostat Calibration Tool includes Allen wrench for cover installation.

Replacement Parts:

14001865-001 Filter Cartridge Assembly
14002053-001 Back Plate Assembly
14002573-001 Modernization Kit to convert all 1 & 2 pipe Honeywell & competitive pneumatic stats to TP970, TP971A, TP972, TP973, TP974, TP9600 family; HP970, HP971 and HP972
14002374-004 Restrictor Block Assembly,.005 in., For TP970A-D; TP971A-E except C; TP972A; TP973A-B; TP9600 family; HP970A-B; and HP972B
14004460-001 Nozzle, Throttling Plate and Bimetal Assembly, DA, Left side
14004460-002 Nozzle, Throttling plate and Bimetal Assembly, reverse acting, left side

Product Number	Action	Setpoint Temperature Range		Throttling Range		Includes	Comments**
		(F)	(C)	(F)	(C)		
TP973A2076	Direct Acting	60 F to 90 F	—	2 F to 10 F	—	Order Cover Separately	For one-pipe order an external .005 in. restriction
TP973A2084	Direct Acting	—	15 C to 30 C	—	1 C to 5 C	Order Cover Separately	For one-pipe order an external .005 in. restriction
TP973A2167	Direct Acting	60 F to 90 F	—	2 F to 10 F	—	Thermostat and cover # 14004407-121	For one-pipe order an external .005 in. restriction
TP973A2209	Direct Acting	60 F to 90 F	—	2 F to 10 F	—	Thermostat and Satin Chrome Cover	Tradeline Kit. For one-pipe application- order an external .005 in. restriction
TP973A2223	Direct Acting	60 F to 90 F	—	2 F to 10 F	—	Thermostat and beige cover	Tradeline Kit. For one-pipe application- order an external .005 in. restriction

Thermostats

Product Number	Action	Setpoint Temperature Range		Throttling Range		Includes	Comments**
		(F)	(C)	(F)	(C)		
TP973B2066	Reverse Acting	60 F to 90 F	—	2 F to 10 F	—	Order Cover Separately	For one-pipe order an external .005 in. restriction
TP973B2074	Reverse Acting	—	15 C to 30 C	—	1 C to 5 C	Order Cover Separately	For one-pipe order an external .005 in. restriction
TP973B2132	Reverse Acting	60 F to 90 F	—	2 F to 10 F	—	Thermostat and cover # 14004407-121	For one-pipe order an external .005 in. restriction
TP973B2171	Reverse Acting	60 F to 90 F	—	2 F to 10 F	—	Thermostat and Satin Chrome Cover	Tradeline Kit. For one-pipe application- order an external .005 in. restriction

A **Tradeline Kit includes a TP970 Series thermostat with either a Satin Chrome or Beige Universal Cover, Windows (horizontal (F), vertical (F) and blank) for new installations or to convert newer, small size Honeywell or competitor thermostat, not requiring a wall plate adapter.

A **Convertastat Kit™** includes a TP970 Series thermostat with either a Satin Chrome or Beige Universal Cover, Windows (horizontal (F), vertical (F) and blank) and a small Universal Wall Plate Adapter to convert newer, small size Honeywell or competitor thermostats.

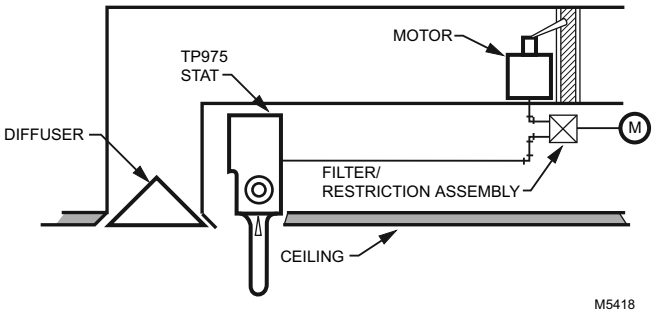
A **Modernization Kit** includes a TP970 Series thermostat with Satin Chrome Universal Cover, Windows (horizontal (F), vertical (F) and blank) and a large Universal Wall Plate Adapter to convert older thermostats.

TP975 Pneumatic Diffuser Thermostat

One-pipe, single temperature, low-capacity pneumatic thermostat used to provide proportional control of pneumatic valves and mixing boxes in heating and air conditioning systems. It mounts in a slot or light troffer diffuser or a return air grill.

- Two-way setpoint indicator for vertical or horizontal mounting.
- Detents in 1 F (0.5 C) increments for blind operation.

TP975 Typical Piping



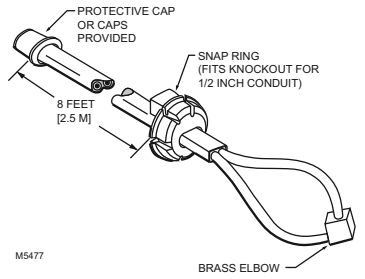
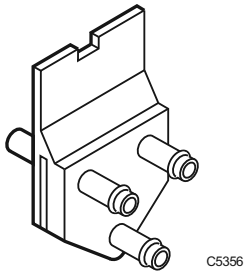
Application Type: Single temperature, low capacity, pneumatic thermostat
Dimensions, Approximate: 1 in. high x 2 1/2 in. wide x 1 1/8 in. deep (25 mm high x 63 mm wide x27 mm deep)
Airflow Usage: 0.011 scfm (5.2 mL/s)
Mounting: Wall
Operating Temperature: 110 F maximum (43 C maximum)
Storage Temperature: 150 F maximum (66 C maximum)
Remote Bulb: No
Sensor Element: Bimetal
Maximum Operating Pressure: 30 psi (207 kPa)

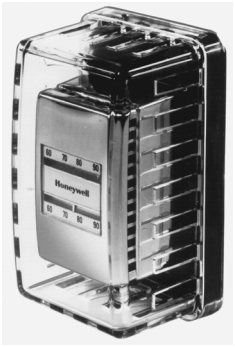
Accessories:
14002913-001 .005 in. Blue Filter Restriction Assembly; Inlet: 1/4 in., Outlets: 1/4 in. and 5/32 in.; Order in Quantities of 10
14002913-004 0.005 in. Blue In-line Filtered Restriction Assembly; Inlet: 1/4 in., Outlets: 5/32 in. and 5/32 in

Product Number	Action	Number of Pipes	Setpoint	Setpoint Temperature Range (F)	Throttling Range (F)	Comments
TP975A1009	Direct Acting	1	Single	67 F to 83 F	2 F to 10 F	Requires external 0.005 in. restrictor

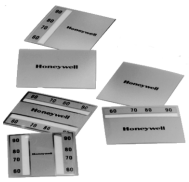
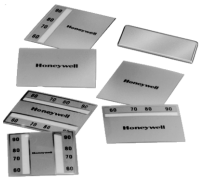
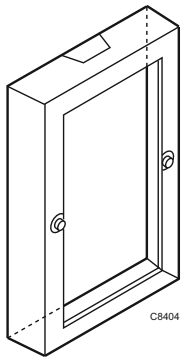
Thermostats

Pneumatic Thermostat Accessories

Product Number	Description	Used With	
14001491-002	Two-Pipe Airhead, plastic tubing assembly for deep wall box	TP970; TP971; TP972; TP973; TP9600 Family; HP970 Family	
14001494-002	2 Pipe Airhead Assembly, copper tubing for deep wall box.	TP970; TP971; TP972; TP973; TP9600 Family; HP970 Family	
14001496-001	Mounting Plate for TP970 to 2" x 4" Electrical Box	TP970; TP971; TP972; TP973; TP9600 Family; HP970 Family	
14001527-001	Three pipe straight white connector	TP970; TP971; TP972; TP973; TP9600 Family; HP970 Family	
14001614-001	Shallow wall plate assembly	TP970; TP971; TP972; TP973; TP9600 Family; HP970 Family	
14001615-001	One-pipe copper tube assembly for shallow wall box	TP970; TP971; TP972; TP973; TP9600 Family; HP970 Family	
14001615-002	Two-pipe cooper tube assembly for shallow wall	TP970; TP971; TP972; TP973; TP9600 Family; HP970 Family	
14001616-002	Two-pipe plastic tube assembly for shallow wall box	TP970; TP971; TP972; TP973; TP9600 Family; HP970 Family	
14001918-001	Branchline pressure plug	TP970; TP971; TP972; TP973; TP9600 Family; HP970 Family	
14002136-004	Black Trim plate	TP970; TP971; TP972; TP973; TP9600 Family; HP970 Family	
14002136-005	Beige Trim plate	TP970; TP971; TP972; TP973; TP9600 Family; HP970 Family	
14002136-006	Premier White Trim Plate	TP970; TP971; TP972; TP973; TP9600 Family; HP970 Family	
14002136-007	Taupe Trim Plate	TP9600 Family	
14002172-001	Gage Tap repair plug	TP970; TP971; TP972; TP973; TP9600 Family; HP970 Family	
14002362-001	Duct Sampling Chamber	TP970; TP971; TP972; TP973; TP9600 Family; HP970 Family	
14002373-001	Switch over Springs 16 To 21 Psi,	TP972; TP971	
14002390-001	Bag assembly of screws	TP970; TP971; TP972; TP973; TP9600 Family; HP970 Family	

Product Number	Description	Used With	
14002430-001	Thermostat Guard	TP970; TP971; TP972; TP973; TP9600 Family; HP970 Family	
14002573-002	Modernization Kit to convert 3 pipe Honeywell TP911C & competitive three pipe pneumatic thermostats to TP971C	TP971C	
14002636-001	Base for 14002362-001 Sampling Chamber	14002362-001	
14002913-001	0.005 in. Blue In-line Filtered Restriction Assembly; Inlet: 1/4 in., Outlets: 1/4 in. and 5/32 in.; Order in Quantities of 10	In-line restriction applications	
14002913-002	0.007 in. Red In-line Filtered Restriction Assembly; Inlet: 1/4 in., Outlets: 1/4 in. and 1/4 in.; Order in Quantities of 10	In-line restriction applications	
14002913-003	0.007 in. Red In-line Filtered Restriction Assembly; Inlet: 1/4 in., Outlets: 1/4 in. and 5/32 in.; Order in Quantities of 10	In-line restriction applications	
14002913-004	0.005 in. Blue In-line Filtered Restriction Assembly; Inlet: 1/4 in., Outlets: 5/32 in. and 5/32 in.; Order in Quantities of 10	In-line restriction applications	
14002913-005	0.007 in. Red In-line Filtered Restriction Assembly; Inlet: 1/4 in., Outlets: 5/32 in. and 5/32 in.; Order in Quantities of 10	In-line restriction applications	
14003113-002	Repair kit containing 0.007 in. restrictor plate, filters, and gaskets for pre-1984 units	LP916	
14003203-001	Bag assembly used in 14003192-001	—	
14003203-003	Conversion Kit to convert Johnson, Powers, Robertshaw, Barber Coleman and older Honeywell switches	—	
14003929-001	Bimetal TP928	TP928	
14004056-001	Dual Cover Assembly; Beige, 60F to 90F thermometer and setpoint display	TP979	
14004056-007	Dual Cover Assembly; Beige, with Honeywell Logo only (no temperature displays)	TP979	
14004056-008	Dual Cover Assembly; Beige, blank (no temperature displays and no logo)	TP979	
14004068-001	Mounting assembly	TP979	
14004193-001	Stand-Off Ring	TP979	
14004376-001	Gasket for 14004378 Connector Assembly	LP916	
14004378-002	Connector Assembly, with integral 0.005 in. restriction and filters for post 1984 units	LP916	
14004401-002	Convertastat wall plate, Black	—	

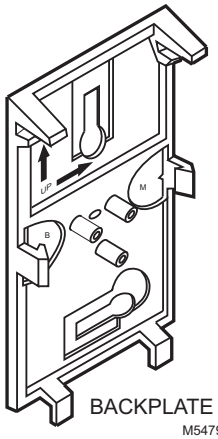
Thermostats

Product Number	Description	Used With	
14004401-004	Convertastat wall plate, Beige	—	
14004402-001	Thermostat Cover Satin Chrome, no windows	TP970; TP971; TP972; TP973; TP9600 Family; HP970 Family	
14004437-001	Insert Cover, Day, Auto, Satin Chrome	TP970; TP971; TP972; TP973; TP9600 Family; HP970 Family	
14004438-001	Insert Cover, Satin Chrome, Setpoint Display	TP970; TP971; TP972; TP973; TP9600 Family; HP970 Family	
14004438-002	Insert Cover, Beige, Setpoint Display	TP970; TP971; TP972; TP973; TP9600 Family; HP970 Family	
14004439-001	Setpoint Extension	TP970; TP971; TP972; TP973; TP9600	
14004441-001	Window inserts for use on Satin Chrome Cover fahrenheit scale (60 to 90 F) for vertical and horizontal mounting.	TP970; TP971; TP972; TP973	
14004441-002	Window inserts for use on Satin Chrome Cover fahrenheit scale (60 to 90 F) for vertical and horizontal mounting. Includes cover insert for setpoint slot	TP970; TP971; TP972; TP973	
14004447-001	Setpoint Cam Assembly for TP970A1004, A1012, A1020, A1038, A1046, A1053, A1095, A2004, A2012, A2020, A2038, A2053, A2095; TP970C; TP972A1143, A2143; TP973A1001, A1019, A1127	TP970A; TP970C; TP972A2143; TP979A	
14004447-002	Setpoint Cam Assembly for TP970B1002, B1010, B1028, B1036, B2002, B2010, B2028, B2036; TP970D; TP972A1002, A1010, A1028, A1044, A2002, A2010, A2028, A2044; TP973B1009, B1017, B1025, B1108	TP970B; TP970D; TP972A2002; TP972A2010; TP973B2108; TP979B	
14004447-003	Setpoint Cam Assembly for TP971A, C, D; TP972A1168, A2168, A2176	TP971A; TP971C; TP971D	
14004447-005	Setpoint Cam Assembly for TP970B1044; TP972A1051, A1101	TP970B; TP972A	
14004458-001	Stand-Off Ring for surface or flush mounting	TP970; TP971; TP972; TP973; TP9600 Family; HP970 Family	
14004505-001	Twin elbow connector	TP970; TP971; TP972; TP973; TP9600 Family; HP970 Family	
14004558-001	Six inch branch tube-spring assembly	TP970; TP971; TP972; TP973; TP9600 Family; HP970 Family	

Product Number	Description	Used With	
14004729-002	Cover Screw	TP970; TP971; TP972; TP973; TP9600 Family; HP970 Family	
14004756-002	Dual Cover Assembly; Satin Chrome, 15 - 30 C thermometer and setpoint scales	TP979	
14004756-005	Dual Cover Assembly; Satin Chrome, 60 - 90F thermometer scale	TP979	
14004756-008	Dual Cover Assembly; Satin Chrome, Blank, no temperature scales or logo.	TP979	
14004908-001	Stop Kit	TP970; TP971; TP972; TP973; TP9600 Family; HP970 Family	
14004911-001	Taupe Converastat wall plate with 2 screws	TP9600 Family	
311699	Tubing Spring	LP916	
314826	Diaphragm	LP916	
315949	Scaleplate for TP928	TP928	
316016A	General purpose mounting assembly, includes 3 3/4 in. mounting bracket, scale plate, knob, bulb hangers, screws, and nuts	LP916	
316016C	Knob and scale plate assembly with screws	LP916	
316016M	Knob, large scale plate and hanger assembly with screws	LP916	
43176655-004	Case	TP937, TP938	
AK3863	Honeywell Thermostat Tool Kit, TP970/TP900	HP970, HP972, TP970	
AK3970	Cover for Aspirator Boxes 14002424-002 and 14002424-003	14002424-002; 14002424-003	

Thermostats

Pneumatic Thermostat Replacement Parts

Product Number	Description	Used With	
14000742-002	Two-pipe red airhead with back connection	TP970; TP971; TP972; TP973; TP9600 Family; HP970 Family	
14001865-001	Filter Cartridge Assembly	TP970; TP971; TP972; TP973; TP9600 Family; HP970 Family	
14001957-001	Plug, BLP Tap,	TP970	
14002053-001	Back Plate Assembly	TP970; TP971; TP972; TP973; TP9600 Family; HP970 Family	 BACKPLATE M5479
14002111-024	Window with 60 to 90F thermometer scale for use on old aluminum style 14001984 thermostat covers.	14001984 cover	
14002374-004	Restrictor Block Assembly,.005 in., 2-pipe for TP970A-D; TP971A-E except C; TP972A; TP973A-B; TP9600 family; HP970A-B; and HP972B	TP970	
14002374-005	Restrictor Block Assembly,.005 in., 3-pipe for TP971C	TP971C	
14002420-001	Mounting. Plate assembly, with mounting plate (14002421-001), 4 clips (14002422-001), 4 rivets (305835)	14002424-001	
14002573-001	Modernization Kit to convert all 1 & 2 pipe Honeywell & competitive pneumatic stats to TP970, TP971A, TP972, TP973, TP974, TP9600 family; HP970, HP971 and HP972	TP970; TP9600; TP972; HP970; HP971; TP971A; HP972; TP973; TP974	
14003192-001	Wallplate adapter kit. Adapts HP970 or TP970 series stats to HP900 and TP900 flush mounted and TP910 series flush or surface mounted installations	TP970; TP971; TP972; TP973; TP9600 Family; HP970 Family	
14003194-001	TP910 black base plate	TP910	
14003195-001	TP910 beige base plate	TP910	
14003923-001	20 to 25 psi spring	TP971	
14004405-005	Window insert for use on Satin Chrome cover 14004402-002. Window has fahrenheit scale (60 to 90F) for thermometer; setpoint display and a Honeywell logo	TP970; TP971; TP972; TP973	
14004447-006	Setpoint Cam Assembly for TP973A2076, A2084, A2209, and A2223	TP973A	
14004447-007	Setpoint Cam Assembly for TP973B2068, B2074, B2132, B2171 and TP9630B1003	TP973B; TP9630B1003	
14004459-001	Repair kit consisting of a thermometer assembly, a thermometer post and a 60 to 90F Aluminum Scaleplate	TP970; TP973	
14004459-003	Repair KIt consisting of a thermometer assembly, a thermometer post and a 15 to 30 C Aluminum Scaleplate	TP970; TP973	
14004460-001	Nozzle, Throttling Plate and Bimetal Assembly, DA, Left side	TP970A,TP971A, C, D, TP972 DA, left side, TP973A, TP979A	
14004460-002	Nozzle, Throttling plate and Bimetal Assembly, reverse acting, left side	TP970B, TP971B, TP972 RA, left side, TP973B, TP979B	

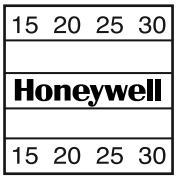
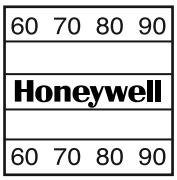
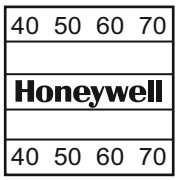
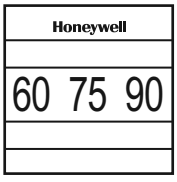
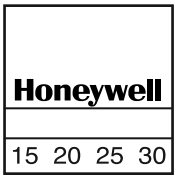
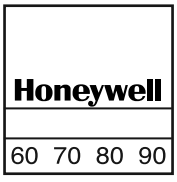
Product Number	Description	Used With	
14004460-003	Nozzle, Throttling plate and Bimetal Assembly, DA, right side	TP972	
14004609-001	Steel Stiffener plate	TP970; TP971; TP972; TP973; TP9600	
14004610-001	Zinc plate metal stud Adapter	TP970; TP971; TP972; TP973; TP9600	
303627	Gasket for LP901	LP901	

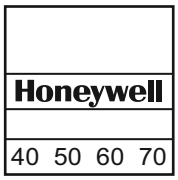
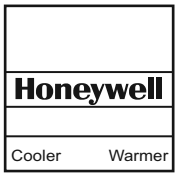
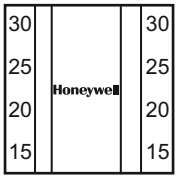
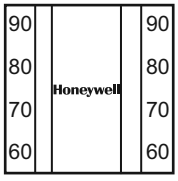
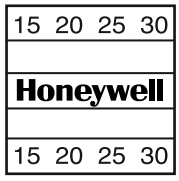
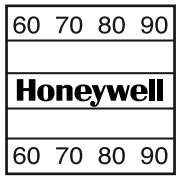
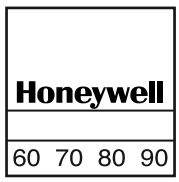
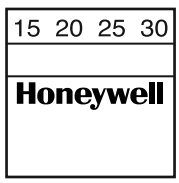
TP9600 Series Standard Covers

Product Number	Description	Used With	
14004910-001	Fahrenheit scale (60 to 90 F) Taupe Thermostat Cover Kit with thermometer and setpoint display visible and Honeywell logo for vertical mounting.	TP9600	
14004910-004	Taupe Thermostat Cover with setpoint and thermometer concealed with Honeywell logo, for vertical mounting	TP9600	

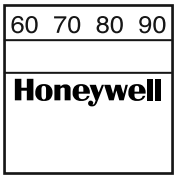
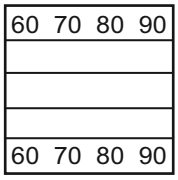
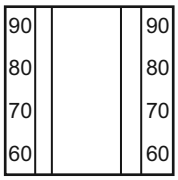
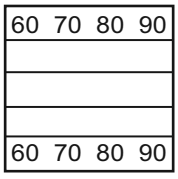
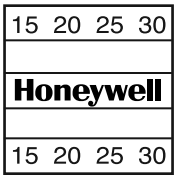
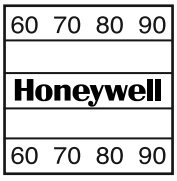
Thermostats

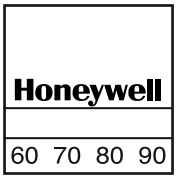
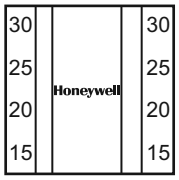
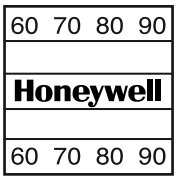
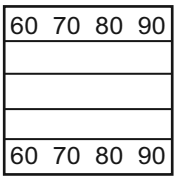
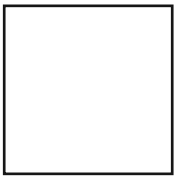
TP970 Series Standard Covers

Product Number	Description	Comments	Used With	
14003925-002	Thermostat Cover Kit - Satin Chrome includes window inserts for 60 to 90 F thermometer and setpoint display and inserts for just the Honeywell logo (vertical and horizontal mounting)	—	TP970; TP972; TP971; TP973	
14004406-110	Celsius scale (15-30 C) Satin Chrome Thermostat Cover Kit with Thermometer Display and setpoint display and Honeywell logo for vertical mounting. Open setpoint slot.	See Specification Data sheet, Form No. 77-1003 for details	TP970; TP972; TP971; TP973	 M18939
14004406-111	Fahrenheit scale (60 to 90 F) Satin Chrome Thermostat Cover Kit with Thermometer Display and setpoint display and Honeywell logo for vertical mounting. Open setpoint slot.	See Specification Data sheet, Form No. 77-1003 for details	TP970; TP972; TP971; TP973	 M18935
14004406-112	Fahrenheit scale (40 to 70 F) Satin Chrome Thermostat Cover Kit with thermometer display, setpoint display and Honeywell logo for vertical mounting. Open Setpoint slot.	See Specification Data sheet, Form No. 77-1003 for details	TP970; TP972; TP971; TP973	 M18962
14004406-115	Fahrenheit scale (60F to 90F). Display has large scale numerals for the visually impaired. Has thermometer display, setpoint display and Honeywell logo for vertical mounting. Open Setpoint slot.	See Specification Data sheet, Form No. 77-1003 for details	TP970; TP972; TP971; TP973	 M13857
14004406-120	Celsius scale (15 to 30C) Satin Chrome Thermostat Cover Kit with setpoint display and Honeywell logo for vertical mounting. Open Setpoint slot.	See Specification Data sheet, Form No. 77-1003 for details	TP970; TP972; TP971; TP973	 M18941
14004406-121	Fahrenheit scale (60 to 90F) Satin Chrome Thermostat Cover Kit with setpoint display and Honeywell logo for vertical mounting. Open Setpoint slot.	See Specification Data sheet, Form No. 77-1003 for details	TP970; TP972; TP971; TP973	 M18938

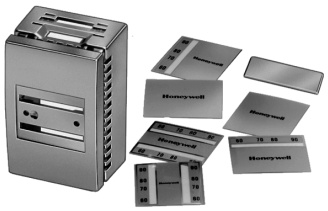
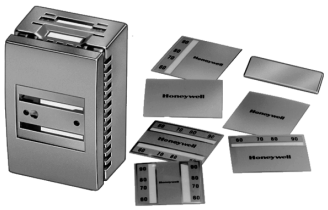
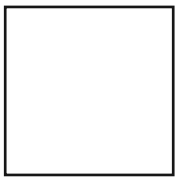
Product Number	Description	Comments	Used With	
14004406-122	Fahrenheit scale (40 to 70F) Satin Chrome Thermostat Cover Kit with setpoint display and Honeywell logo for vertical mounting. Open Setpoint slot.	See Specification Data sheet, Form No. 77-1003 for details	TP970; TP972; TP971; TP973	 M18964
14004406-123	Satin Chrome Thermostat Cover Kit with setpoint display and Honeywell logo for vertical mounting with Warmer/Cooler Scale. Open Setpoint slot.	See Specification Data sheet, Form No. 77-1003 for details	TP970; TP972; TP971; TP973	 M18970
14004406-210	Celsius scale (15 to 30 C) Satin Chrome Thermostat Cover kit with thermometer and setpoint display and Honeywell logo for horizontal mounting. Open Setpoint slot.	See Specification Data sheet, Form No. 77-1003 for details	TP970; TP972; TP971; TP973	 M13901
14004406-211	Fahrenheit scale (60 to 90F) Satin Chrome Thermostat Cover Kit with thermometer display, setpoint display and Honeywell logo for horizontal mounting. Open Setpoint slot.	See Specification Data sheet, Form No. 77-1003 for details	TP970; TP972; TP971; TP973	 M18968
14004406-310	Celsius scale (15 to 30C) Satin Chrome Thermostat Cover Kit with thermometer display, setpoint display and Honeywell logo for vertical mounting. Closed Setpoint slot.	See Specification Data sheet, Form No. 77-1003 for details	TP970; TP972; TP971; TP973	 M18939
14004406-311	Fahrenheit scale (60 to 90C) Satin Chrome Thermostat Cover Kit with thermometer display, setpoint display and Honeywell logo for vertical mounting. Closed Setpoint slot.	See Specification Data sheet, Form No. 77-1003 for details	TP970; TP972; TP971; TP973	 M18935
14004406-321	Fahrenheit scale (60 to 90F) Satin Chrome Thermostat Cover Kit with setpoint display and Honeywell logo for vertical mounting. Closed Setpoint slot.	See Specification Data sheet, Form No. 77-1003 for details	TP970; TP972; TP971; TP973	 M18938
14004406-330	Celsius scale (15 to 30C) Satin Chrome Thermostat Cover Kit with thermometer display and Honeywell logo for vertical mounting. Closed Setpoint slot.	See Specification Data sheet, Form No. 77-1003 for details	TP970; TP972; TP971; TP973	 M18940

Thermostats

Product Number	Description	Comments	Used With	
14004406-331	Fahrenheit scale (60 to 90F), Satin chrome thermostat cover kit with thermometer display and Honeywell logo for vertical mounting. Closed Setpoint slot.	See Specification Data sheet, Form No. 77-1003 for details	TP970; TP972; TP971; TP973	 M18936
14004406-511	Fahrenheit scale (60 to 90F), Satin Chrome Thermostat Cover Kit with thermometer display, setpoint display. No logo for vertical mounting. Open Setpoint slot.	See Specification Data sheet, Form No. 77-1003 for details	TP970; TP972; TP971; TP973	 M18965
14004406-611	Fahrenheit scale (60 to 90F), Satin Chrome Thermostat Cover Kit with thermometer display, setpoint display and no logo for horizontal mounting. Open Setpoint slot.	See Specification Data sheet, Form No. 77-1003 for details	TP970; TP972; TP971; TP973	 M18971
14004406-711	Fahrenheit scale (60 to 90F), Satin Chrome Thermostat Cover Kit with thermometer and setpoint display and no logo for vertical mounting. Closed Setpoint slot.	See Specification Data sheet, Form No. 77-1003 for details	TP970; TP972; TP971; TP973	 M18965
14004406-910	Thermostat cover kit, Satin Chrome include a cover, setpoint cover and 6 window inserts for 60 to 90F scale for vertical and horizontal mounting.	—	TP970; TP972; TP971; TP973	
14004407-110	Celsius scale (15 C to 30 C), Beige Thermostat Cover Kit with thermometer display, setpoint display and Honeywell logo for vertical mounting. Open Setpoint slot.	See Specification Data sheet, Form No. 77-1003 for details	TP970; TP972; TP971; TP973	 M18939
14004407-111	Fahrenheit scale (60 F to 90 F), Beige Thermostat Cover Kit with thermometer display, setpoint display and Honeywell logo for vertical mounting. Open Setpoint slot.	See Specification Data sheet, Form No. 77-1003 for details	TP970; TP972; TP971; TP973	 M18935

Product Number	Description	Comments	Used With	
14004407-121	Fahrenheit scale (60 F to 90 F), Beige Thermostat Cover Kit with setpoint display and Honeywell logo for vertical mounting. Open Setpoint slot.	See Specification Data sheet, Form No. 77-1003 for details	TP970; TP972; TP971; TP973	 M18938
14004407-210	Celsius scale (15 to 30 C) Beige Thermostat Cover Kit with thermometer and setpoint display and Honeywell logo for horizontal mounting. Open Setpoint slot.	See Specification Data sheet, Form No. 77-1003 for details	TP970; TP972; TP971; TP973	 M13901
14004407-300	Beige Cover Kit with Honeywell logo for vertical mounting. Closed Setpoint slot.	See Specification Data sheet, Form No. 77-1003 for details	TP970; TP972; TP971; TP973; HP970; HP972	 M18937
14004407-311	Fahrenheit scale (60 F to 90 F), Beige Thermostat Cover Kit with thermometer display, setpoint display and Honeywell logo for vertical mounting. Closed Setpoint slot.	See Specification Data sheet, Form No. 77-1003 for details	TP970; TP972; TP971; TP973	 M18935
14004407-511	Fahrenheit scale (60 F to 90 F), Beige Thermostat Cover Kit with thermometer display and setpoint display for vertical mounting. Closed Setpoint slot.	See Specification Data sheet, Form No. 77-1003 for details	TP970; TP972; TP971; TP973	 M18965
14004407-800	Beige Cover Kit with no display and no logo for vertical or horizontal mounting. Closed Setpoint slot.	See Specification Data sheet, Form No. 77-1003 for details	TP970; TP972; TP971; TP973; HP970; HP972	 M18967

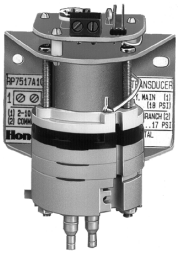
Thermostats

Product Number	Description	Comments	Used With	
14004407-910	Thermostat Cover Kit - Beige includes cover, setpoint insert cover and 6 window inserts for 60 to 90 F scale for vertical and horizontal mounting.	See Specification Data sheet, Form No. 77-1003 for details	TP970; TP972; TP971; TP973	
14004787-910	Thermostat Cover Kit - Bright Chrome includes cover, setpoint insert cover and 6 window inserts for 60 to 90 F scale for vertical and horizontal mounting.		TP970; TP972; TP971; TP973	
14004878-700	Premiere White Cover Kit with no display and no logo for vertical or horizontal mounting. Closed Setpoint slot.		TP970; TP972; TP971; TP973; HP970; HP972	 M18967
14004878-910	Thermostat Cover Kit - Premier White includes cover, setpoint insert cover and 6 window inserts for 60 to 90 F scale for vertical and horizontal mounting.	—	TP970; TP972; TP971; TP973	

Controllers

Pneumatic Transducer

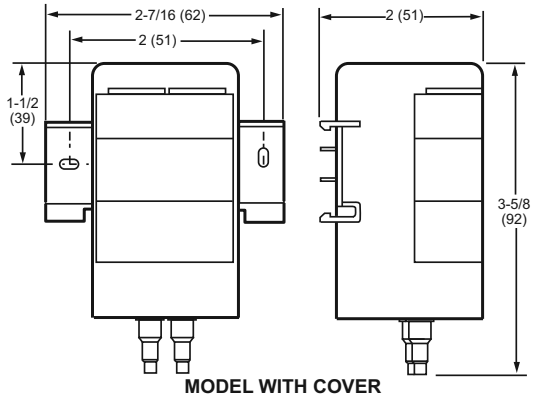
RP7517 Electronic-Pneumatic Transducer



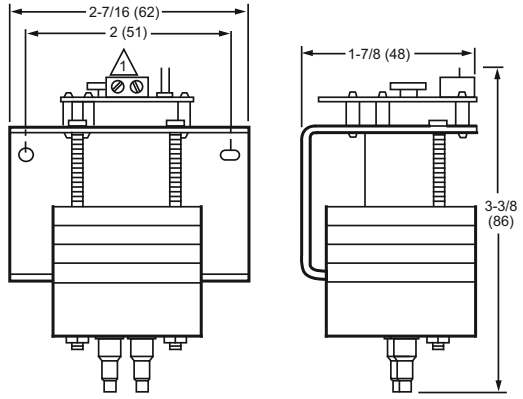
Electronic-Pneumatic Transducers are used in electronic-pneumatic control systems to convert a proportional electric output signal from a controller into a direct-acting, proportional pneumatic signal.

- Screw mounting or snap rail (models with cover).
- Factory calibrated.
- Dual barb fittings.
- High accuracy.

Dimensions in inches (millimeters)



MODEL WITH COVER

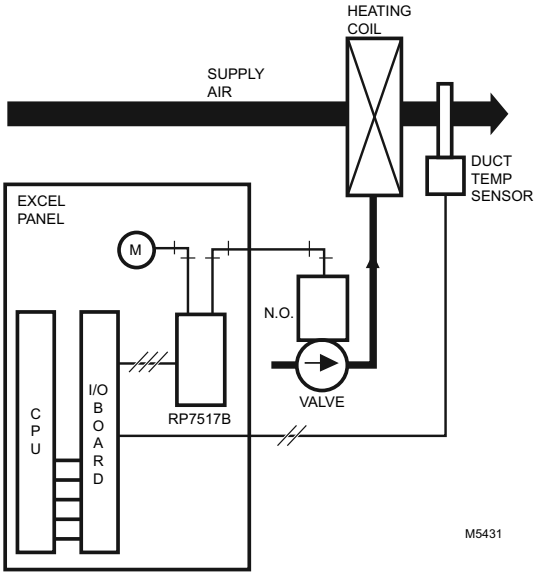


MODEL WITHOUT COVER

1 2 TERMINALS ON RP7517A1017
3 TERMINALS ON RP7517B1024

M13904

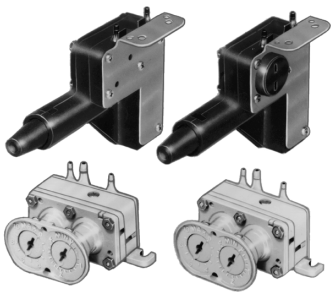
RP7517 Typical Piping/Wiring



Application: Electric to pneumatic Transducer
Action: Direct Acting
Airflow Usage: 0.025 scfm (117mL/s)
Connections: Dual barb-fittings for 1/4 in. or 5/32 in. O.D. plastic tubing
Maximum Operating Temperature: 131 F (55 C)
Maximum Operating Pressure: 30 psi (205 kPa)
Pressure Ranges: 0 to 18 psi (0 to 125 kPa)
Nominal High End: 16 psi with 18 psi main pressure at 12 Vdc (110 kPa with 125 kPa main pressure at 12 Vdc)
Nominal Low End: 0.5 psi at 0 Vdc (3.5 kPa at 0 Vdc)
Output Pressure Range: 3 to 15 psi (21 to 103 kPa)
Capacity: 0.45 scfm (211 mL/s)
Humidity Ratings: 5 to 95% RH

Product Number	Electrical Connections	Input Signal	Power Consumption	Voltage	Description	Includes
RP7517A1009	30 in. (762 mm) lead wire	2 to 10 Vdc	16mA at 12 Vdc	Powered by Control signal	Electronic Pneumatic Transducer with direct action and 2 to 10 vdc input signal. Powered by control signal.	With cover, without internal power supply (2-wire)
RP7517A1017	screw terminals for 14 to 22 gage wire	2 to 10 Vdc	16mA at 12 Vdc	Powered by Control signal	Electronic Pneumatic Transducer with direct action and 2 to 10 vdc input signal. Powered by control signal	Without cover, without internal power supply for panel mounting (2 wire)
RP7517B1016	30 in. (762 mm) lead wire	2 to 10 Vdc at 0.1 mA max	1.7 vA	24 Vac external transformer	Electronic Pneumatic Transducer with direct action and 2 to 10 Vdc at 0.1 mA max input signal. External transformer required.	With cover, external transformer required, 24 Vac, 50/60 Hz, (3 wire)
RP7517B1024	screw terminals for 14 to 22 gage wire	2 to 10 Vdc at 0.1 mA max	1.7 vA	24 Vac external transformer	Electronic Pneumatic Transducer with direct action and 2 to 10 Vdc at 0.1 mA max input signal. External transformer required.	Without cover, external transformer required, 24 Vac, 50/60 Hz, (3 wire)

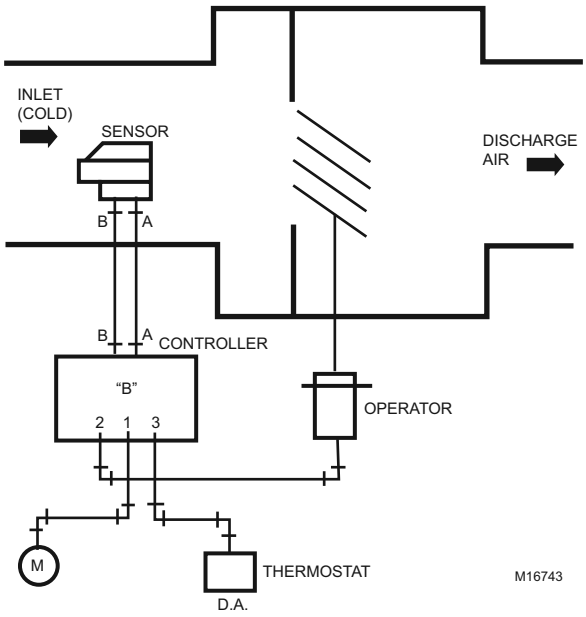
CP980 Velocitrol Velocity Sensor/Controller



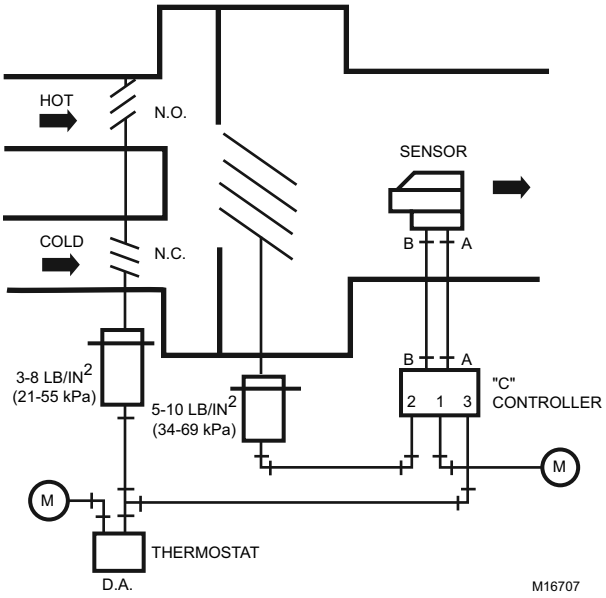
An ultra-sensitive air velocity sensor and pneumatic controller, control pneumatic damper actuators in heating and air conditioning systems to provide constant air velocity in the duct regardless of the static pressure.

- State-of-the-art design provides reliable operation.
- Not position sensitive.
- Direct Acting (DA) and Reverse Acting (RA) models are available.
- Insensitive to static pressure changes.
- Accurate control throughout entire velocity range.
- Graduated scales for minimum and maximum velocity adjustments.
- Velocity reset by thermostat demand.
- Adaptable to many terminal unit control strategies.

Single Duct, Variable Constant Volume Application



Dual Duct, Variable Constant Volume Application



Dimensions, Approximate: Controller: 1 3/4 in. high x 3 1/4 in. wide x 2 3/8 in. deep / Sensor: 3 3/16 in. high x 1 3/4 in. wide x 4 3/16 in. long with orifice and 3 3/8 in. long without orifice
(Controller: 44 mm high x 83 mm wide x 60 mm deep / Sensor: 81 mm high x 45 mm wide x 107 mm long with orifice and 86 mm long without orifice.)

Airflow Usage: 0.029 scfm (13.7 mL/s), includes supply for bleed type thermostats for type B, does not include thermostat air for type C controller

Maximum Safe Operating Pressure: 30 psi (207 kPa)
Mainline Air Pressure (min): 18 psi (124 kPa)
Nominal Mainline Air Pressure: 20 psi (138 kPa)
Remote Sensor: Yes
Temperature Range: 40 F to 130 F (5 C to 55 C)
Operating Humidity Range: 5 to 95% RH

Product Number	Application	Action	Control Range (fpm)	Control Range (m/s)	Reset Pressure Range (psi)	Reset Pressure Range (kPa)	Comments
CP980C1065	Velocitrol Air Velocity Sensor B Type	Direct, non-sequencing, normally open	500 fpm up to 3500 fpm by changing orifice	2.5 m/s up to 17.8 m/s by changing orifice	1 to 15 psi	7 to 103 kPa	For normally open damper and one-pipe thermostat
CP980D1063	Velocitrol Air Velocity Sensor B Type	Reverse, non-sequencing, normally closed	500 fpm up to 3500 fpm by changing orifice	2.5 m/s up to 17.8 m/s by changing orifice	1 to 15 psi	7 to 103 kPa	For normally closed damper and one-pipe thermostat
CP980E1060	Velocitrol Air Velocity Sensor C Type	Direct, sequencing, normally open	500 fpm up to 3500 fpm by changing orifice	2.5 m/s up to 17.8 m/s by changing orifice	9 to 15 psi	62 to 103 kPa	For normally open damper and two-pipe thermostat
CP980F1068	Velocitrol Air Velocity Sensor C Type	Reverse, sequencing, normally closed	500 fpm up to 3500 fpm by changing orifice	2.5 m/s up to 17.8 m/s by changing orifice	9 to 15 psi	62 to 103 kPa	For normally closed damper and two-pipe thermostat

Velocity Sensors/Controllers

CP980C,D,E, and F Cross-Reference Table

Current Order Number (Less Orifice)	Orifice Order No.	Velocity Range ft/min (m/s)	Orifice Set	Replaces Honeywell		
				Original Set Less Orifice	Interim Matched Set (Less Orifice)	Matched Set (Includes Orifice)
CP980C1065	None	500 (2.5)	None	—	—	—
	14003642-002	750 (3.8)	Green			CP980C1016
	14003642-003	1500 (7.6)	White			CP980C1024
	14003642-004	2000 (10.2)	Blue			CP980C1032
	14003749-001	2500 (12.7)	Black			CP980C1040
	14003749-002	3500 (17.8)	Gray			CP980C1057
CP980D1063	None	500 (2.5)	None	CP980A1002/	CP980B1000	—
	14003642-002	750 (3.8)	Green	RP980A1006	or	CP980D1014
	14003642-003	1500 (7.6)	White	or	CP980B1018	CP980D1022
	14003642-004	2000 (10.2)	Blue	CP980A1002/		CP980D1030
	14003749-001	2500 (12.7)	Black	RP980B1004		CP980D1048
	14003749-002	3500 (17.8)	Gray		CP980B1034	CP980D1055
			RP980A1006 or RP980A1010/ RP980B1004	CP980A1010/ or CP980B1042		
CP980E1060	None	500 (2.5)	None	—	—	—
	14003642-002	750 (3.8)	Green			CP980E1011
	14003642-003	1500 (7.6)	White			CP980E1029
	14003642-004	2000 (10.2)	Blue			CP980E1037
	14003749-001	2500 (12.7)	Black			CP980E1045
	14003749-002	3500 (17.8)	Gray			CP980E1052
CP980F1068	None	500 (2.5)	None	CP980A1002/	CP980B1026	—
	14003642-002	750 (3.8)	Green	RP980C1002		CP980F1019
	14003642-003	1500 (7.6)	White	CP980A1010/	CP980B1059[a]	CP980F1027
	14003642-004	2000 (10.2)	Blue	RP980C1002[a]		CP980F1035
	14003749-001	2500 (12.7)	Black			CP980F1043
	14003749-002	3500 (17.8)	Gray			CP980F1050

[a] Valid with green (1500 ft/min), red (2500 ft/min), white (3500 ft/min) or blue (4250 ft/min) orifices only.

Pneumatic Velocity Control Accessories and Replacement Parts

Product Number	Description	Used With
14003469-001	Replacement Diaphragm	RP980
14003514-001	Sensor for CP980E Velocitrol Velocity Control	CP980E
14003617-002	Velocitrol Supply Module “B”	CP980; RP980
14003642-002	Orifice Green, Velocity Range 750 ft/min (3.8 m/s)	CP980
14003642-003	Orifice White, Velocity Range 1500 ft/min (7.6 m/s)	CP980
14003642-004	Orifice Blue, Velocity Range 2000 ft/min (10.2 m/s)	CP980
14003749-001	Orifice Black, Velocity Range 2500 ft/min (12.7 m/s)	CP980
14003749-002	Orifice Gray, Velocity Range 3500 ft/min (17.8 m/s)	CP980
14003749-003	Orifice Yellow	CP980
14003882-001	Direct Acting Veloitrol sensor plate assembly including Base plate (14003480-001), Diaphragm (14003504-001), top plate assembly (14003525-002), gasket (14003885-001), valve plate assembly (14003897-001), knob (14003886-001), diaphragm (14003886-001),	CP980E, CP980C
14003931-006	Stainless steel SCCM flow Restriction of 120-160 at 100 kPa	CP980E, CP980C
14004176-001	Air check Valve assembly including Base & pipe assembly (14004126-001), valve cup (14004090-001), Membrane (14004092-001), protective cover (14004091-001), Gasket (14004093-001), and Label (14004177-001)	CP981
14004316-001	Cover Assembly for CP983A.	CP981
315993A	Scaleplate assembly, RP908	RP908
316155A	Cover Assembly, RP908	RP908

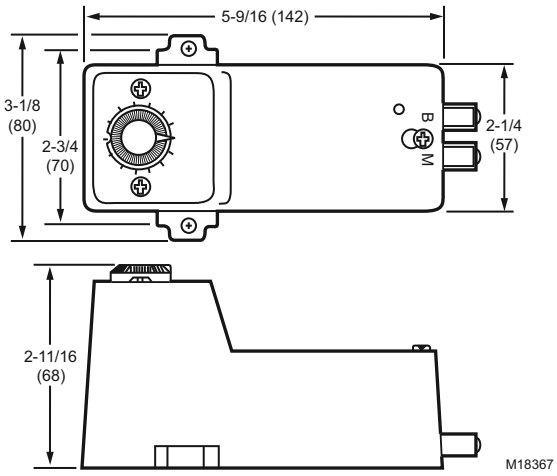
Temperature Controllers

LP920 Remote Bulb Temperature Controllers

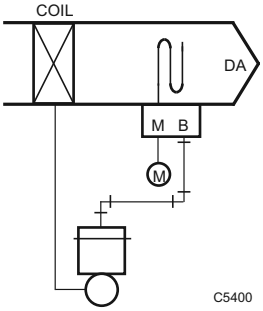
Two-pipe, single temperature, pneumatic temperature controller used to provide proportional control of pneumatic valves and damper actuators in heating and air conditioning systems. Replacement devices are available for Johnson, Powers, Robertshaw, Barber-Colman, and older Honeywell two-pipe pneumatic temperature controller.

- Fahrenheit or Celsius scales for all adjustments.
- Pilot operated for high capacity.
- Direct Acting (DA) and Reverse Acting (RA) models are available.
- Adjustable setpoint and throttling ranges.
- Scales in bold type for high visibility.
- Replaceable filter cartridge.
- Single point or averaging elements.

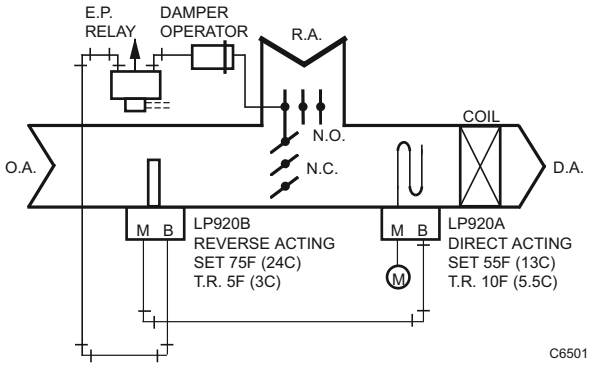
Dimensions in inches (millimeters)



Typical coil discharge control



Typical mixed air control



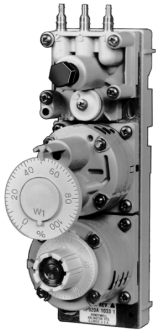
Application: Remote Bulb Temperature
Airflow Usage: 0.011 scfm (5.2 mL/s)
Maximum Operating Temperature: Element: 230 F, Controller: 150 F (Element: 110 C, Controller: 66 C)
Maximum Storage Temperature: 150 F (66 C)
Maximum Operating Pressure: 30 psi (207 kPa)
Throttling Range: Factory set at 10 F with adjustment range of 5 to 25 F (Factory set at 6K with adjustment range of 3 to 15 K)
Remote Bulb Sensor: yes
Comments: Scale plate is reversible for F and C applications

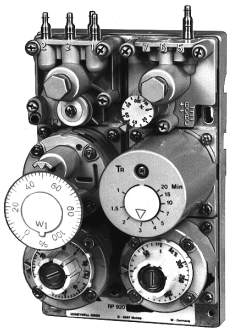
Accessories:
314439 Duct Clip for Averaging Element
315904B 1/2 in. NPT stainless steel Well, 7 5/16 in. (186 mm) long
315046B Well, 1/2 NPT Copper, 7 1/2 in. (191 mm) long

Replacement Parts:
14001865-001 Filter Cartridge Assembly
14002172-001 Gage Tap repair Plug

Product Number	Action	Number of Pipes	Scale Range (F)	Scale Range (C)	Includes
LP920A1005	Direct Acting	2	30 F to 150 F	-1 C to +66 C	8 ft (2.4 m) averaging element for duct mounting
LP920A1013	Direct Acting	2	30 F to 150 F	-1 C to +66 C	3/8 x 5 1/4 in. (10 x 133 mm) bulb with 3 in. (76 mm) capillary, well mount
LP920A1021	Direct Acting	2	30 F to 150 F	-1 C to +66 C	3/8 x 5 1/4 in. (10 x 133 mm) bulb with 10 in. (254 mm) capillary, integral duct mount
LP920A1039	Direct Acting	2	30 F to 150 F	-1 C to +66 C	3/8 x 5 1/4 in. (10 x 133 mm) bulb with 5 ft. (1.5 m) capillary, remote duct mount
LP920B1037	Reverse Acting	2	30 F to 150 F	-1 C to +66 C	3/8 x 5 1/4 in. (10 x 133 mm) bulb with 5 ft. (1.5 m) capillary, remote duct mount

RP920 Pneumatic Controller

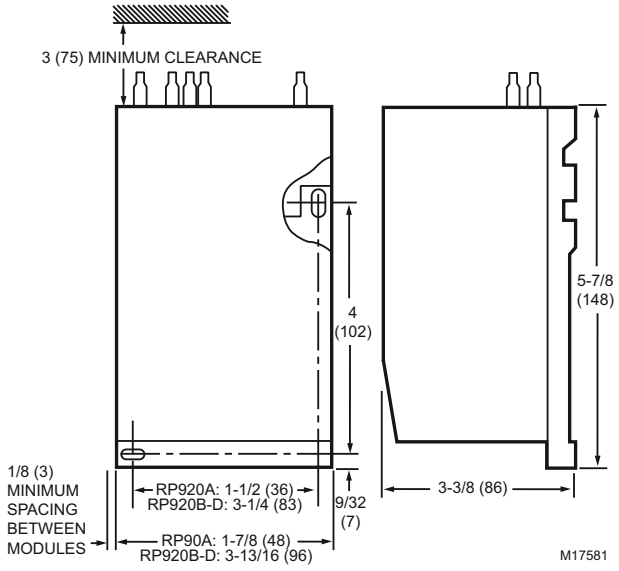




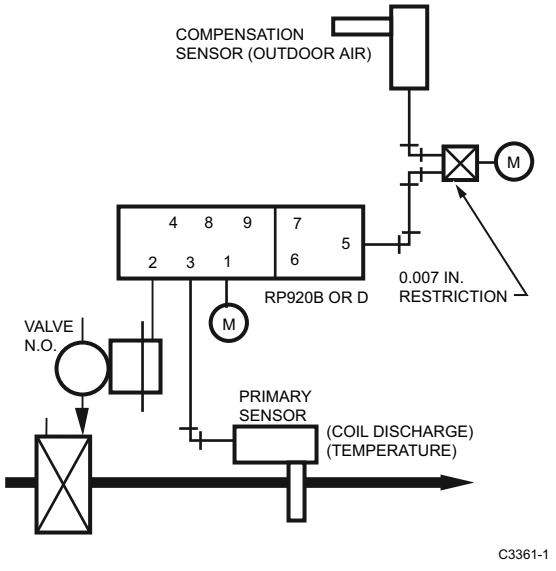
Proportional, high capacity, single or dual input pneumatic controller used in conjunction with remote sensors to provide proportional (P) or proportional plus integral (P+I) control of temperature, humidity, pressure, or dewpoint for heating and air conditioning systems. Replacement devices are available for Johnson, Powers, Robertshaw, Barber-Colman, and older Honeywell controllers.

- Proportional plus integral control option minimizes offset.
- Miniature diaphragm technology provides high degree of accuracy and reliability.
- Direct Acting models can be converted to Reverse Acting (RA) function in field.
- Field adjustable compensation start point.
- Local or remote setpoint field option. Integral action cut-off provides trouble-free automatic startup.
- Transparent cover (optional) provides protection while allowing easy reading of settings and gages.
- Corrosion resistant construction.

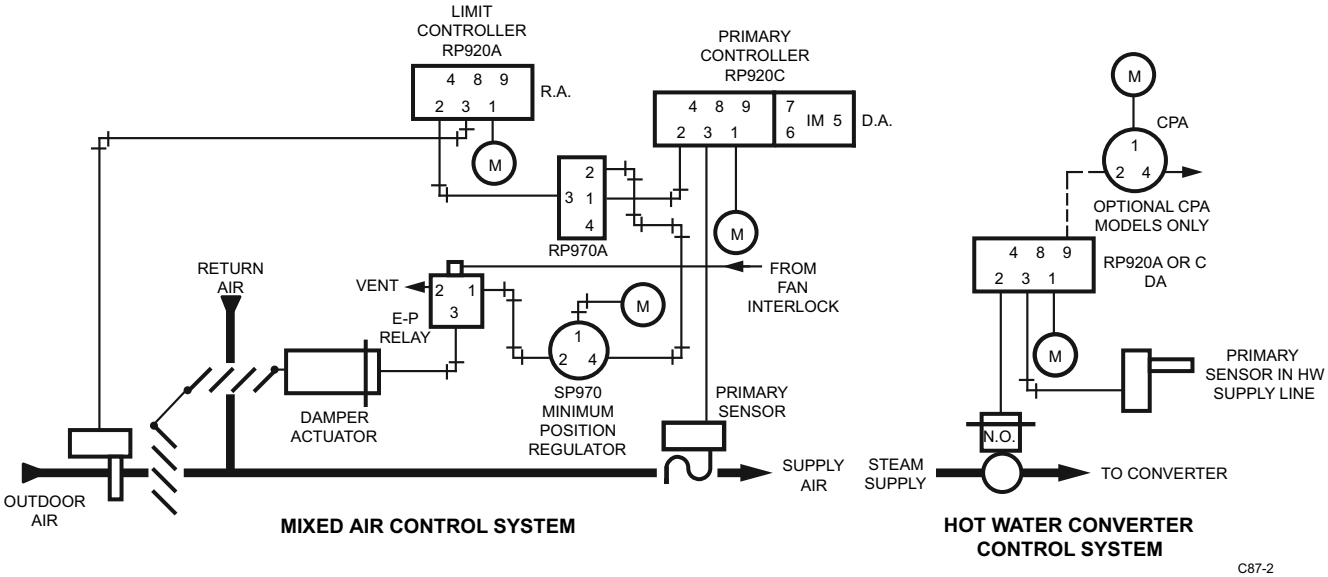
Dimensions in inches (millimeters)



Typical Dual-Input Control System



Typical Single-Input Control System



Temperature Controllers

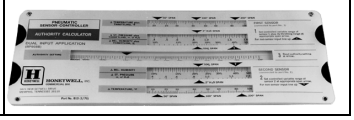
Airflow Usage: 0.07 scfm (33.0 mL/s) with 1 psi (7kPa) pressure drop at 18 psi (124 kPa) main air supply
Connections: Air: Combination 5/32 in. by 1/4 in. barb. Optional accessory 14003755-001 (barb fitting for port 4,6,7, or 8 for all RP920).
Input Signal: 3 to 15 psi (21 to 103 kPa)
Maximum Operating Temperature: 130 F (54 C)
Temperature Range: 40 F to 130 F (5 C to 55 C)
Maximum Operating Pressure: 30 psi (207 kPa)
Humidity Ratings: 5 to 95% RH
Remote Bulb Sensor: no
Remote Control Point Adjustment: Yes
Comments: All RP920s can be converted to reverse acting in the field. For additional technical information see literature Form no. 85-0224 and 95-7392EF.

Accessories:
14000786-001 Receiver Gauge, 25 F-125 F scale, 1 1/2 in. diameter, 1/8 in. NPT connection
14000786-003 Receiver Gauge, 15 to 75% RH scale, 1 1/2 in. diameter, 1/8 in. NPT connection
14000786-004 Receiver Gauge, 65 to 95% RH scale, 1 1/2 in. diameter, 1/8 in. NPT connection
14000786-005 Receiver Gauge, 15 to 85% RH scale, 1 1/2 in. diameter, 1/8 in. NPT connection
14000786-002 Receiver Gauge, -5 to 55 C scale, 1 1/2 in. diameter, 1/8 in. NPT connection
14004267-001 Temperature and Humidity scaleplate insert for setpoint knob for all RP920
14004322-001 DIN Rail Mount
14505694-003 13 3/4 inch (350 mm) long mounting rail for RP920
14505694-004 17 3/4 inch (450 mm) long mounting rail for RP920
43188057-010 Clear plastic cover for all RP920A pneumatic controllers
43188123-010 Clear plastic cover for all RP920B, RP920C, RP920D pneumatic controllers
305616 1-1/2 in. diameter, 1/8 NPT center stem back mount Receiver gauge (0 to 2 in. w.c. scale) with +/- 2% accuracy
305965 1-1/2 in. diameter, 1/8 NPT center stem back mount Pressure Indicating gauge (0 to 30 psi scale) with +/- 4% accuracy
305929 1-1/2 in. diameter, 1/8 NPT center back stem mount Receiver gauge (-40 to +160 F scale) with +/- 2% accuracy
305930 1-1/2 in. diameter, 1/8 NPT center back stem mount Receiver gauge (0 to 200 F scale) with +/- 2% accuracy
305931 1-1/2 in. diameter, 1/8 NPT center back stem mount Receiver gauge (40 to 240 F scale) with +/- 2% accuracy
305972 Receiver gauge, 1-1/2 in. 1/8 NPT center back, temperature 50 to 100F
305986 Receiver Gauge. -20 to 80 F scale 1-1/2 in. diameter,1/2 NPT connection

Replacement Parts:
14004277-003 Setpoint module with gasket with CPA for RP920
14004278-002 Compensation module with gasket for RP920B and RP920D
14004533-001 Connector block with gasket and CPA for RP920
14003757-001 Seal screw for port 8 and O-ring repair parts for RP920
43915905-110 O-ring for filter in RP920
43188059-001 Setpoint knob for all RP920 pneumatic controllers
14002172-001 Gage Tap repair Plug
14001865-001 Filter Cartridge Assembly

Product Number	Application	Action	Capacity	Number of Sensors	Output Pressure Range		Includes
					(psi)	(kPa)	
RP920A1025	Proportional pneumatic controller	Direct Acting	at 18 psi (124 kPa) MLP and 8.5 psi (59 kPa) BLP (does not include sensor usage): 0.021 scfm (10 mL/s)	single	3 to 13 psi, output signal maximum is Mainline Pressure minus 1/2 psi	21 to 90 psi, output signal maximum is Mainline Pressure minus 7 kPa	With remote control point adjustment capability.
RP920A1033	Proportional pneumatic controller	Direct Acting	at 18 psi (124 kPa) MLP and 8.5 psi (59 kPa) BLP (does not include sensor usage): 0.021 scfm (10 mL/s)	single	3 to 13 psi, output signal maximum is Mainline Pressure minus 1/2 psi	21 to 90 psi, output signal maximum is Mainline Pressure minus 7 kPa	Without remote control point adjustment capability.
RP920B1023	Proportional pneumatic controller	Direct Acting	at 18 psi (124 kPa) MLP and 8.5 psi (59 kPa) BLP (does not include sensor usage): 0.046 scfm (21.7 mL/s)	dual	3 to 13 psi, output signal maximum is Mainline Pressure minus 1/2 psi	21 to 90 psi, output signal maximum is Mainline Pressure minus 7 kPa	With remote control point adjustment capability.
RP920B1031	Proportional pneumatic controller	Direct Acting	at 18 psi (124 kPa) MLP and 8.5 psi (59 kPa) BLP (does not include sensor usage): 0.046 scfm (21.7 mL/s)	dual	3 to 13 psi, output signal maximum is Mainline Pressure minus 1/2 psi	21 to 90 psi, output signal maximum is Mainline Pressure minus 7 kPa	Without remote control point adjustment capability.
RP920C1021	Proportional plus integral pneumatic controller	Direct Acting	at 18 psi (124 kPa) MLP and 8.5 psi (59 kPa) BLP (does not include sensor usage): 0.021 scfm (10 mL/s)	single	3 to 13 psi, output signal maximum is Mainline Pressure minus 1/2 psi	21 to 90 psi, output signal maximum is Mainline Pressure minus 7 kPa	With remote control point adjustment capability.
RP920C1039	Proportional plus integral pneumatic controller	Direct Acting	at 18 psi (124 kPa) MLP and 8.5 psi (59 kPa) BLP (does not include sensor usage): 0.021 scfm (10 mL/s)	single	3 to 13 psi, output signal maximum is Mainline Pressure minus 1/2 psi	21 to 90 psi, output signal maximum is Mainline Pressure minus 7 kPa	Without remote control point adjustment capability.
RP920D1029	Proportional plus integral pneumatic controller	Direct Acting	at 18 psi (124 kPa) MLP and 8.5 psi (59 kPa) BLP (does not include sensor usage): 0.046 scfm (21.7 mL/s)	dual	3 to 13 psi, output signal maximum is Mainline Pressure minus 1/2 psi	21 to 90 psi, output signal maximum is Mainline Pressure minus 7 kPa	With remote control point adjustment capability.

Pneumatic Temperature Controller Accessories

Product Number	Description	Used With	
14000786-001	Receiver Gauge, 25 F-125 F scale, 1 1/2 in. diameter, 1/8 in. NPT connection	RP920;	
14000786-002	Receiver Gauge, -5 to 55 C scale, 1 1/2 in. diameter, 1/8 in. NPT connection	RP920;	
14000786-003	Receiver Gauge, 15 to 75% RH scale, 1 1/2 in. diameter, 1/8 in. NPT connection	RP920;	
14000786-004	Receiver Gauge, 65 to 95% RH scale, 1 1/2 in. diameter, 1/8 in. NPT connection	RP920;	
14000786-005	Receiver Gauge, 15 to 85% RH scale, 1 1/2 in. diameter, 1/8 in. NPT connection	RP920;	
14002696-001	Repair kit including filters, screens, washers, gaskets, O-rings, and restrictors for RP908A and RP908B controllers	RP908;	
14004278-002	Compensation module with gasket for RP920B and RP920D	RP920;	
14004322-001	DIN Rail Mount	RP920;	
14505694-003	13 3/4 inch (350 mm) long mounting rail for RP920	RP920;	
14505694-004	17 3/4 inch (450 mm) long mounting rail for RP920	RP920;	
305616	1-1/2 in. diameter, 1/8 NPT center stem back mount Receiver gauge (0 to 2 in. w.c. scale) with +/- 2% accuracy	RP920;	
305617	1-1/2 in. diameter, 1/8 NPT center stem back mount Receiver gauge (1.0 to 3.0 in. w.c. scale) with +/- 2% accuracy	RP920;	
305929	1-1/2 in. diameter, 1/8 NPT center back stem mount Receiver gauge (-40 to +160 F scale) with +/- 2% accuracy	RP920;	
305930	1-1/2 in. diameter, 1/8 NPT center back stem mount Receiver gauge (0 to 200 F scale) with +/- 2% accuracy	RP920;	
305931	1-1/2 in. diameter, 1/8 NPT center back stem mount Receiver gauge (40 to 240 F scale) with +/- 2% accuracy	RP920;	
305965	1-1/2 in. diameter, 1/8 NPT center stem back mount Pressure Indicating gauge (0 to 30 psi scale) with +/- 4% accuracy	RP920;	
305972	Receiver gauge, 1-1/2 in. 1/8 NPT center back, temperature 50 to 100F	RP920;	
43188057-010	Clear plastic cover for all RP920A pneumatic controllers	RP920;	
43188123-010	Clear plastic cover for all RP920B, RP920C, RP920D pneumatic controllers	RP920;	
CCT813	Slide Rule for Calculating Pneumatic Controller Settings for all RP908 and RP920's.	RP908; RP920;	

Pneumatic Temperature Controller Replacement Parts

Product Number	Description	Used With
14003757-001	Seal screw for port 8 and O-ring repair parts for RP920	RP920;
14004277-003	Setpoint module with gasket with CPA for RP920	RP920;
14004286-002	Zinc plated metric machine screw, M3x0.5., 19 min., 26 - 0.8	RP920;
14004533-001	Connector block with gasket and CPA for RP920	RP920;
43188059-001	Setpoint knob for all RP920 pneumatic controllers	RP920;
43915905-110	O-ring for filter in RP920	RP920;

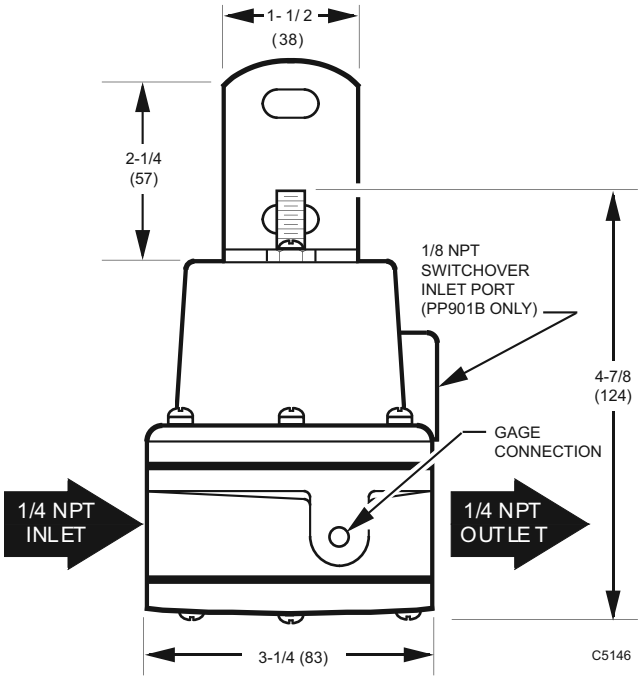
Pressure Controllers

PP901; PP902 Pressure Reducing Valves

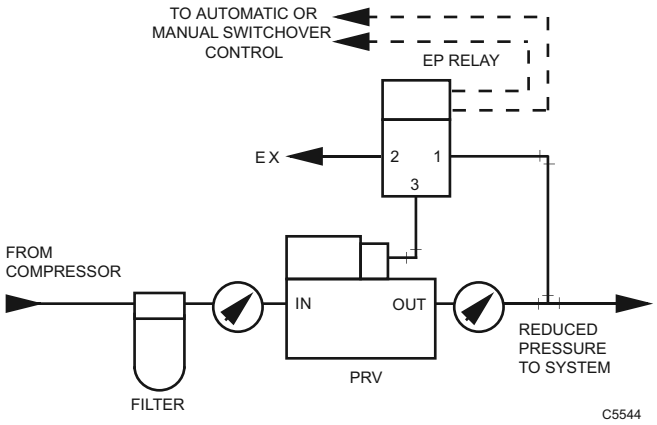
Used to control the pressure of the air delivered to pneumatic control systems. Models available for single-pressure systems or two-pressure systems (Day/Night or Summer/Winter) requiring two independently regulated pressure settings. Dual-pressure units switch from the lower settings to the higher settings when main air is applied to the pilot port. Models also available including a sub-micron filter assembly and pressure gauges. Replacement devices are available for Johnson, Powers, Robertshaw, Barber-Colman and older Honeywell pressure reducing valves.

- Built-in adjustable safety relief valve for limiting downstream pressure.
- For two-pressure models: Pressure changes accomplished with manual switch or automatically with electric pneumatic switch.
- Adjustable stops for desired settings.

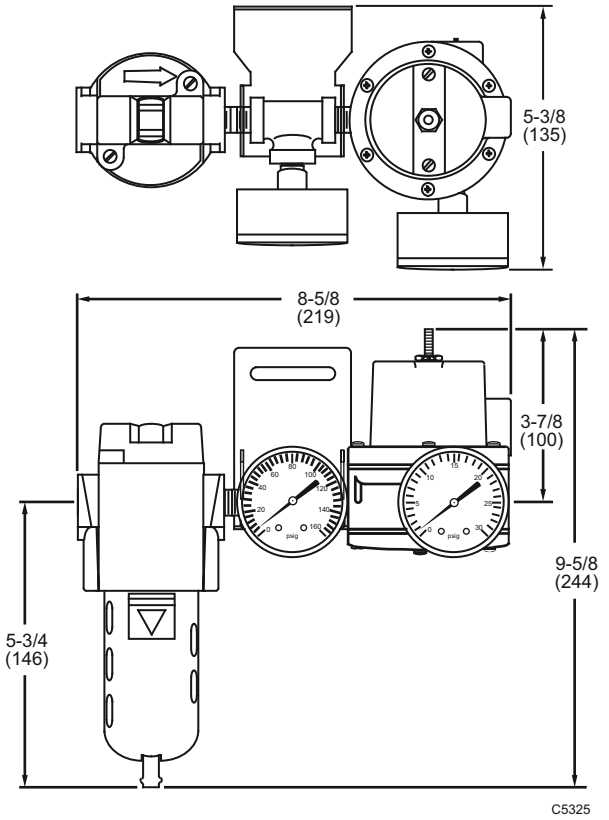
Dimensions in inches (millimeters)



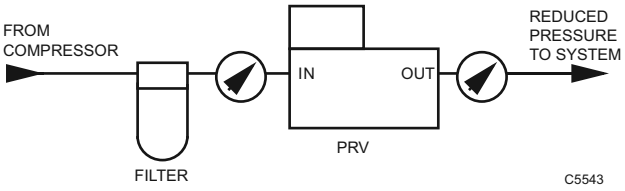
PP902D Typical Operation



Dimensions in inches (millimeters)



PP902C Typical Operation



Application Type: Pressure Reducing
Connection Size: Inlet and out air: 1/4 in. NPT (female) Air gage: 1/8 in. NPT (female)
Mounting: Bracket furnished

Accessories:
305917 2 in. diameter, 1/4 NPT center stem back mount Pressure Indicating gauge (0 to 160 psi scale) with +/- 3% accuracy
305965 1-1/2 in. diameter, 1/8 NPT center stem back mount Pressure Indicating gauge (0 to 30 psi scale) with +/- 4% accuracy
804191E 2-1/2 in. diameter, panel-mounted Pneumatic Pressure Indicating Gauge (0 to 160 psi), 1/8 in. NPT connection, +/-3% accuracy

Replacement Parts:
14003121-002 Filter for PP902A or B
14004203-001 Filter cartridge kit for PP902C and PP902D.
14004205-002 Filter Station Assembly for PP901, PP902A or B
316134B PP901A & B Diaphragm Repair Kit
316203A Pressure Regulator Valve Assembly, PP901A & PP901B, PP902A,B.

Product Number	Inlet Pressure Range (psi)	Inlet Pressure Range (kPa)	Output Pressure Range (psi)	Output Pressure Range (kPa)	Includes	Description
PP901A1004	45 to 150 psi	310 to 1034 kPa	primary pressure: adj.0 to 25 psi.	primary pressure: adj.0 to 172 kPa.	Gage tapping to measure the regulated pressure.	High Pressure Diaphragm Operated Reducing Valve with Built-in Adjustable Relief Valve for Single Pressure Systems. Includes Mounting Bracket and Gage Taps But No Gages.
PP901B1002	45 to 150 psi	310 to 1034 kPa	primary pressure: adj.0 to 25 psi; secondary pressure: adj. 0 to 5 psi above primary rating	primary pressure: adj.0 to 172 kPa; secondary pressure: adj. 0 to 34kPa above primary setting.	Gage tapping to measure the regulated pressure.	High Pressure Diaphragm Operated Reducing Valve with Built-in Adjustable Relief Valve for Dual Pressure Systems. Includes Mounting Bracket and Gage Taps But No Gages.
PP902C1009	45 to 150 psi	310 to 1034 kPa	primary pressure: adj.0 to 25 psi	primary pressure: adj.0 to 172 kPa.	Sub-micron filter assembly and two psig gages.	Pressure Reducing Valve for Single Pressure Systems, consists of a PP901A Valve, a sub-micron filter station, 2 psig gages, Interconnecting Pipe Fittings, and a Mounting Bracket
PP902D1007	45 to 150 psi	310 to 1034 kPa	primary pressure: adj.0 to 25 psi; secondary pressure: adj. 0 to 5 psi above primary rating	primary pressure: adj.0 to 172 kPa; secondary pressure: adj. 0 to 34kPa above primary setting.	Sub-micron filter assembly and two psig gages.	Pressure Reducing Valve for Dual Pressure Systems, consists of a PP901B Valve, a sub-micron filter station, 2 psig gages, Interconnecting Pipe Fittings, and a Mounting Bracket

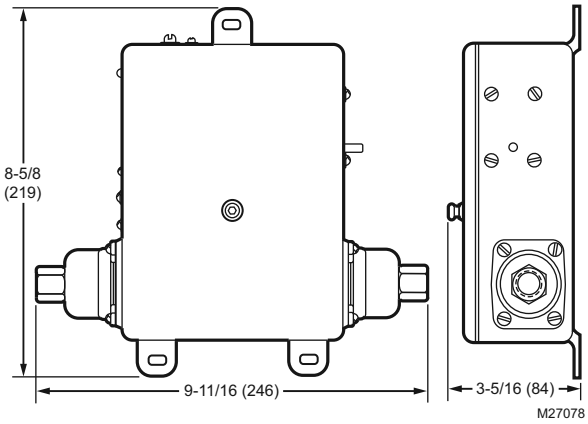
Pressure Controllers

PP903 Pneumatic Differential Pressuretrol

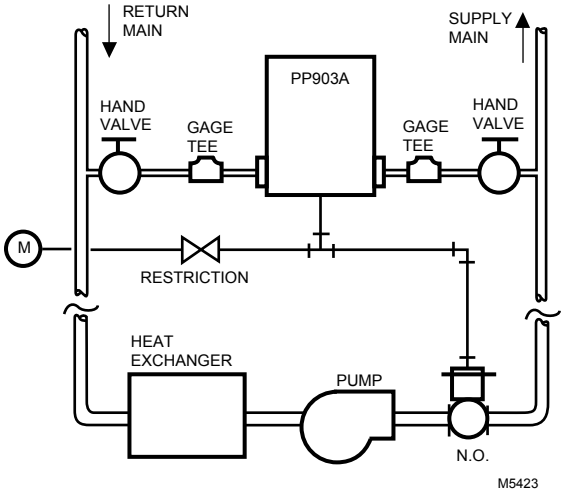
One-pipe, pressure operated device used to provide proportional control of pneumatic valve or damper actuators by varying the pressure to the actuators in relation to the pressure difference between two separate water pressures. Replacement devices are available for Johnson, Powers, Robertshaw, and older Honeywell pneumatic pressure controllers.

- Easily accessible adjustments.
- Direct Acting (DA) or Reverse Acting (RA) setting.
- Mounting lugs for quick mounting.

Dimensions in inches (millimeters)



PP903A Typical Piping



Application Type: Differential Pressure
Connection Size: Input: 1/4 in. NPT; Branchline: 1/8 in. NPT
Approximate Throttling Range, Midscale (max.): 25 psi (172 kPa)

Pressure Range: 0 to 300 psi (0 to 2068 kPa)
Mounting: Lugs for 3-point surface mounting

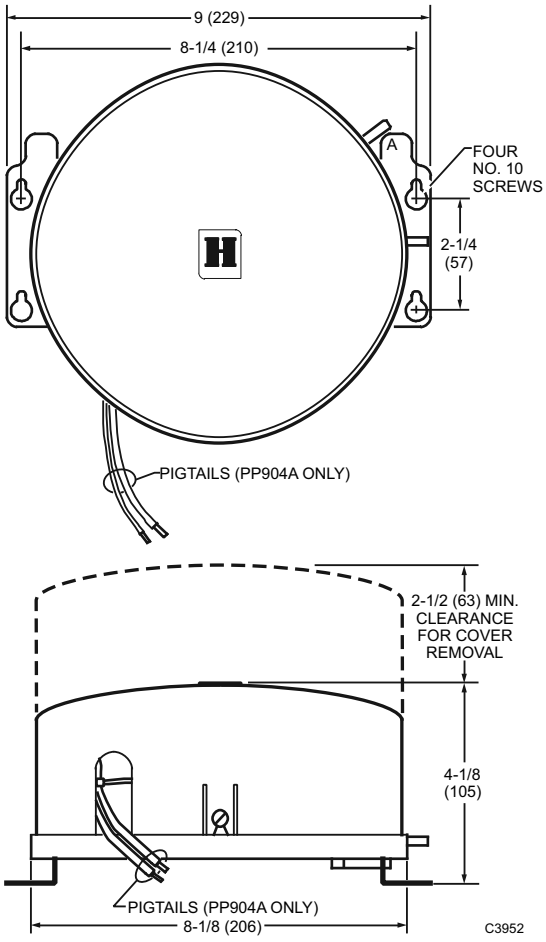
Product Number	Action	Actuator Force		Maximum Safe Operating Pressure		Differential Pressure Range	
		(psi)	(kPa)	(psi)	(kPa)	(psi)	(kPa)
PP903A1036	Reverse Acting, Direct Acting	7.5 psi	52 kPa	18 psi	124 kPa	5 to 65 psi	34 to 448 kPa

PP904 Static Pressure Regulators

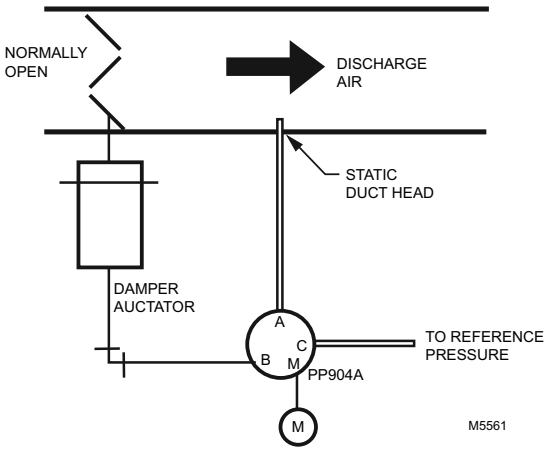
One- or two-pipe, direct- or reverse-acting, low- or high-capacity controller used with pneumatic actuators to regulate static or differential pressure in central fan installations. Replacement devices are available for Johnson, Powers, Robertshaw, Barber-Colman, and older Honeywell devices.

- Adjustable setpoint and throttling range (Zero and span).
- Direct Acting (DA) and Reverse Acting (RA).
- Sharp-barb, push-on connectors for plastic tubing.
- Field calibration possible.

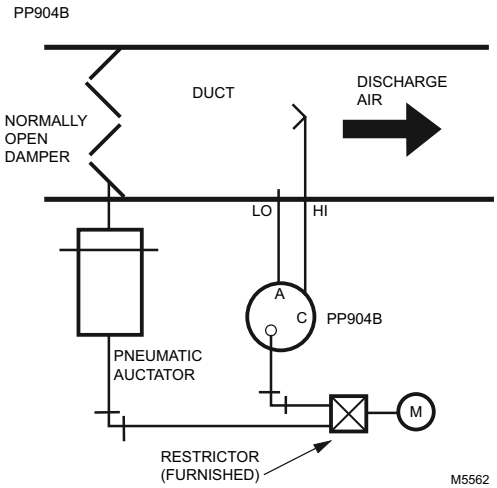
Dimensions in inches (millimeters)



PP904A Typical Piping



PP904B Typical Piping



Application Type: Static or Differential Pressure
Airflow Usage: 0.022 scfm (10.0 mL/s) at 18 psi (124 kPa)
Connections: Main: Sharp-barbed fittings for 1/4 in. diameter tubing; Branch: Sharp-barbed fittings for 5/32 in. diameter tubing
Mainline Air Pressure (min.): 16 psi (112 kPa)
Mainline Air Pressure (max.): 25 psi (175 kPa)
Maximum Safe Static Pressure: 28 in. wc (7 kPa)
Maximum Safe Operating Pressure: 25 psi (170 kPa)

Mounting: Duct mount
Temperature Range: 40 F to 120 F (5 C to 50 C)

Accessories:
14004238-001 Static Pressure Duct Head for 1/4 in., 6 mm diameter Plastic Tubing
301298B Outdoor Static Pressure Head

Product Number	Action	Number of Pipes	Setpoint Range (in. wc)	Setpoint Range (kPa)	Throttling Range (in. wc)	Comments
PP904A1035	Reverse Acting, Direct Acting	2	0 to +/-8 in. wc (adjustable)	0 to +/-2 kPa (adjustable)	0.03 to 0.5 in wc (adjustable)	High capacity branchline pressure
PP904B1009	Reverse Acting, Direct Acting	1	0 to +/-8 in. wc (adjustable)	0 to +/-2 kPa (adjustable)	0.06 to 0.5 in. wc (adjustable)	Low capacity branchline pressure

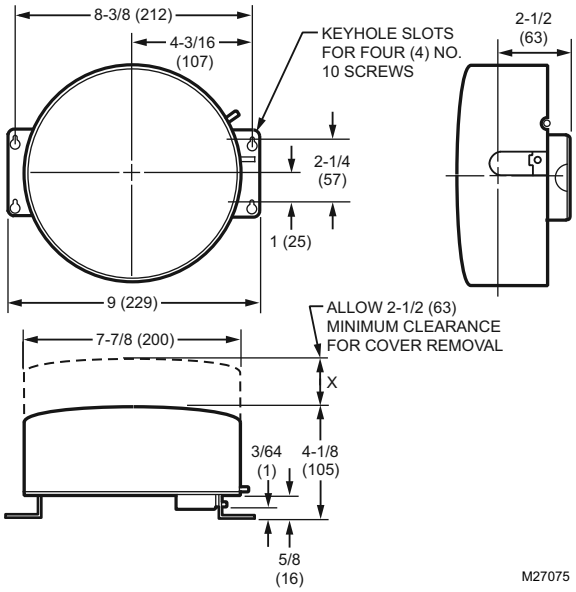
Pressure Controllers

PP905 Static Pressure Sensor

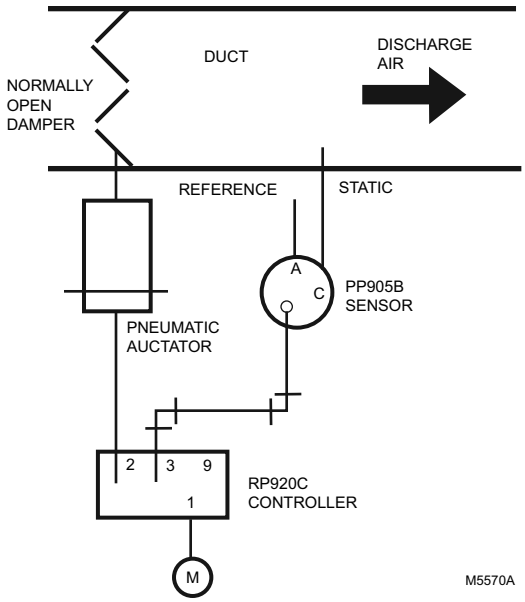
One-pipe, direct-or reverse-acting pressure sensor used with RP908/RP920 Controllers to provide control of duct static, velocity, or differential pressure in airflow applications. Replacement devices available for Johnson, Powers, Robertshaw, Barber-Colman, and older Honeywell devices.

- Three-diaphragm design minimizes calibration shift with static pressure changes in velocity pressure applications.
- Not sensitive to normal supply air variations.
- Continuous static, total, velocity, or differential pressure indication available by using differential pressure gage.

Dimensions in inches (millimeters)



PP905 in Pneumatic Static Pressure Application



Application Type: Static Pressure
Airflow Usage: 0.021 cfm (9.9 ml/s)
Connections: Push-on barb for 1/4 in (6 mm) Diameter tubing
Mainline Air Pressure (min.): 16 psi (112 kPa)
Mainline Air Pressure (max.): 25 psi (175 kPa)
Maximum Safe Static Pressure: 28 in. wc (7 kPa)
Maximum Safe Operating Pressure: 25 psi (172 kPa)

Pressure Range: 2 in. wc (0.5 kPa)
Mounting: Duct mount
Temperature Range: 40 F to 120 F (4 C to 50 C)

Accessories:
14004238-001 Static Pressure Duct Head for 1/4 in., 6 mm diameter Plastic Tubing

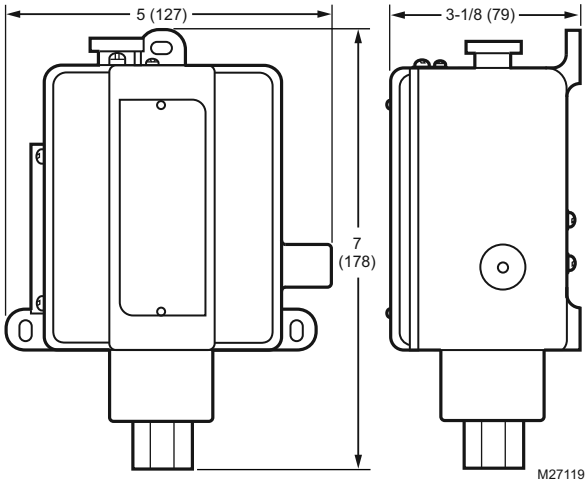
Product Number	Action	Output Pressure Range (psi)	Output Pressure Range (kPa)	Setpoint Range (in. wc)	Setpoint Range (kPa)	Span (Non-Adjustable) (in. wc)	Span (Non-Adjustable) (kPa)	Comments
PP905B1008	Can be set for Direct Acting or Reverse Acting	3 psi to 15 psi	21 kPa to 103 kPa	0 in. wc. to 7 in. wc. (Adjustable)	0 kPa to 1.7 kPa (Adjustable)	2 in. wc.	0.5 kPa	The setpoint determines the midpoint of the span.

PP97 Pneumatic Pressure Control

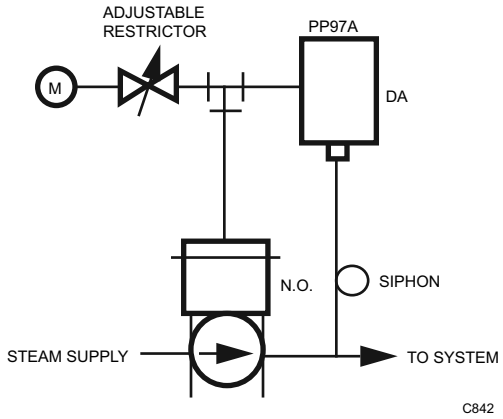
One-pipe, pressure operated device that provides proportional control of pneumatic valves to control steam, air, noncorrosive gas, or noncorrosive liquid pressure. Replacement devices are available for Johnson, Powers, Robertshaw, and older Honeywell pneumatic pressure controllers.

- Easily accessible adjustments.
- Direct Acting (DA) or Reverse Acting (RA) setting.

Dimensions in inches (millimeters)



PP97A Typical Piping



Application Type: Proportional Pressure
Connection Size: Bellows: 1/4 in., NPT; Air: 1/8 in. NPT
Approximate Throttling Range, Midscale (max.): 1.5 psi (10 kPa)
Approximate Throttling Range, Midscale (min.): 0.1 psi (0.7 kPa)
Mounting: Lugs for 3-point surface mounting

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Product Number	Action	Setpoint Range (psi)	Setpoint Range (kPa)	Maximum Safe Operating Pressure (psi)	Maximum Safe Operating Pressure (kPa)	Maximum Allowable pressure (psi)	Maximum Allowable pressure (kPa)	Description
PP97A1035	Reverse Acting, Direct Acting	0 to 15 psi	0 to 103 kPa	25 psi	172 kPa	25 psi	172 kPa	Pneumatic Pressure Controller, Proportional Pressure, Action: Direct or Reverse, Output: Proportional Pressure, 0 to 15 psi pressure range
PP97A1076	Reverse Acting, Direct Acting	10 to 300 psi	69 to 2068 kPa	350 psi	2413 kPa	350 psi	2413 kPa	Pneumatic Pressure Controller, Proportional Pressure, Action: Direct or Reverse, Output: Proportional Pressure, 10 to 300 psi pressure range

Pressure Controllers

UEC24014 Differential Pressure Switch

Differential pressure switches open or close a switch contact in response to a change in sensed differential pressure.

- NEMA Enclosures.
- UL and CSA Listed.
- Gold Clad Contacts.
- Brass Pipe Connection.
- Pipe or Surface Mount.

Dimensions, Approximate: 3 1/2 in. high x 2 3/8 in. wide (89 mm high x 58 mm wide)
Connection Size: Pipe connection: Brass, 1/4 in. NPT
Electric connection: terminal strip, 16 AWG max.
Pressure Range: 150 psi at either port (1034 kPa at either port)
Mounting: Pipe or surface

Temperature Range: 30 F to 160 F (-1 C to +71 C)
Approvals:
Canadian Standards Association: Approved
Factory Mutual: Approved
NEMA Standard: NEMA 1
Underwriters Laboratories, Inc. Certified

Product Number	Differential Pressure Range (psi)	Differential Pressure Range (kPa)	Description
UEC24014M262	4 to 45 psi	28 to 310 kPa	Pneumatic, Type of control: Pneumatic, NEMA 1, 150 psi at either end
UEC24014M262M900	4 to 45 psi	28 to 310 kPa	Pneumatic, Type of control: Pneumatic, NEMA 4, 150 psi at either end

Pneumatic Pressure Controller Accessories and Replacement Parts

Product Number	Description	Used With
14003121-002	Filter for PP902A or B	PP902A,B
14004203-001	Filter cartridge kit for PP902C and PP902D.	PP902C,D
14004205-002	Filter Station Assembly for PP901, PP902A or B	PP901; PP902A,B
14004238-001	Static Pressure Duct Head for 1/4 in., 6 mm diameter Plastic Tubing	PP904
301298B	Outdoor Static Pressure Head	PP904

Sensors

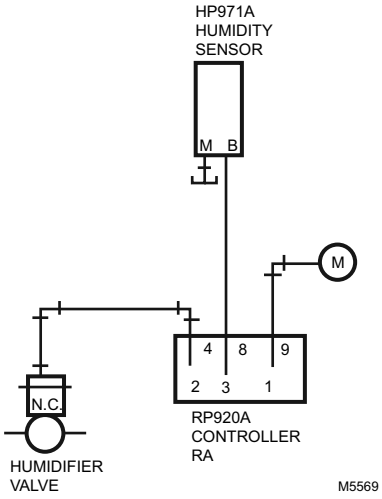
Humidity Sensors

HP971 Pneumatic Humidity Sensor

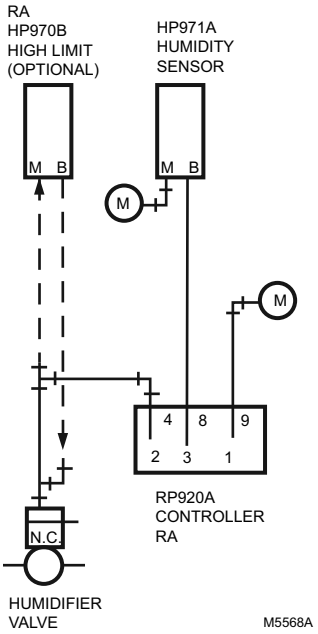
One- or two-pipe, direct-acting humidity sensor used with RP908/ RP920 Controllers to provide proportional control of pneumatic valve or damper actuators in systems requiring humidification or dehumidification control.

- Corrosion resistant materials.
- Simple plug-in air head connections.
- Factory calibrated.
- Continuous relative humidity indication available by using receiver gage.
- Integral or external restriction can be used.

HP971A One-Pipe Application



HP971A Two-Pipe Application



Application Type: Humidity Sensor
Dimensions, Approximate: 3 1/4 in. high x 2 in. wide x 1 5/8 in. deep (88 mm high x 51 mm wide x 41 mm deep)
Action: Direct Acting
Airflow Usage: 0.022 scfm (10.4 mL/s)

Connections: Push-on barb for 5/32 in. (4 mm) O.D. tubing
Maximum Operating Temperature: 125 F (52 C)
Maximum Operating Pressure: 25 psi (172 kPa)
Output Pressure Range: 3 psi to 15 psi (21 kPa to 103 kPa)
Supply Pressure: 16-21 psi (110-145 kPa)

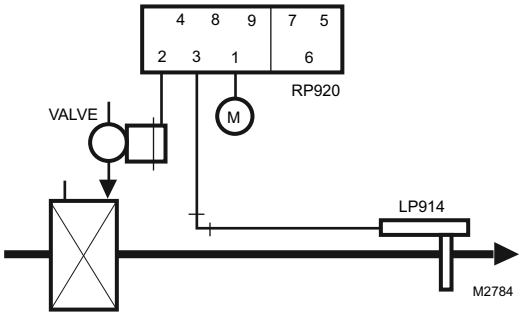
Product Number	Number of Pipes	Sensor Range	Mounting	Description	Comments
HP971A1008	1 or 2	15 to 75% RH	Vertical or Horizontal Wall Mounting or Mounted in Duct Sampling Chamber	Pneumatic Humidity Sensor, 15 to 75% RH range	Order Cover Separately
HP971A1024	1 or 2	15 to 85% RH	Vertical or Horizontal Wall Mounting or Mounted in Duct Sampling Chamber	Pneumatic Humidity Sensor, 15 to 85% RH range	Order Cover Separately

LP914 Pneumatic Temperature Sensor

One-pipe, direct-acting temperature sensor used with RP908/ RP920 Controllers to provide proportional control of pneumatic valve or damper actuators. Rod and tube insertion element for duct, well, or through-the-wall mounting.

- Corrosion resistant.
- Continuous temperature indication available by using receiver gage.

LP914 Typical Piping Duct-Mounted Applications



Application Type: Temperature Sensor
Dimensions, Approximate: Body: 2 in. high x 2 1/2 in. wide (Body: 51 mm high x 64 mm wide)
Action: Direct Acting
Airflow Usage: 0.019 scfm (540 sccm)
Connections: Push-on barb for 5/32 in. (4 mm) and 1/4 in. (6 mm) O.D. tubing
Maximum Operating Temperature: 265 F (129 C)
Maximum Operating Pressure: 25 psi (172 kPa)
Output Pressure Range: 3 psi to 15 psi (21 kPa to 103 kPa)
Supply Pressure: 18 psi (124 kPa)

Accessories:
315046A Well, 1/2 NPT Copper, 15 1/2 in. (392 mm) long
315046B Well, 1/2 NPT Copper, 7 1/2 in. (191 mm) long
315904A Well, 1/2 NPT Stainless Steel, 15 7/16 in., 394 mm
315904B 1/2 in. NPT stainless steel Well, 7 5/16 in. (186 mm) long
311085/0107 Sunshield for LP914A1011

Replacement Parts:
14004664-001 0.36 inch diameter Wool felt filter
315602 Inner Filter

Product Number	Number of Pipes	Sensor Element	Element Length		Temperature Sensing Range		Mounting
			(in.)	(mm)	(F)	(C)	
LP914A1003	1	Rod and tube	15 in.	381 mm	-40 F to +160 F	-40 C to +71 C	Duct mount
LP914A1011	1	Rod and tube	27 in.	686 mm	-40 F to +160 F	-40 C to +71 C	Wall
LP914A1029	1	Rod and tube	15 in.	381 mm	40 F to 240 F	5 C to 115 C	Well
LP914A1045	1	Rod and tube	7 in.	178 mm	-40 F to +160 F	-40 C to +71 C	Duct mount
LP914A1052	1	Rod and tube	7 in.	178 mm	40 F to 240 F	5 C to 115 C	Well
LP914A1060	1	Rod and tube	7 in.	178 mm	-40 F to +160 F	-40 C to +71 C	Well
LP914A1144	1	Rod and tube	15 in.	381 mm	25 F to 125 F	-4 C to +52 C	Duct mount
LP914A1151	1	Rod and tube	15 in.	381 mm	-40 F to +160 F	-40 C to +71 C	Duct mount
LP914A1177	1	Rod and tube	15 in.	381 mm	40 F to 240 F	5 C to 115 C	Well
LP914A1193	1	Rod and tube	6 1/2 in.	165 mm	-40 F to +160 F	-40 C to +71 C	Duct mount
LP914A1201	1	Rod and tube	6 1/2 in.	165 mm	40 F to 240 F	5 C to 115 C	Well
LP914A1235	1	Rod and tube	15 in.	381 mm	25 F to 125 F	-4 C to +52 C	Duct mount
LP914A1268	1	Rod and tube	15 in.	381 mm	40 F to 240 F	5 C to 115 C	Duct or Well mount

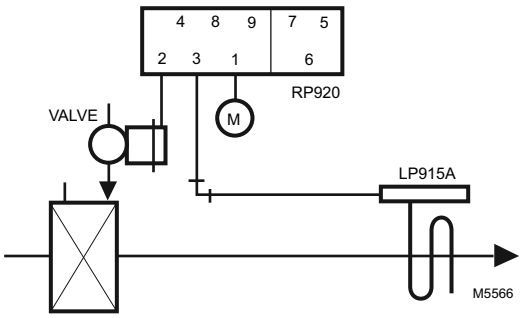
Temperature Sensors

LP915 Pneumatic Temperature Sensor

One-pipe, direct-acting temperature sensor used with RP908/ RP920 Controllers to provide proportional control of pneumatic valve or damper actuators. Averaging, liquid-filled element for duct mounting.

- Easily formed into variety of configurations to assure sensing of average temperatures.
- Continuous temperature indication available by using receiver gage.

LP915A Typical Piping Duct-Mounted Application



Application Type: Temperature Sensor
Dimensions, Approximate: 3 in. high x 1 7/8 in. wide x 1 1/2 in. deep (76 mm high x 44 mm wide x 33 mm deep)
Action: Direct Acting
Airflow Usage: 0.019 scfm (540 sccm)
Connections: Push-on barb for 5/32 in. (4 mm) and 1/4 in. (6 mm) O.D. tubing
Maximum Operating Temperature: 225 F (118 C)
Maximum Operating Pressure: 25 psi (172 kPa)
Output Pressure Range: 3 psi to 15 psi (21 kPa to 103 kPa)
Supply Pressure: 18 psi (124 kPa)

Accessories:
314439 Duct Mounting Clip for Averaging capillary

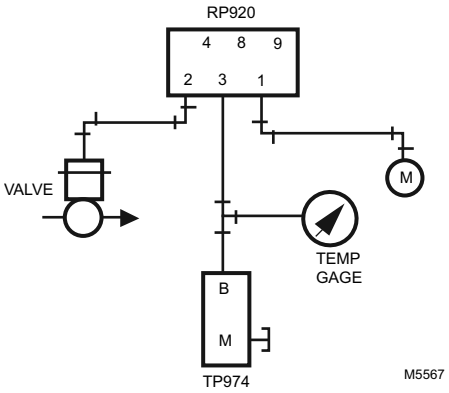
Product Number	Number of Pipes	Sensor Element	Element Length		Temperature Sensing Range		Mounting
			(ft)	(m)	(F)	(C)	
LP915A1044	1	Liquid-filled	18 1/2 ft	5.6m	0 F to 200 F	-18 C to +93 C	Duct mount
LP915A1051	1	Liquid-filled	8 7/8 ft	2.7m	0 F to 200 F	-18 C to +93 C	Duct mount
LP915A1077	1	Liquid-filled	18 1/2 ft	5.6m	25 F to 125 F	-4 C to +52 C	Duct mount

TP974 Pneumatic Temperature Sensor

One- or two-pipe direct-acting temperature sensor used with RP908/RP920 Controllers to provide proportional control of pneumatic valve and damper actuators.

- Plug-in air connections.
- High efficiency air filter.
- Bimetal element.
- Continuous temperature indication available by using receiver gage.

TP974A Typical Piping



Application Type: Temperature Sensor
Dimensions, Approximate: 3 1/4 in. high x 2 in. wide x 1 5/8 in. deep (83 mm high x 51 mm wide x 41 mm deep)
Action: Direct Acting
Airflow Usage: 0.019 scfm (9 mL/s)
Maximum Operating Temperature: 110 F (43 C)
Maximum Operating Pressure: 25 psi (170 kPa)
Output Pressure Range: 3 psi to 15 psi (21 kPa to 103 kPa)
Supply Pressure: 16 to 25 psi (110 to 172 kPa)

Product Number	Number of Pipes	Sensor Element	Temperature Sensing Range		Mounting	Description	Comments
			(F)	(C)			
TP974A2000	1 or 2	Bimetal	50 F to 100 F	10 C to 38 C	Vertical or Horizontal Wall Mounting	Pneumatic Temperature Sensor Direct Acting	Order Cover Separately

Pneumatic Sensor Accessories

Product Number	Description	Used With
309379	Screen for LP914	LP914
311085/0107	Sunshield for LP914A1011	LP914A1011
314439	Duct Mounting Clip for Averaging capillary	LP915
315046A	Well, 1/2 NPT Copper, 15 1/2 in. (392 mm) long	LP914
315046B	Well, 1/2 NPT Copper, 7 1/2 in. (191 mm) long	LP914
315602	Inner Filter	LP914, LP915; LP907
315904A	Well, 1/2 NPT Stainless Steel, 15 7/16 in., 394 mm	LP914
315904B	1/2 in. NPT stainless steel Well, 7 5/16 in. (186 mm) long	LP914

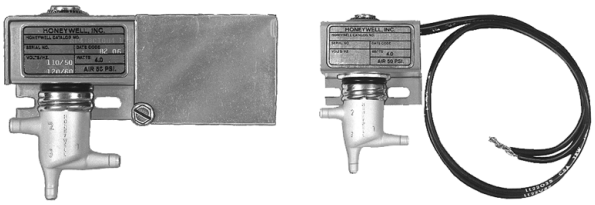
Pneumatic Sensor Replacement Parts

Product Number	Description	Used With
14002374-006	Restrictor Block Assembly, 0.007 in, 2 pipe for TP974A	TP974A
14004664-001	0.36 inch diameter Wool felt filter	LP915A

Relays

Relays

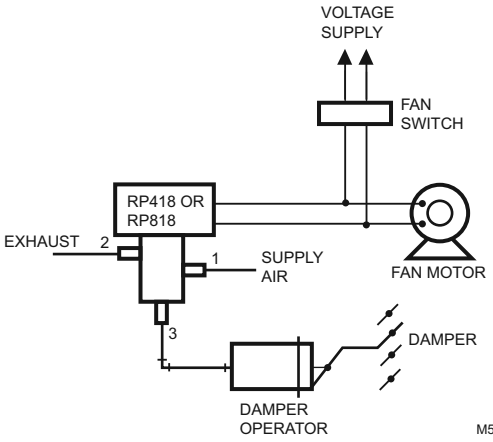
RP418, RP818 Electric/Pneumatic Relay



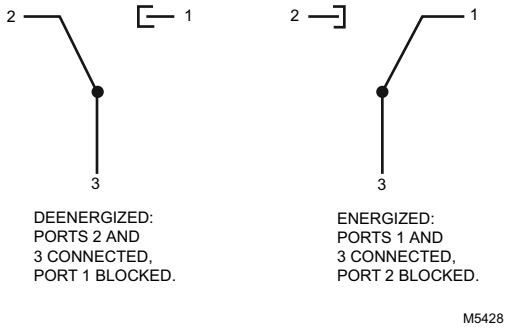
Electrically operated pneumatic switches used to interlock an electrical system and a pneumatic control system. Replacement devices are available for Johnson, Powers, Robertshaw, Barber-Colman, and older Honeywell devices.

- Usable as a diverting relay, a selector relay, or a stop and bleed relay.
- Mount and operate in any position.
- Available with lead wires or junction box.
- Line or low voltage models available.

RP418 & RP818 Typical Piping and Wiring



Internal Connections



Type: Electric / Pneumatic Relay
Dimensions, Approximate: 2 7/8 in. high x 3 13/16 in. wide x 1 1/4 in. deep (73 mm high x 97 mm wide x 32 mm deep)
Airflow Usage: 0.42 scfm (200 mL/s) at 20 psi (138 kPa) supply with 1 psi (7 kPa) pressure drop
Air Connections: Barbed fitting for 1/4 in. O.D. plastic tubing
Capacity: 0.075 Cv minimum
Operation: Energized: ports 1 and 3 connected, port 2 blocked
De-energized: ports 2 and 3 connected, port 1 blocked
Operating Humidity Range (% RH): 5 to 95% RH

Temperature Range: 0 F to 100 F (-18 C to +38 C)
Maximum Safe Operating Pressure: 50 psi (340 kPa)
Approvals:
Canadian Standards Association: Canadian Standards Association Listed: File No. LR50900
Canadian Underwriters Laboratories, Inc. Listed: File No. LR50900
Underwriters Laboratories, Inc. Component Recognized File: MP1502, Vol. 11, Sec. 1
UL Listed: Guide Y10Z

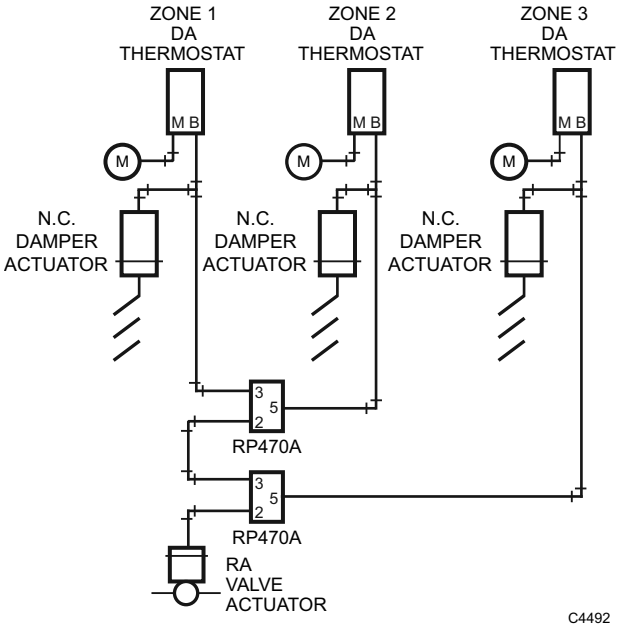
Product Number	Mounting	Voltage rating at 50 Hz	Voltage rating at 60 Hz	Frequency	Electrical Connections	Includes
RP418A1008	Surface	208 Vac	—	50 Hz	Junction Box and 15 in. (380 mm) leads	Junction Box
RP418A1057	Surface	120 Vac	—	50 Hz	Junction Box and 15 in. (380 mm) leads	Junction Box
RP418A1065	Surface	440 Vac	480 Vac	50 Hz; 60 Hz	Junction Box and 15 in. (380 mm) leads	Junction Box
RP418A1073	Surface	—	277 Vac	60 Hz	Junction Box and 15 in. (380 mm) leads	Junction Box
RP418A1081	Surface	—	208 Vac	60 Hz	Junction Box and 15 in. (380 mm) leads	Junction Box
RP418A1099	Surface	220 Vac	240 Vac	50 Hz; 60 Hz	Junction Box and 15 in. (380 mm) leads	Junction Box
RP418A1107	Surface	110 Vac	120 Vac	50 Hz; 60 Hz	Junction Box and 15 in. (380 mm) leads	Junction Box
RP418B1014	Panel mount	208 Vac	—	50 Hz	15 in. (380 mm) leads	—
RP418B1022	Panel mount	240 Vac	—	50 Hz	15 in. (380 mm) leads	—
RP418B1030	Panel mount	120 Vac	—	50 Hz	15 in. (380 mm) leads	—
RP418B1048	Panel mount	440 Vac	480 Vac	50 Hz; 60 Hz	15 in. (380 mm) leads	—
RP418B1055	Panel mount	—	208 Vac	60 Hz	15 in. (380 mm) leads	—
RP418B1071	Panel mount	110 Vac	120 Vac	50 Hz; 60 Hz	15 in. (380 mm) leads	—
RP818A1004	Surface	—	24 Vac	60 Hz	Junction Box and 15 in. (380 mm) leads	Junction Box
RP818B1002	Panel mount	—	24 Vac	60 Hz	15 in. (380 mm) leads	—
RP818B1010	Panel mount	24 Vac	—	50 Hz	15 in. (380 mm) leads	—

RP470 Pneumatic Selector Relay

Three-port relays used in HVAC systems to perform a variety of relay functions; transmit the higher of two input signals, lock out one pressure signal when a second signal is higher, or transmit the lower of two pressure signals. Replacement devices are available for Johnson, Powers, Robertshaw, Barber-Colman, and older Honeywell devices.

- Uses diaphragm-logic technology.
- In-line, wall, or panel mounted.
- Sharp-barb air connections.
- Molded plastic construction.

RP470A Higher-of-Two Pressures Application

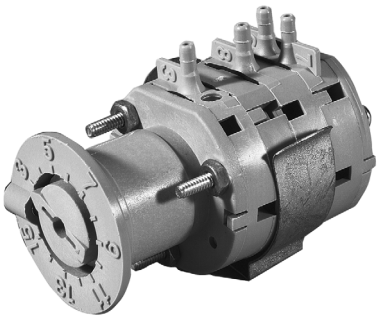


Type: Pneumatic Three-port Selector Relay
Dimensions, Approximate: 1 1/2 in. diameter x 1 in. deep (38 mm diameter x 25 mm deep)
Air Connections: Barb fittings 5/32 in. (4 mm) O.D. plastic tubing
Capacity: 0.039 scfm at 1 psi differential (18 mL/s at 5 kPa differential)
Operation: Higher-of-two-pressures selector relay
Mounting: Wall or In-line or panel
Operating Humidity Range (% RH): 5 to 95% RH
Temperature Range: 0 F to 140 F (-18 C to +60 C)
Maximum Safe Operating Pressure: 30 psi (205 kPa)

Product Number	Operation	Input Operating Pressure (psi)	Input Operating Pressure (kPa)	Description	Includes
RP470A1003	Higher-of-two-pressures selector relay	0 to 20 psi	0 to 138 kPa	Pneumatic Selector Relay, transmits higher of two input pressures	14003030-001, 1 1/2 in. Mounting Clip for Mounting relay to wall or panel
RP470B1001	repeater relay; Lower-of-two pressures; Lockout	0 to 20 psi	0 to 138 kPa	Pneumatic Selector Relay, used in lockout, repeater and lower of two input pressure applications.	14003030-001, 1 1/2 in. Mounting Clip for Mounting relay to wall or panel

Relays

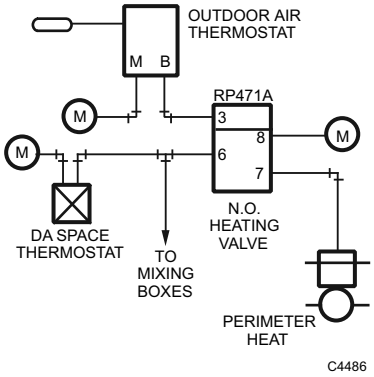
RP471 Snap-Acting Pneumatic Relay



The four port, snap acting relay converts a proportional air pressure change from a controller to a positive (two-position) pressure change. It can also divert a supply line to one of two branches. Replacement device is available for Johnson, Powers, Robertshaw, Barber-Colman, and older Honeywell devices.

- Manually adjustable switching pressure.
- Sharp barb connections for 5/32 inch (4 mm) O.D. plastic tubing.
- Molded plastic construction with neoprene diaphragms and stainless steel lever.
- Mounts in any position with mounting clip.

RP471A Typical Piping



Type: Pneumatic, four-port, snap acting relay
Dimensions, Approximate: 1 1/2 in. diameter x 2 3/4 in. deep (38 mm diameter x 70 mm deep)
Air Connections: Barb fittings 5/32 in. (4 mm) O.D. plastic tubing
Capacity: 0.039 scfm at 1 psi differential (18 mL/s at 5 kPa differential)
Mounting: Wall or Panel
Operating Humidity Range (% RH): 5 to 95% RH
Temperature Range: 0 F to 140 F (-18 C to +60 C)
Maximum Safe Operating Pressure: 30 psi (205 kPa)
Nominal Switch Differential: 0.5 psi (3 kPa)

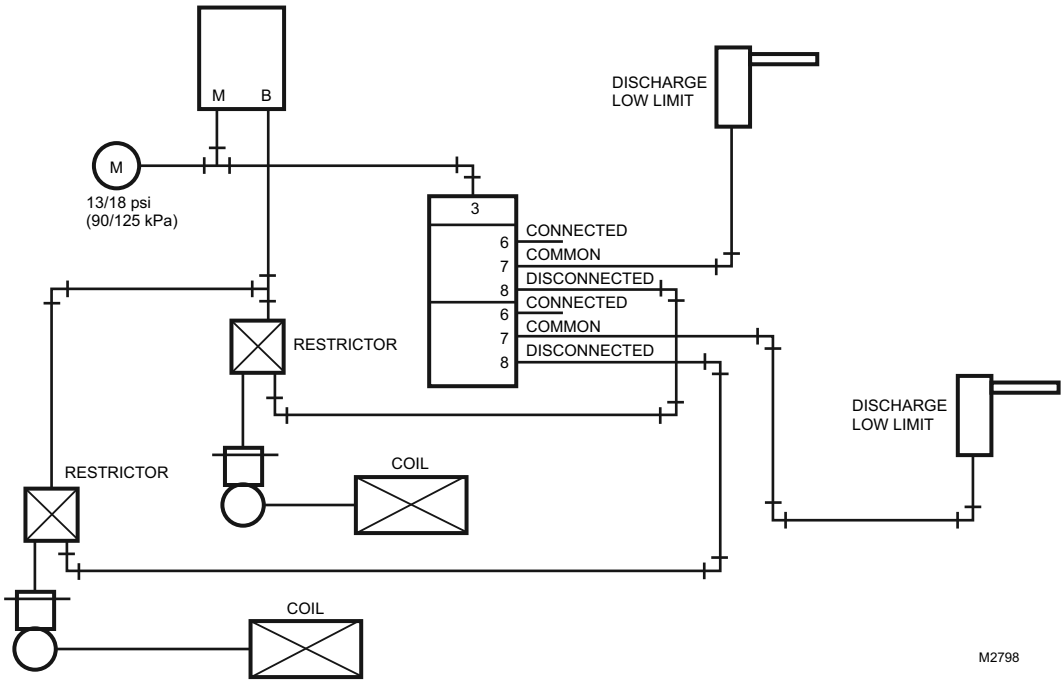
Product Number	Operation	Differential Pressure Range (psi)	Differential Pressure Range (kPa)	Setpoint Range (psi)	Setpoint Range (kPa)	Description	Includes
RP471A1002	Proportional to 2-position converter	1 psi maximum	7 kPa maximum	Adjustable between 3 to 15 psi	Adjustable between 21 to 103 kPa	Wall or Panel Mounted Pneumatic, four-port, snap acting relay, SPDT	14003030-001, 1 1/2 in. Mounting Clip for Mounting relay to wall or panel

RP670 Pneumatic Switching Relay

Pneumatic switching relays block, divert, or bleed pneumatic air lines when pilot pressure is changed from one specific value to another. Commonly applied in Day-Night, Summer-Winter, Start-Stop, On-Off-Auto and other multiple condition systems where control sequence is changed as conditions change. Replacement devices are available for Johnson, Powers, Robertshaw, Barber-Colman, and older Honeywell devices.

- Available with either single-pole, double-throw (SPDT) or double-pole, double-throw (DPDT) switching action.
- Second switch on dpdt (RP670B) models molded in natural color for identification.
- Air connections for 5/32 in. (4 mm) O.D. plastic tubing.
- Molded plastic construction with neoprene diaphragms, stainless steel lever.
- In-line mounting, or wall or panel mounting with provided metal spring clip.

RP670 Typical Piping



Type: Pneumatic Switching Relay
Dimensions, Approximate: 1 1/2 in. diameter x 2 1/4 in. deep (38 mm diameter x 56 mm deep)
Air Connections: Barb fittings 5/32 in. (4 mm) O.D. plastic tubing

Capacity: 0.039 scfm at 1 psi differential (18 mL/s at 5 kPa differential)
Operating Humidity Range (% RH): 5 to 95% RH
Temperature Range: 0 F to 140 F (-18 C to +60 C)
Maximum Safe Operating Pressure: 30 psi (205 kPa)

Product Number	Operation	Switching Occurs Between Pressures (psi)	Switching Occurs Between Pressures (kPa)	Description	Includes
RP670A1001	SPDT relay	3 and 7 psi	20 and 50 kPa	Pneumatic Switching Relay with SPDT switching	14003030-001, 1 1/2 in. Mounting Clip for Mounting relay to wall or panel
RP670A1019	SPDT relay	13 and 17 psi	90 and 120 kPa	Pneumatic Switching Relay with SPDT switching	14003030-001, 1 1/2 in. Mounting Clip for Mounting relay to wall or panel
RP670B1009	DPDT relay	3 and 7 psi	20 and 50 kPa	Pneumatic Switching Relay with DPDT switching	14003030-001, 1 1/2 in. Mounting Clip for Mounting relay to wall or panel
RP670B1017	DPDT relay	13 and 17 psi	90 and 120 kPa	Pneumatic Switching Relay with DPDT switching	14003030-001, 1 1/2 in. Mounting Clip for Mounting relay to wall or panel
RP670B1066	DPDT relay	18 and 22 psi	124 and 152 kPa	Pneumatic Switching Relay with DPDT switching	14003030-001, 1 1/2 in. Mounting Clip for Mounting relay to wall or panel
RP670B1074	DPDT relay	20 and 25 psi	140 and 175 kPa	Pneumatic Switching Relay with DPDT switching	14003030-001, 1 1/2 in. Mounting Clip for Mounting relay to wall or panel

Relays

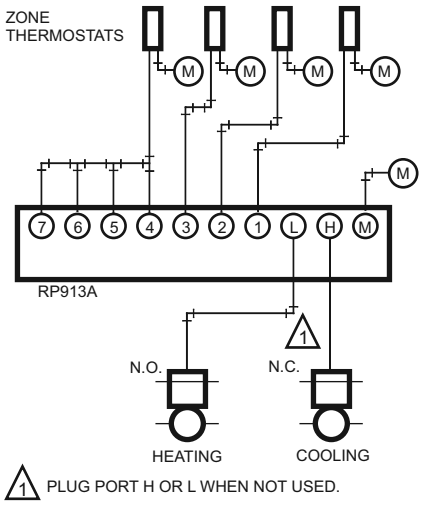
RP913 Pneumatic Load Analyzer

A diaphragm logic pressure selector selects the highest and/or lowest branch pressure input from zone thermostats to operate final control elements in pneumatic control applications.

Replacement devices are available for Johnson, Powers, Robertshaw, and Barber-Colman devices.

- Seven input manifold containing logic diaphragm, air filter, and restrictions.
- Ten sharp barb connectors for all piping requirements.
- Large integral filter assures clean air to the manifold.
- Requires no field adjustment, and plastic construction results in minimum maintenance.
- Two analyzers can be connected together to increase inputs to twelve.

RP913A Typical Piping



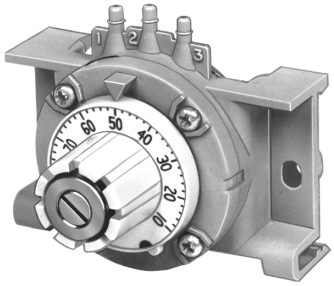
C4483

Type: Load Analyzer Relay, 7 input
Dimensions, Approximate: 3/4 in. high x 6 1/2 in. long x 2 1/16 deep (19 mm high x 165 mm long x 52 mm deep)
Airflow Usage: 0.04 scfm (0.019 mL/s)
Air Connections: Barb fittings (10) for 1/4 in. (6 mm) O.D. plastic tubing
Capacity: 0.039 scfm at 1 psi differential (18 mL/s at 5 kPa differential)
Operating Humidity Range (% RH): 5 to 95% RH
Temperature Range: 0 F to 140 F (-18 C to +60 C)
Maximum Safe Operating Pressure: 25 psi (172 kPa)

Replacement Parts:
14001865-001 Filter Cartridge Assembly

Product Number	Operation	Mounting	Description
RP913A1008	Selects highest and/or lowest branch pressure input to operate final control elements	Wall or In-line or panel	Wall, In-Line or Panel Mounted Load Analyzer Relay, 7 input

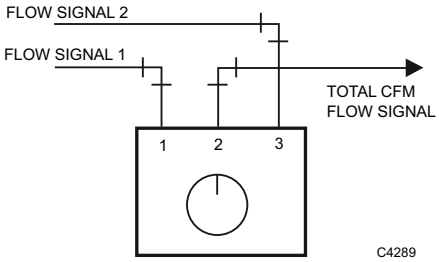
RP922 Pneumatic Potentiometer



A three-port pneumatic potentiometer can sum two input pressures, average two input pressures, be an adjustable flow restriction, or be an adjustable pressure supply. Replacement devices are available for Johnson, Powers, Robertshaw, Barber-Colman, and older Honeywell devices.

- High efficiency integral filters for all ports.
- High reliability, no internal moving parts.
- Compact size.
- High accuracy.

Typical Wiring Diagram for RP922



Type: Pneumatic Averaging / Ratio Relay
Dimensions, Approximate: 2 7/16 in. wide x 1 5/8 in. deep x 2 7/8 in. high (62 mm wide x 42 mm deep x 73 mm high)
Airflow Usage: Average of two input pressures
Air Connections: Barb fittings 5/32 in. (4 mm) O.D. plastic tubing
Operation: Can sum two input pressures, average two input pressures, be adjustable flow restriction or be an adjustable pressure supply.
Mounting: Wall or panel or Snap onto DIN rail
Operating Humidity Range (% RH): 5 to 95% RH
Maximum Safe Operating Pressure: 30 psi (205 kPa)

Product Number	Operation	Mounting	Description
RP922A1007	Can sum two input pressures, average two input pressures, be adjustable flow restriction or be an adjustable pressure supply.	Wall or panel or Snap onto DIN rail	Wall, Snap onto DIN rail or panel mounted Pneumatic Averaging / Ratio Relay

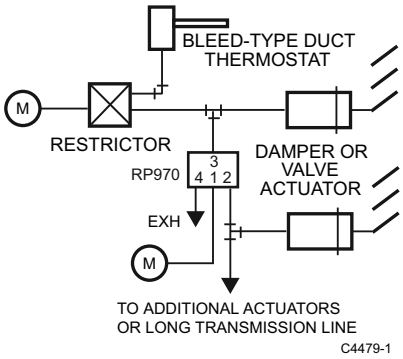
Relays

RP970 Pneumatic Capacity Relay

Direct acting, modulating relay provides increased capacity of the branchline pressure to the final control device. Replacement devices are available for Johnson, Powers, Robertshaw, Barber-Colman, and older Honeywell devices.

- In-line, wall, or panel mounted.
- Sharp-barb air connections.
- Molded plastic construction with neoprene diaphragms.
- Mounting clip provided.

RP970 Typical Piping



Type: Pneumatic Capacity Relay
Dimensions, Approximate: 1 1/2 in. diameter, 1 1/2 in. deep (38 mm dia., 38 mm deep)
Airflow Usage: 0.002 scfm (1.0 mL/s) maximum
Air Connections: Barb fittings, Port 1: 1/4 in. (6 mm) O.D. plastic tubing; Other Ports: 5/32 in. (4 mm) O.D. plastic tubing
Action: Direct Acting
Capacity: 0.039 scfm at 1 psi differential (18 mL/s at 5 kPa differential)
Mounting: Wall or In-line or panel
Operating Humidity Range (% RH): 5 to 95% RH
Temperature Range: 0 F to 140 F (-18 C to +60 C)
Maximum Safe Operating Pressure: 30 psi (205 kPa)

Accessories:
14003203-003 Conversion Kit to convert Johnson, Powers, Robertshaw, Barber Coleman and older Honeywell switches

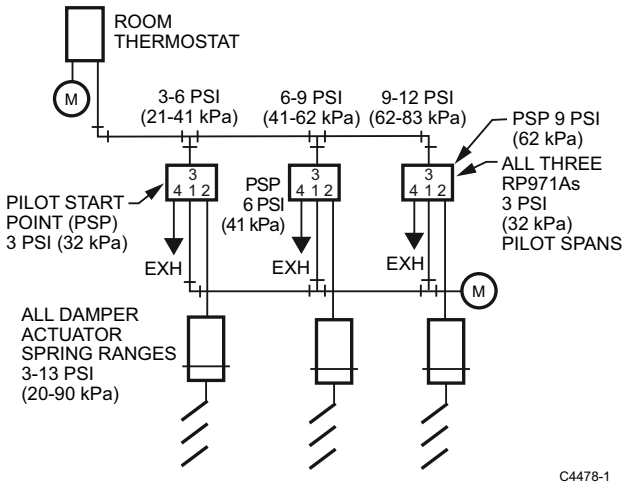
Product Number	Operation	Input Operating Pressure		Description	Includes
		(psi)	(kPa)		
RP970A1008	Provides increased capacity of branchline pressure to final control device	0 to 20 psi	0 to 138 kPa	Wall, In-Line or panel mounted Pneumatic Capacity Relay	14003030-001, 1 1/2 in. Mounting Clip for Mounting relay to wall or panel

RP971 Pneumatic Ratio Relay

A four port non-bleed pneumatic relay which produces a modulating pressure output, proportional in a fixed ratio to pilot input changes. It is used to control pneumatic valve or damper actuators in sequence from a single thermostat. Replacement devices are available for Johnson, Powers, Robertshaw, Barber-Colman, and older Honeywell devices.

- Adjustable pilot start point pressures.
- Two pilot pressure spans available.
- Four sharp-barb air connections.
- Molded plastic construction with neoprene.
- Mounting clip provided.

RP971A Typical Piping



C4478-1

Type: Pneumatic, Four Port Ratio Relay
Dimensions, Approximate: 2 in. diameter x 2 5/8 in. deep (52 mm dia. x 67 mm deep)
Airflow Usage: 0.002 scfm (1.0 mL/s) maximum
Air Connections: Barb fittings, Port 1: 1/4 in. (6 mm) O.D. plastic tubing; Other Ports: 5/32 in. (4 mm) O.D. plastic tubing
Action: Direct Acting
Capacity: 0.039 scfm at 1 psi differential (18 mL/s at 5 kPa differential)
Mounting: Wall or In-line or panel
Operating Humidity Range (% RH): 5 to 95% RH
Temperature Range: 0 F to 140 F (-18 C to +60 C)
Maximum Safe Operating Pressure: 30 psi (205 kPa)
Pilot Start Pressure: Adjustable 0 to 10 psi (Adjustable 0 to 69 kPa)
Output Span: 3 to 13 psi (21 to 90 kPa)

Accessories:
14003203-003 Conversion Kit to convert Johnson, Powers, Robertshaw, Barber Coleman and older Honeywell switches
801629T Clip for surface mounting

Product Number	Operation	Pilot Input Span (psi)	Pilot Input Span (kPa)	Description	Includes
RP971A1007	Produces modulating pressure output proportional to pilot pressure input changes	3 psi input span for 3 to 13 psi output	—	Wall, In-Line or panel mounted Pneumatic Four Port Ratio Relay	14003030-002 Mounting Clip and scaleplate with psi markings
RP971A1015	Produces modulating pressure output proportional to pilot pressure input changes	5 psi input span for 3 to 13 psi output	—	Wall, In-Line or panel mounted Pneumatic Four Port Ratio Relay	14003030-002 Mounting Clip and scaleplate with psi markings
RP971A1023	Produces modulating pressure output proportional to pilot pressure input changes	—	21 kPa input span for 21 to 90 kPa output	Wall, In-Line or panel mounted Pneumatic Four Port Ratio Relay	14003030-002 Mounting Clip and scaleplate with kPa markings
RP971A1031	Produces modulating pressure output proportional to pilot pressure input changes	—	34 kPa input span for 34 to 90 kPa output	Wall, In-Line or panel mounted Pneumatic Four Port Ratio Relay	14003030-002 Mounting Clip and scaleplate with kPa markings

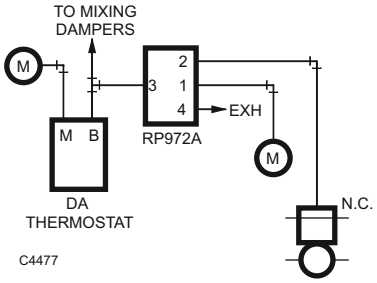
Relays

RP972 Pneumatic Reversing Relay

A modulating relay suitable for all types of heating and air conditioning control systems to reverse and increase the capacity of the branchline pressure to the final control element. The output varies inversely with the input with an adjustable offset. Replacement devices are available for Johnson, Powers, Robertshaw, Barber-Colman, and older Honeywell devices.

- Reverse acting.
- In-line mounting or can be wall or panel mounted with mounting clip provided.
- Molded plastic construction with neoprene diaphragms.

RP972A Typical Piping

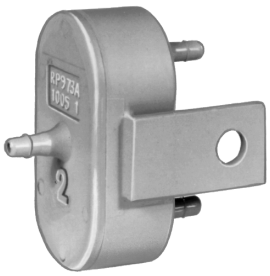


Type: Pneumatic Reversing Relay
Dimensions, Approximate: 1 1/2 in. diameter x 2 1/4 in. deep (38 mm diameter x 57 mm deep)
Airflow Usage: 0.002 scfm (1.0 mL/s) maximum
Air Connections: Barb fittings for three 5/32 in. (4 mm) and one 1/4 in. (6 mm) O.D. plastic tubing
Action: Reverse Acting
Capacity: 0.039 scfm at 1 psi differential (18 mL/s at 5 kPa differential)
Mounting: Wall or In-line or panel
Operating Humidity Range (% RH): 5 to 95% RH
Temperature Range: 0 F to 140 F (-18 C to +60 C)
Maximum Safe Operating Pressure: 30 psi (205 kPa)

Accessories:
14003203-003 Conversion Kit to convert Johnson, Powers, Robertshaw, Barber Coleman and older Honeywell switches

Product Number	Operation	Description	Includes
RP972A1006	Output varies inversely with input with an adjustable offset	Wall, In-line or panel mounted Pneumatic Reversing Relay	14003030-001, 1 1/2 in. Mounting Clip for Mounting relay to wall or panel

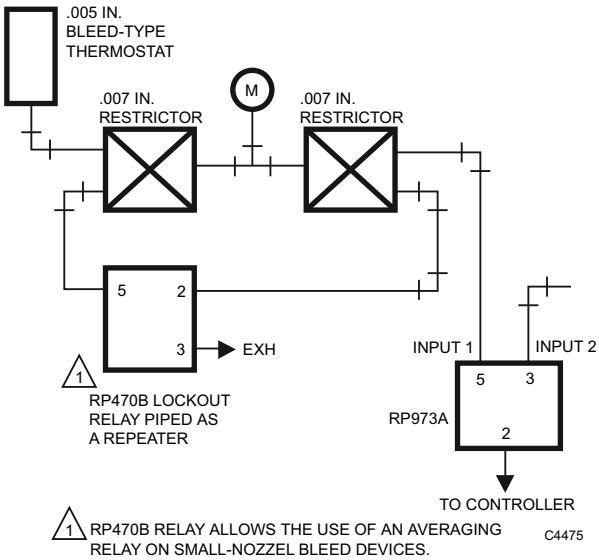
RP973 Pneumatic Averaging Relay



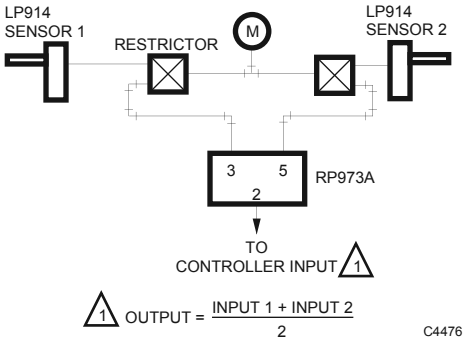
A three-port relay used in HVAC systems averages the signals from two thermostats to control a single device such as a heating coil valve for a multizone unit. The pneumatic averaging relay provides an output pressure equal to the average of two input pressures. Replacement devices are available for Johnson, Powers, Robertshaw, Barber-Colman, and older Honeywell devices.

- In-line, wall or panel mounted.
- Sharp-barb air connections.
- Molded plastic construction.

RP973A Typical Piping



Typical Averaging Application



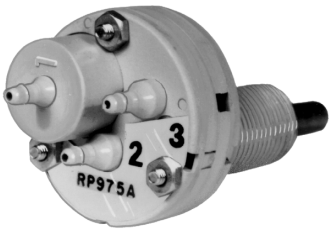
Type: Pneumatic Three-Port Averaging Relay
Dimensions, Approximate: 1 1/2 in. high x 7/8 in. wide x 15/16 in. deep (38 mm high x 22 mm wide x 24 mm deep)
Airflow Usage: 0.007 scfm (3.303 mL/s) maximum
Air Connections: Barb fittings 5/32 in. (4 mm) O.D. plastic tubing
Capacity: 0.039 scfm at 1 psi differential (18 mL/s at 5 kPa differential)

Operation: Output pressure equals average of two input pressures
Mounting: Wall or In-line or panel
Operating Humidity Range (% RH): 5 to 95% RH
Temperature Range: 32 F to 125 F (0 C to 52 C)
Maximum Safe Operating Pressure: 30 psi (205 kPa)
Output Operating Pressure: 3 to 15 psi (21 to 103 kPa)

Product Number	Operation	Input Operating Pressure (psi)	Input Operating Pressure (kPa)	Output Operating Pressure (psi)	Output Operating Pressure (kPa)	Description
RP973A1005	Output pressure equals average of two input pressures	3 to 15 psi	21 to 103 kPa	3 to 15 psi	21 to 103 kPa	Output is the average of the two inputs. Pneumatic Three-Port Averaging Relay.

Relays

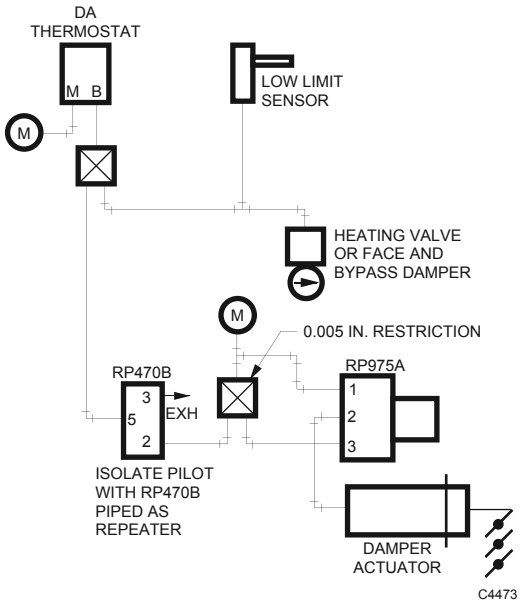
RP975 Pneumatic Hesitation Relay



A three-port hesitation relay provides minimum outside air damper position plus controlled ventilation for large volume unit ventilators. Replacement devices are available for Johnson, Powers, and Barber-Colman devices.

- Manually adjustable minimum position. In-line, wall or panel mounted.
- Sharp-barb air connections.
- Molded plastic construction.

Typical Piping With Isolation Circuit



Type: Pneumatic Three-Port Hesitation relay
Dimensions, Approximate: 2 1/4 in. high x 2 1/2 in. wide x 3 3/4 in. deep (57 mm high x 63 mm wide x 96 mm deep)
Airflow Usage: 0.022 scfm (10 mL/s)
Air Connections: Barb fittings 5/32 in. (4 mm) O.D. plastic tubing
Capacity: 0.003 scfm (1.65 mL/s)
Knob Rotation: Knob has two (2) internal breakaway stops that limit rotation to 188 degrees. Each stop, when removed, adds 56 degrees of rotation. Maximum rotation is 300 degrees.
Mounting: Wall or In-line or panel
Operating Humidity Range (% RH): 5 to 95% RH
Temperature Range: 32 F to 125 F (0 C to 52 C)
Maximum Safe Operating Pressure: 30 psi (205 kPa)

Replacement Parts:
14003203-003 Conversion Kit to convert Johnson, Powers, Robertshaw, Barber Coleman and older Honeywell switches

Product Number	Operation	Description	Includes
RP975A1003	Provides minimum outside air damper position	Pneumatic Three-Port Hesitation Relay	14003030-001, 1 1/2 in. Mounting Clip for mounting relay to wall or panel. Also includes scaleplate and knob, factory mounted and calibrated. Use with MP909 or MP918 Damper Actuator having a 7 to 13 psi (50 to 90 kPa) spring range

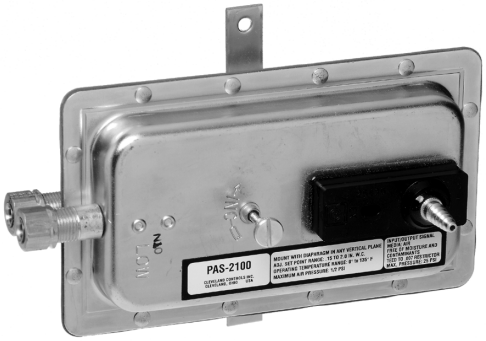
Pneumatic Relay Accessories and Replacement Parts

Product Number	Description	Used With
14003030-001	Mounting Clip	RP470, RP471, SP970
14003638-001	Bag Assembly, Mounting Hardware for RP418	RP418;
315178/0062	Cup, feedback spring for old Gradutrol relay	—;

Switches

Switches

CLEPAS Air Pressure Switch



Senses differential air pressure in HVAC systems and provides and on/off output. A typical application is sensing fan shutdown in a unit ventilator to close the outdoor air damper.

- Reliable pneumatic operation.
- Adjustable setpoint (switching pressure).
- Eliminates electrical interlock wiring.

Dimensions, Approximate: 6 1/8 in. high x 4 1/8 in. wide x 2 13/16 in. deep (156 mm high x 105 mm wide x 72 mm deep)
Air Connections: Sensing Inputs: 1/4 in. compression fittings; Control Air: Barb for 1/4 in. (6 mm) or 3/8 in. (10 mm) O.D. plastic tubing

Temperature Range: 0 F to 135 F (-18 C to +57 C)
Switch Type: On/Off Pneumatic Airflow Switch

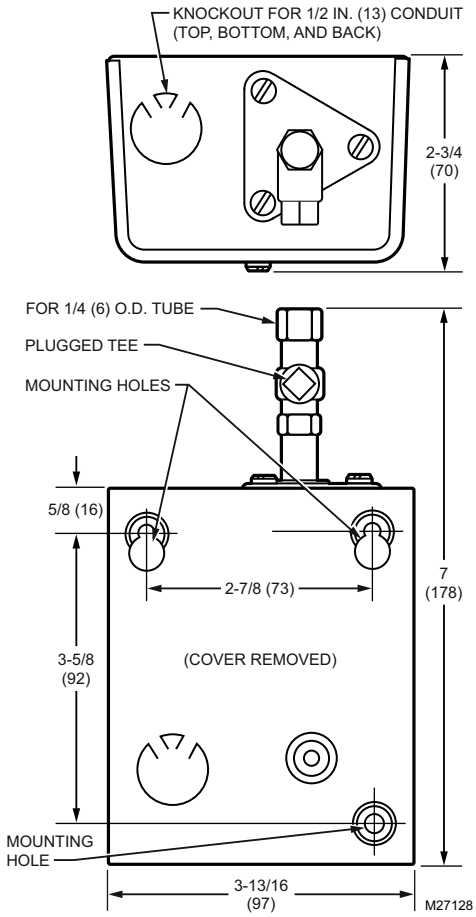
Product Number	Mounting	Switching Pressure		Switching Action	Description
		(psi)	(kPa)		
CLEPAS2100	Vertical Mount	0.15 to 2.0 in. w.c.; 0.15 to 12.0 in w.c.	0.037 to 0.50 kPa; 0.037 to 2.99 kPa	On/Off	Pneumatic Airflow Differential Pressure Switch, Low Setpoint Range
CLEPAS2200	Vertical Mount	0.15 to 12.0 in w.c.	0.037 to 2.99 kPa	On/Off	Pneumatic Airflow Differential Pressure Switch, High Setpoint Range

P643 Pneumatic/Electric Switch

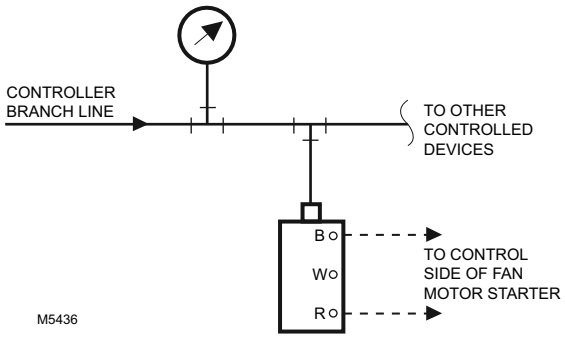
Used to convert a pneumatic signal from a controller to an electrical switching action to provide start and stop control of equipment such as fans and pumps. Replacement devices available for Johnson, Powers, Robertshaw, Barber-Colman, and older Honeywell pneumatic/electric switches. Adjustable setpoint.

- Adjustable differential.
- Externally visible scales.
- Heavy-duty switch.
- Integral gage connection

Dimensions in inches (millimeters)



P643A Typical Piping



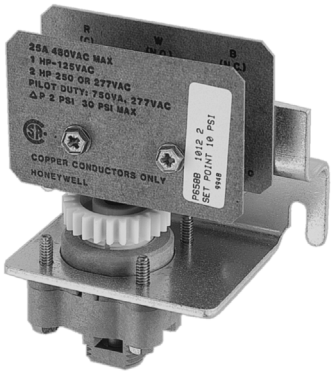
Air Connections: Compression fitting 1/4 in. (6 mm) O.D. tubing
Mounting: Holes in back of case
Operating Humidity Range (% RH): —
Temperature Range: -30 F to +125 F (-34 C to +52 C)
Maximum Safe Operating Pressure: 25 psi (170 kPa)
Switch Operation: Converts pneumatic signal to electrical switching action
Switch Type: Pneumatic/Electric Switch
Frequency: 50 Hz; 60 Hz
Current: 120 Vac: 8.0 AFL, 48.0 LRA, 17.0 A resistive
208/240 Vac: 5.1 AFL, 30.6 ALR, 17.0 A resistive
270 Vac: 17.0 A resistive
480 Vac: 3.5 AFL, 21.0 ALR, 10.0 A resistive
Approvals:
Underwriters Laboratories, Inc. Listed

Product Number	Electrical Connections	Differential Pressure Range		Switching Pressure		Voltage	Description	Includes
		(psi)	(kPa)	(psi)	(kPa)			
P643A1007	Knockouts (3) for 1/2 in. conduit	3 to 13 psi adjustable	20 to 90 kPa adjustable	0 to 22.5 psi	0 to 155 kPa	120 Vac; 208 Vac; 240 Vac; 277 Vac; 480 Vac	Pneumatic / Electric Switch including Spdt switch and adjustable differential	SPDT switch

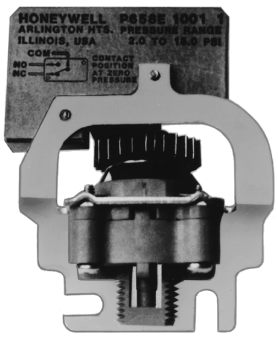
Switches

P658 Pneumatic/Electric Switch

P658A



P658B

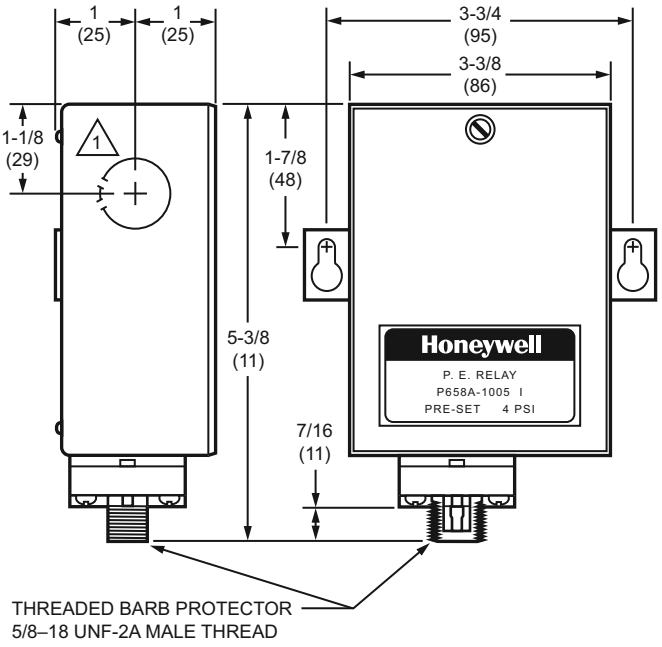


P658E

Pneumatic-electric switches (P658A,B,E and F) used to convert a pneumatic signal from a controller to an electrical switching action (SPDT) to provide start and stop control of equipment such as fans and pumps. Replacement devices available for Johnson, Powers, Robertshaw, Barber-Colman, and older Honeywell pneumatic/ electric switches.

- Models available for surface or panel mounting.
- Barb protected by open cage.
- All ferrous parts plated to prevent corrosion.
- Factory calibrated setpoint field adjustable to meet job requirements.
- Neoprene diaphragm element

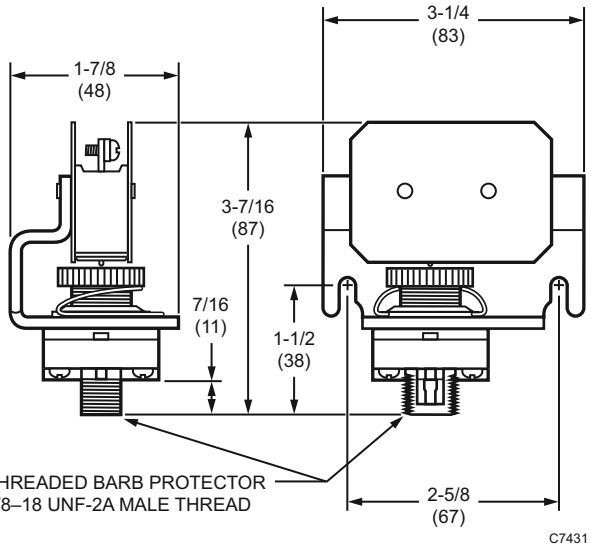
P658A Dimensions in inches (millimeters)



1 KNOCKOUT ON ONE SIDE FOR 3/4 1NCH CONDUIT. KNOCKOUTS ON OPPOSITE SIDE, TOP, AND BACK FOR 1/2 INCH CONDUIT.

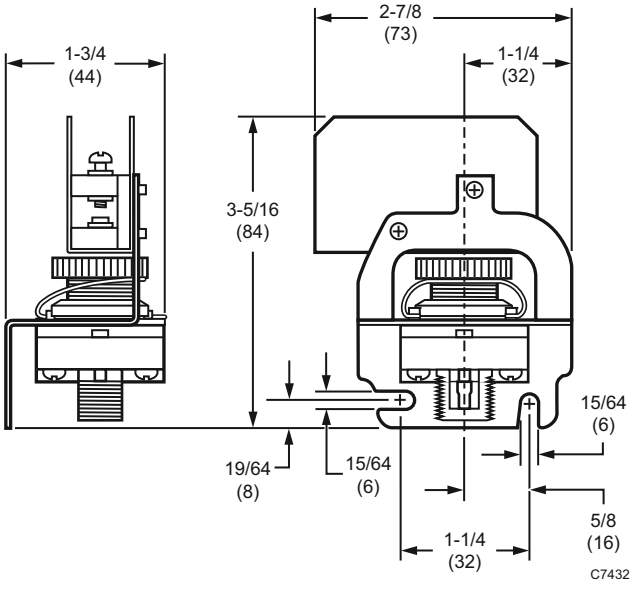
C7435

P658B Dimensions in inches (millimeters)

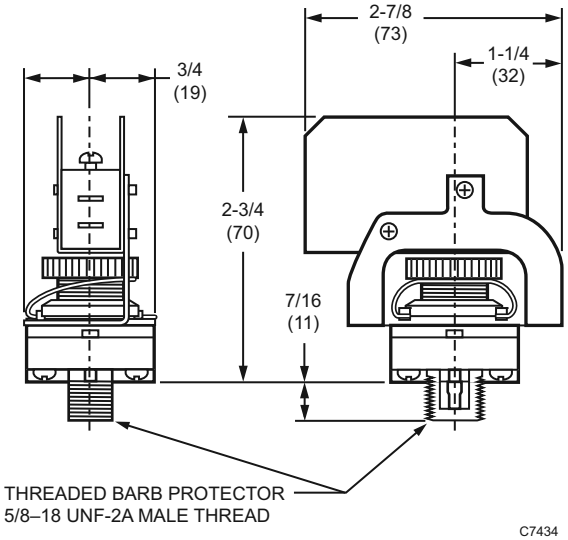


C7431

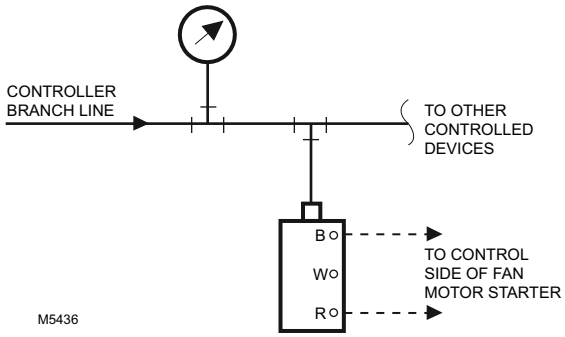
P658E Dimensions in inches (millimeters)



P658F Dimensions in inches (millimeters)



P658 Typical Piping



Air Connections: Barb fitting for 1/4 in. (6 mm) O.D. plastic tubing
Operating Humidity Range (% RH): 5 to 95% RH, 80 F (27C) max wet bulb
Temperature Range: 40 F to 140 F (4 C to 66 C)
Maximum Safe Operating Pressure: 30 psi (207 kPa)
Switch Operation: Converts pneumatic signal to electrical switching action (spdt)
Switch Type: Pneumatic/Electric Switch
Motor Load: 1 hp @ 125 Vac, 2 hp @ 250 or 277 Vac
Resistive Load: 25A @ 125, 250 or 480 Vac
Frequency: 60 Hz
Pilot Duty Ratings: 750 VA @ 125, 250 or 277 Vac
Approvals:
Underwriters Laboratories, Inc. Category SDYF

Product Number	Mounting	Electrical Connections	Differential Pressure Range		Setpoint Range (Field Adjustable)		Switching Action	Calibration
			(psi)	(kPa)	(psi)	(kPa)		
P658A1013	Surface (includes case)	Screw terminals	2 psi	14 kPa	2 to 24 psi	14 to 165 kPa	Make R-W on pressure rise to setpoint plus differential; Make R-B on pressure fall to setpoint	Factory Calibrated at 10 psi
P658B1012	Panel mount	Screw terminals	2 psi	14 kPa	2 to 24 psi	14 to 165 kPa	Make R-W on pressure rise to setpoint plus differential; Make R-B on pressure fall to setpoint	Factory Calibrated at 10 psi
P658E1001	Panel mount	1/4 in. quick-connect male terminals	1 psi	7 kPa	2 to 17 psi	14 to 117 kPa	Make COM-NC on pressure fall to setpoint; Make COM-NO on pressure rise to setpoint plus differential	No Factory Calibration
P658E1167	Panel mount	1/4 in. quick-connect male terminals	1 psi	7 kPa	2 to 25 psi	14 to 172 kPa	Make COM-NC on pressure fall to setpoint; Make COM-NO on pressure rise to setpoint plus differential	No Factory Calibration
P658F1000	Panel, through double D hole secured with hex nut	1/4 in. quick-connect male terminals	1 psi	7 kPa	2 to 17 psi	14 to 117 kPa	Make COM-NC on pressure fall to setpoint; Make COM-NO on pressure rise to setpoint plus differential	No Factory Calibration

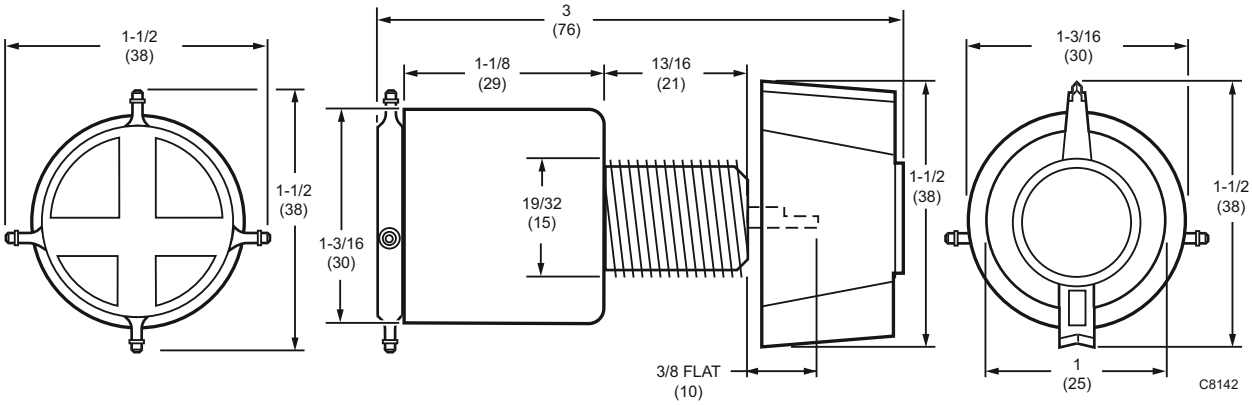
Switches

SP470 Pneumatic Diverting Switches

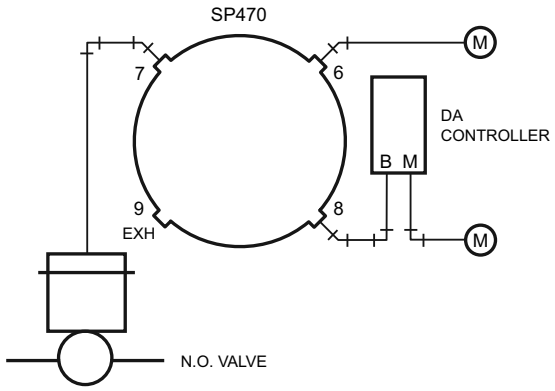
Pneumatic diverting switch used to manually divert, block, or bleed air in pneumatic air lines to revise control sequence with a change in conditions. Commonly applied on Day-Night, Summer-Winter, On-Off-Auto, or Start-Stop functions. Replacement kits are available for Johnson, Powers, Robertshaw, Barber-Colman, and older Honeywell switches.

- Available in two-position or three-position devices.
- Mountable on a panel up to 7/16 in (11 mm) thick.
- Complete with knob and scaleplate.

Dimensions in inches (millimeters)



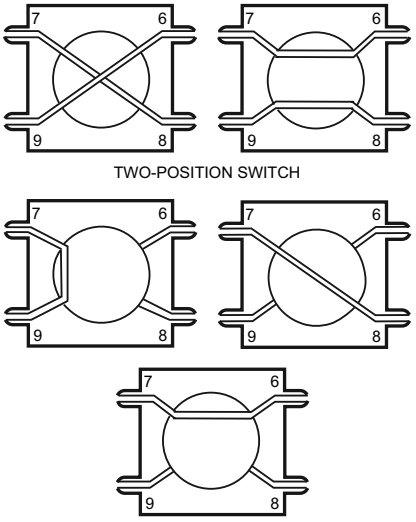
SP470A Typical three-position application



NOTES:
POSITION 1, VALVES OPEN: PORTS 7 AND 9 CONNECTED, PORTS 6 AND 8 BLOCKED
POSITION 2, VALVE AUTO: PORTS 7 AND 8 CONNECTED, PORTS 6 AND 9 BLOCKED
POSITION 3, VALVE CLOSED: PORTS 7 AND 6 CONNECTED, PORTS 8 AND 9 BLOCKED

C4290

SP470A Switches

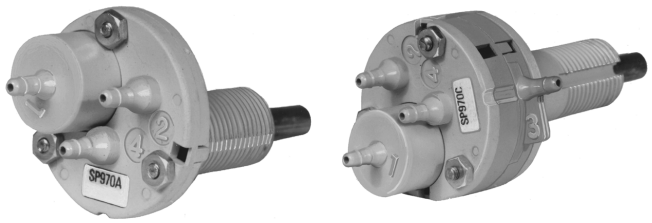


Airflow Usage: 0.175 scfm (82.6 mL/s) minimum at 1 psi pressure drop
Air Connections: Barb fitting for 5/32 in. (4 mm) O.D. plastic tubing
Mounting: Panel mount
Operating Humidity Range (% RH): 5 to 95% RH

Temperature Range: 20 F to 140 F (-7 C to +60 C)
Maximum Safe Operating Pressure: 30 psi (207 kPa)
Switch Operation: Used to manually divert, block or bleed pneumatic air lines
Switch Type: Two or Three Position Pneumatic Diverting Switch

Product Number	Mounting	Description	Includes
SP470A1000	Panel mount	Pneumatic Manual Switch, 4 port, 2-position interchange	Mounting nuts, knob, and two-position scaleplate
SP470A1018	Panel mount	Pneumatic Manual Switch, 4 port, 3-position, Port 7 is common	Mounting nuts, knob, and three-position scaleplate

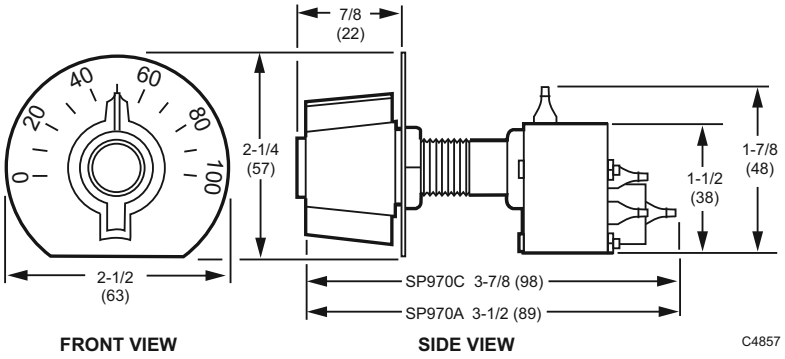
SP970 Pneumatic Manual or Minimum Position Switches



Used to manually position a remote damper actuator or to reset the setpoint of a pneumatic controller. They can also provide minimum damper position by setting a minimum pressure limit in the branchline to the damper actuator. Replacement kits are available for Johnson, Powers, Robertshaw, Barber-Colman, and older Honeywell switches.

- Two spans available as shipped. Six spans with breakaway stops on knob.
- Pilot bleed and isolated pilot models available.
- Wall or panel mounting.

Dimensions in inches (millimeters)



Airflow Usage: 0.022 scfm (9.8 mL/s)
Air Connections: Barb fitting for 5/32 in. (4 mm) O.D. plastic tubing
Mounting: Panel or Wall
Capacity: 0.021 scfm (9.4 mL/s) below minimum position. Above minimum position, device feeding pilot determines capacity
Operating Humidity Range (% RH): 5 to 95% RH

Temperature Range: 0 F to 140 F (-18 C to +60 C)
Maximum Safe Operating Pressure: 30 psi (207 kPa)
Switch Operation: Used to manually position a remote damper actuator or reset setpoint of pneumatic controller
Switch Type: Three-port pneumatic manual or minimum position switch

Product Number	Output Span (psi)	Output Span (kPa)	Description	Includes
SP970A1005	10 psi (with 188 degree knob rotation); 13 psi (with 244 degree knob rotation); 16 psi (with 300 degree knob rotation)	69 kPa (with 188 degree knob rotation); 90 kPa (with 244 degree knob rotation); 110 kPa (with 300 degree knob rotation)	Manual Pressure Regulator or Provides minimum branchline pressure when used with a high capacity device (like a RP920).	Knob, 0 to 100% scale plate and locknuts
SP970A1013	5 psi (with 188 degree knob rotation); 6.5 psi (with 244 degree knob rotation); 8 psi (with 300 degree knob rotation)	34 kPa (with 188 degree knob rotation); 45 kPa (with 244 degree knob rotation); 56 kPa (with 300 degree knob rotation)	Manual Pressure Regulator or Provides minimum branchline pressure when used with a high capacity device.	Knob, 0 to 100% scale plate and locknuts
SP970C1001	10 psi (with 188 degree knob rotation); 13 psi (with 244 degree knob rotation); 16 psi (with 300 degree knob rotation)	69 kPa (with 188 degree knob rotation); 90 kPa (with 244 degree knob rotation); 110 kPa (with 300 degree knob rotation)	Manual Pressure Regulator or Provides minimum branchline pressure when used with a low capacity device.	Knob, 0 to 100% scale plate and locknuts
SP970C1043	5 psi (with 188 degree knob rotation); 6.5 psi (with 244 degree knob rotation); 8 psi (with 300 degree knob rotation)	34 kPa (with 188 degree knob rotation); 45 kPa (with 244 degree knob rotation); 56 kPa (with 300 degree knob rotation)	Manual Pressure Regulator or Provides minimum branchline pressure when used with a low capacity device.	Knob, 0 to 100% scale plate and locknuts

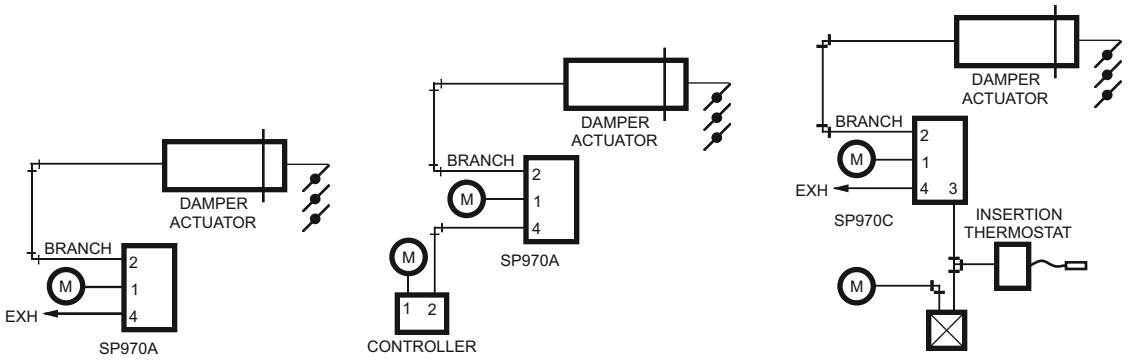
Pneumatic Switch Replacement Parts

Product Number	Description	Used With
14003022-003	Final Assembly, manual and minimum position switch, 10 psi span	SP970A
14003078-003	Pneumatic 2-Position Switch	SP470A
14003199-002	Bag assembly with two scale plates, knob assembly and nuts for SP470A	SP470A

Switches

SP970 Operation

SP970 Typical Piping



A. MANUAL POSITION APPLICATION

B. MINIMUM POSITION APPLICATION WITH CONTROLLER INPUT

C. MINIMUM POSITION APPLICATION WITH BLEED TYPE THERMOSTAT INPUT (LP916)

C4471A

Operation

SP970A Three Port Switches

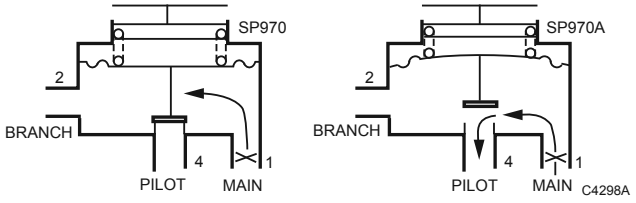
PRESSURE REGULATOR OPERATION

Main line air flows through the restriction into the branchline chamber and out the nozzle. Branchline pressure increases until it is strong enough to compress the spring and lift the diaphragm off the nozzle. Air flow out the nozzle is controlled by the balance between the branchline pressure and spring force. See Typical Piping Diagram A Above.

MINIMUM POSITION OPERATION

See Typical Piping Diagram B above. An external signal is connected to Port 4 (Exhaust Port). When the external signal is greater than the spring load, the nozzle opens and branchline pressure is the same as the external signal. When the external signal is less than the spring load, branchline pressure is controlled as described above. See Operation Diagram below.

SP970A operation

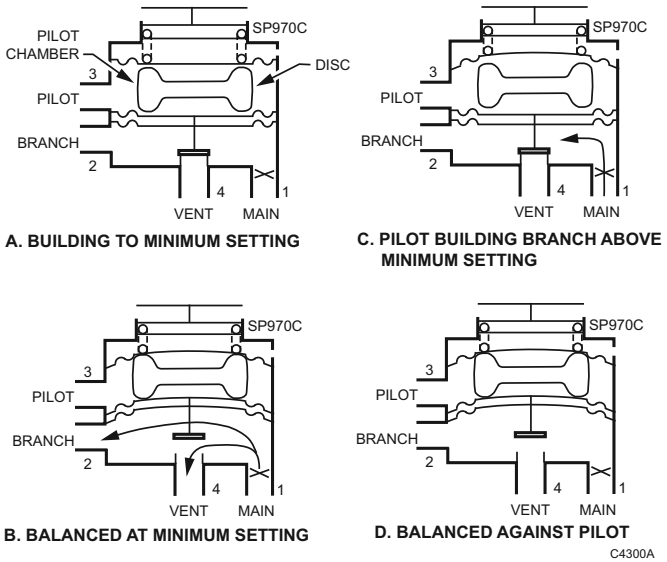


SP970C Four Port Switches

These minimum position devices have a separate dead-ended chamber connected to Port 3 to receive an external signal. When the external signal is less than the spring load, the signal has no effect and functions similar to the SP970A as a pressure regulator. When the external signal is greater than the spring load, the spring load is isolated and the device duplicates the input signal. See Operation Diagram below.

Piping Diagram C above shows a typical four-port SP970C application. The minimum-position switch keeps the pneumatic actuator at a minimum position until the thermostat pressure is greater than the minimum position valves. The thermostat then controls the actuator.

SP970C Operation



A. BUILDING TO MINIMUM SETTING

C. PILOT BUILDING BRANCH ABOVE MINIMUM SETTING

B. BALANCED AT MINIMUM SETTING

D. BALANCED AGAINST PILOT

C4300A

Damper and Valve Actuators

Pneumatic Damper Actuator Torque Ratings

TORQUE (LB-IN.) DELIVERED TO A 90-DEGREE STROKE DAMPER SHAFT:

Actuator	Spring Range Psi (kPa)	Stroke in. (mm)	Delivered Torque lb-in. (N•m)				
			Shaft Retracted	Midstroke[a]	Shaft Extended		
					13 psi (90 kPa) main	18 psi (129 kPa) main	20 psi (138 kPa) main
MP913	10-15 (69-103)	1 (25)	11 (1.243)	2 (0.226)	0 (0)	3 (3.339)	5 (0.565)
	5-10 (34-69)	1 (25)	6 (0.678)	2 (0.226)	3 (0.339)	9 (1.017)	13 (1.469)
MP916	3-12 (21-83)	2-1/4 (57)	41 (4.632)	26 (2.937)	14 (1.582)	138 (15.6)	109 (12.315)
	4-8 (27-55)	2-1/4 (57)	51 (6.214)	26 (2.937)	69 (7.796)	138 (15.6)	166 (18.755)
	5-12 (34-83)	2-1/4 (57)	69 (7.796)	26 (2.937)	14 (1.582)	82 (9.264)	109 (12.315)
MP909D	3-8 (21-55)	2-3/8 (60)	10.7 (1.209)	7.6 (0.859)	17.9 (2.023)	35.7 (4.034)	42.8 (4.836)
	5-10 (34-70)	2-3/8 (60)	17.9 (1.98)	7.6 (0.859)	10.7 (1.209)	28.6 (3.232)	35.7 (4.034)
	8-13 55-90)	2-3/8 (60)	28.6 (3.232)	7.6 (0.859)	0 (0)	17.9 (2.023)	25.0 (2.825)
	5-10 (34-70)	3 (76)	22.5 (2.543)	9.5 (1.974)	13.5 (1.526)	36 (4.008)	45 (5.085)
MP909E	2.5-6.5 (17-45)	3.1 (79)	25.6 (2.893)	22 (2.486)	66.5 (7.515)	118 (13.33)	138 (15.59)
	3-13 (21-90)	4 (101)	39.6 (4.475)	28 (3.164)	0 (0)	66 (7.058)	92.4 (10.44)
	5-10 (34-70)	4 (101)	66 (7.458)	28 (3.164)	39.6 (4.475)	105.6 (11.93)	132 (14.92)
	5-10 (34-70)	3.1 (79)	51.2 (5.786)	22 (2.486)	30.7 (3.469)	81.8 (9.243)	102 (11.53)
	9-13 (62-90)	3.1 (79)	92.1 (10.41)	22 (2.486)	0 (0)	51.2 (5.786)	71.7 (8.102)
MP909H	9-13 (62-90) plus positioner	3.1 (79)	92.1 (10.41)	[b]	0 (0)	66 (7.1)	92.4 (10.44)
MP918A	8-13 (55-90) plus positioner	3-1/2 (89)	333 (37.63)	[b]	0 (0)	208 (23.5)	292 (33)
MP918B	3-7 (21-49)	3-1/2 (89)	125 (14.3)	88 (9.944)	250 (28.25)	458 (51.53)	541 (61.3)
	3-13 (21-90)	3-1/2 (89)	125 (14.3)	88 (9.944)	0 (0)	208 (23.5)	292 (33)
	5-10 (34-70)	3-1/2 (89)	208 (23.5)	88 (9.944)	125 (14.3)	333 (37.63)	416 (47.01)
	8-13 (55-90)	3-1/2 (89)	333 (37.63)	88 (9.944)	0 (0)	208 (23.5)	292 (33)
MP920	7-13 (34-90)	6 (152)	520 (58.75)	158 (17.85)	0 (0)	372 (42.03)	521 (58.86)

[a] Torque in this column is for modulating service only.

[b] The lesser of retracted or extended shaft torque.

The following reference formulas are valid for actuators mounted on fixed brackets only.

Most dampers operate through a 90-degree arc. The amount of torque that a pneumatic actuator can deliver to the damper shaft may be calculated from the net force delivered and the length of stroke of the actuator using the following equations:

$$T_R = \frac{F_R \times S}{2}$$

$$T_E = \frac{F_E \times S}{2}$$

$$T_M = 1.5 \times A \times 0.707S$$

T_R = Torque with actuator shaft retracted.

T_E = Torque with actuator shaft extended.

T_M = Midstroke torque.

F_R = Force exerted by actuator with shaft retracted.

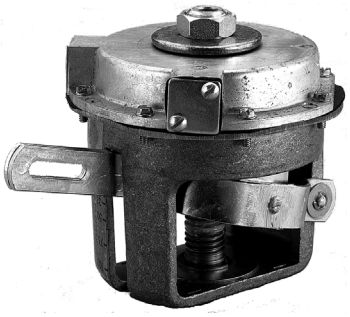
F_E = Force exerted by actuator with shaft extended.

A = Effective area of actuator diaphragm.

S = Actuator stroke.

The midstroke is significant only for modulating service and is based on the premise that an input pressure change no greater than 1.5 psi (10 kPa) should cause the actuator to reposition the damper.

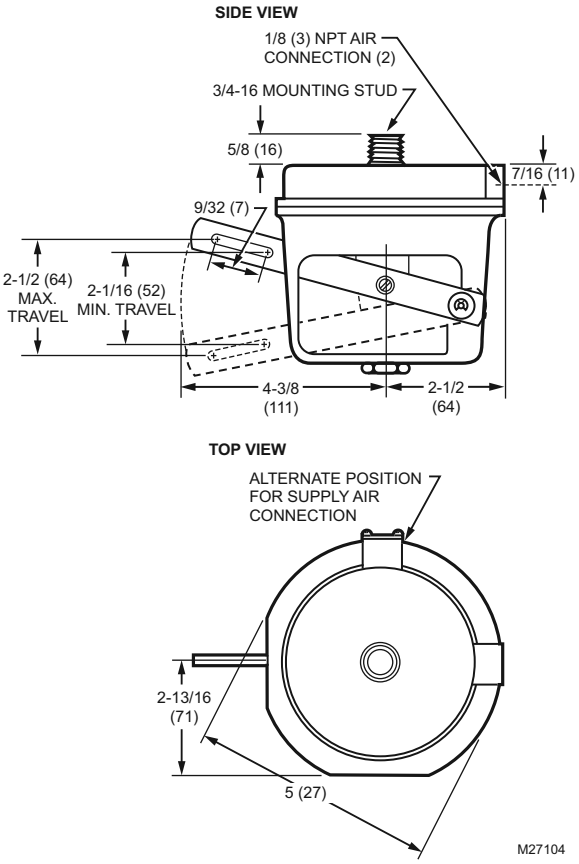
MP516 Pneumatic Unit Ventilator Damper Actuator



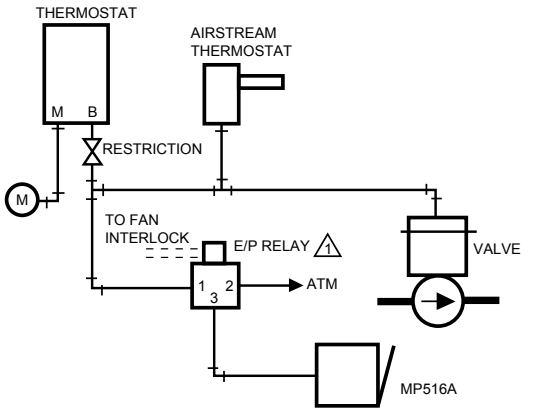
Used to control the damper on unit ventilators. Can be adapted to various unit ventilator control cycles. Replacement devices are available for Johnson, Powers, Robertshaw, Barber-Colman, and older Honeywell unit ventilator damper actuators.

- Constructed of strong zinc die castings.
- Hesitation feature available for unit ventilator cycles requiring a minimum percentage of outdoor air.

Dimensions in inches (millimeters)



MP516A Typical Piping



Actuator Type: Damper
Fail Safe Mode: Spring Return
Air Connections: 1/8 in. NPT
Stroke: 2-1/8 in. to 2-1/2 in. (54 mm to 63 mm)
Diaphragm Effective Area: 11 sq in. (71 sq cm)
Temperature Range: -20 F to +160 F (-29 C to +71 C)
Maximum Operating Pressure: 25 psi (172 kPa)
Humidity Range: 5 to 95% RH

Accessories:

26025B Damper crank arm for 3/8 in. (9.5 mm) diameter axle. Elongated slot for linkage connection. Slot scaled for 40-50-60-75-90 degrees.
27174B Damper crank arm for 7/16 in. (11.1 mm) diameter axle. Elongated slot for linkage connection. Slot scaled for 40-50-60-75-90 degrees.
27520C Push Rod (5/16 in. dia., 12 in. length)
27520G Push Rod (5/16 in. dia., 24 in. length)
27520K Push Rod (5/16 in. dia., 36 in. length)
27520L Push Rod (5/16 in. dia., 48 in. length)
309389J Mounting Bracket and Linkage
312867C Damper Crank Arm for 1/2 in. (12.7mm) diameter axle. Elongated slot for linkage connection. Slot scaled for 45-60-75-90 degrees
315321 Crankarm Balljoint (with 1/4 in male threads), fits 5/16 in. diameter pushrod

Product Number	Actuator Force	Spring Range (psi)	Spring Range (kPa)	Comments
MP516A1087	Medium	3 psi to 12 psi	21 kPa to 83 kPa	The lever arm moves to the desired minimum position as air pressure increases from 0 to 3 psi, hesitates from 3 to 8 psi, and completes its stroke from 8-12 psi.
MP516A1095	Medium	4 psi to 8 psi	28 kPa to 55 kPa	No hesitation.
MP516A1103	Medium	5 psi to 12 psi	34 kPa to 83 kPa	No hesitation.

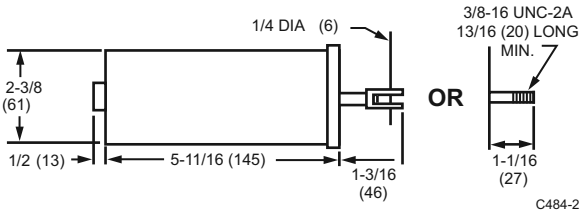
Damper Actuator

MP909D Pneumatic Damper Actuator

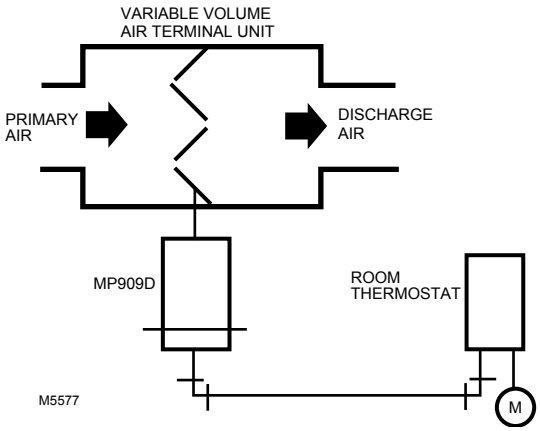
Used for pneumatic proportional control of variable volume terminal units and small damper. Available in various operating ranges for either individual or sequence operation with other actuators. Replacement devices are available for Johnson, Powers, Robertshaw, and older Honeywell actuator models.

- Rugged ribbed aluminum body.
- Low-friction shaft bearing.
- Close tolerance on operating range and stroke.
- Protected barb connector.
- Versatile mounting and connecting hardware options.
- Positive leakproof seal.

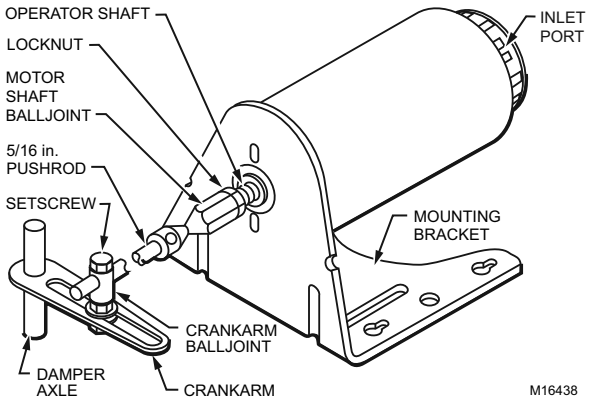
Dimensions in inches (millimeters)



MP909D Piping Diagram



MP909D Ball Joint Linkage



Actuator Type: Damper
Actuator Force: Low
Fail Safe Mode: Spring Return
Temperature Range: 50 F to 140 F (10 C to 60 C)
Maximum Operating Pressure: 30 psi (207 kPa)
Humidity Range: 5 to 95% RH

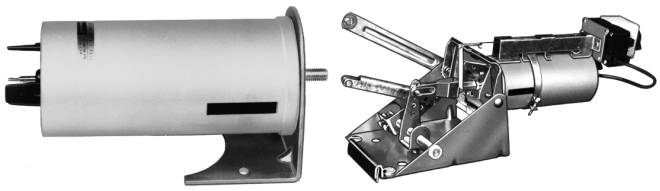
Accessories:

14002850-001 Angle Bracket 5 3/8 in, 137 mm, long, 5 in, 127 mm, wide
14003640-001 Angle Bracket 3 in. (76 mm) long, 3 3/4 in. (95 mm) wide, 2 3/4 in. (70 mm) high
26025B Damper crank arm for 3/8 in. (9.5 mm) diameter axle. Elongated slot for linkage connection. Slot scaled for 40-50-60-75-90 degrees.
27174B Damper crank arm for 7/16 in. (11.1 mm) diameter axle. Elongated slot for linkage connection. Slot scaled for 40-50-60-75-90 degrees.
27520C Push Rod (5/16 in. dia., 12 in. length)
27520G Push Rod (5/16 in. dia., 24 in. length)
27520K Push Rod (5/16 in. dia., 36 in. length)
27520L Push Rod (5/16 in. dia., 48 in. length)
312867C Damper Crank Arm for 1/2 in. (12.7mm) diameter axle. Elongated slot for linkage connection. Slot scaled for 45-60-75-90 degrees
315321 Crankarm Balljoint (with 1/4 in male threads), fits 5/16 in. diameter pushrod
315781 Motor shaft balljoint with 3/8 - 16 UNC female threads, fits 5/16 inch diameter pushrods.

Product Number	Air Connections	Diaphragm Effective Area		Spring Range		Stroke		Includes
		sq in.	sq cm	(psi)	(kPa)	(inch)	(mm)	
MP909D1201	Barbed fitting for 3/32 in. O.D. tubing	3 sq in.	19.4 sq cm	3 psi to 8 psi	21 kPa to 55 kPa	2.4 in.	61 mm	Actuator only. 3/8 in.-16 Threaded Shaft. No Mounting Bracket or Ball Joint
MP909D1219	Barbed fitting for 3/32 in. O.D. tubing	3 sq in.	19.4 sq cm	8 psi to 13 psi	55 kPa to 90 kPa	2.4 in.	61 mm	Actuator only. 3/8 in.-16 Threaded Shaft. No Mounting Bracket or Ball Joint
MP909D1227	Barbed fitting for 3/32 in. O.D. tubing	3 sq in.	19.4 sq cm	5 psi to 10 psi	34 kPa to 69 kPa	2.4 in.	61 mm	Actuator only. 3/8 in.-16 Threaded Shaft. No Mounting Bracket or Ball Joint
MP909D1318	Barbed fitting for 3/32 in. O.D. tubing	3 sq in.	19.4 sq cm	8 psi to 13 psi	55 kPa to 90 kPa	2.4 in.	61 mm	14002850-001 - External Mounting Bracket with Balljoint
MP909D1334	Barbed fitting for 3/32 in. O.D. tubing	3 sq in.	19.4 sq cm	5 psi to 10 psi	34 kPa to 69 kPa	2.4 in.	61 mm	14003640-001 - 90 degree Angled Mounting Bracket with Ball Joint
MP909D1342	Barbed fitting for 5/32 in. or 1/4 in. O.D. tubing	3 sq in.	19.4 sq cm	5 psi to 10 psi	35 kPa to 70 kPa	2.4 in.	61 mm	3/8 in.-16 Threaded Shaft and 14003640-001 - 90 degree Angled Mounting Bracket
MP909D1367	Barbed fitting for 3/32 in. O.D. tubing	3 sq in.	19.4 sq cm	5 psi to 10 psi	35 kPa to 70 kPa	3 in.	76 mm	Actuator only. 3/8 in.-16 Threaded Shaft. No Mounting Bracket or Ball Joint
MP909D1441	Barbed fitting for 3/32 in. O.D. tubing	3 sq in.	19.4 sq cm	5 psi to 10 psi	34 kPa to 69 kPa	3 in.	76 mm	Small clevis on shaft. No mounting bracket or ball joint
MP909D1474	Barbed fitting for 1/4 in. O.D. tubing	3 sq in.	19.4 sq cm	5 psi to 10 psi	35 kPa to 70 kPa	2.4 in.	61 mm	Actuator only. 3/8 in.-16 Threaded Shaft. No Mounting Bracket or Ball Joint
MP909D1508	Barbed fitting for 1/4 in. O.D. tubing	3 sq in.	19.4 sq cm	8 psi to 13 psi	55 kPa to 90 kPa	2.4 in.	61 mm	Actuator only. 3/8 in.-16 Threaded Shaft. No Mounting Bracket or Ball Joint
MP909D1516	Barbed fitting for 1/4 in. O.D. tubing	3 sq in.	19.4 sq cm	5 psi to 10 psi	35 kPa to 70 kPa	2.4 in.	61 mm	Actuator only. 3/8 in.-16 Threaded Shaft. No Mounting Bracket or Ball Joint
MP909D1524	Barbed fitting for 1/4 in. O.D. tubing	3 sq in.	19.4 sq cm	5 psi to 10 psi	35 kPa to 70 kPa	3 in.	76 mm	31578 ball joint and 14003640-001 - 90 degree Angled Mounting Bracket

Damper Actuator

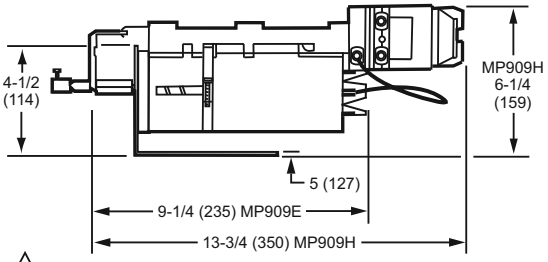
MP909E,H Pneumatic Damper Actuators



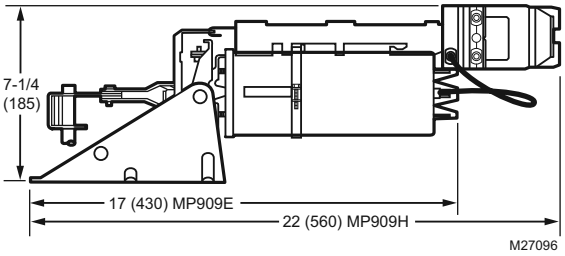
These actuators are used for proportional control of variable volume terminal units, mixing boxes, and small to medium sized dampers. They are available in various operating ranges for either independent operation or sequence operation with other actuators. The MP909E has an optional adjustable stroke feature.; The MP909H includes a positive positioner. Replacement devices are available for Johnson, Powers, Robertshaw, Barber-Colman, and older Honeywell actuator models.

- Rolling diaphragm operated.
- Low friction shaft bearing.
- Close tolerance on operating range and stroke.
- Non-overlapping spring ranges for sequencing.
- Corrosion resistant materials.
- Reliable-long life.

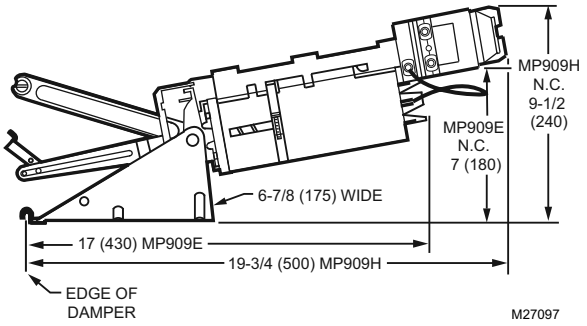
Dimensions in inches (millimeters)
Actuator with Fixed External Mounting Bracket



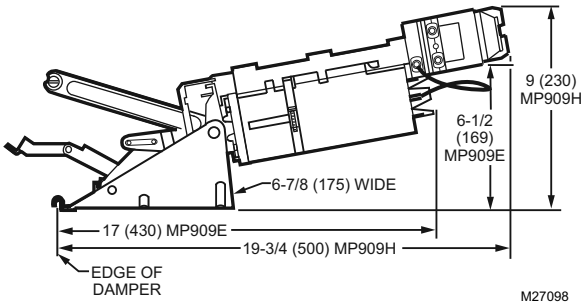
Dimensions in inches (millimeters)
Actuator with External Trunnion Mounting Bracket



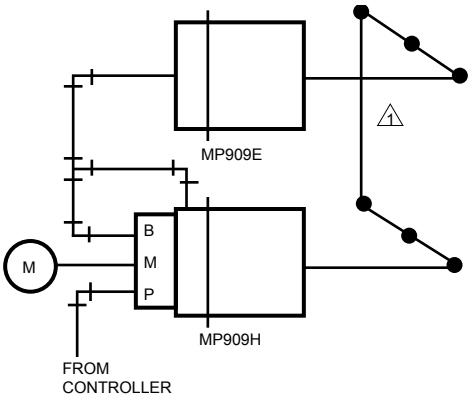
Dimensions in inches (millimeters)
Bracket with Internal N.C. Trunnion Mounting Bracket



Dimensions in inches (millimeters)
Bracket with Internal N.O. Trunnion Mounting Bracket



MP909E,H Piping Diagram



Actuator Type: Damper
Fail Safe Mode: Spring Return
Actuator Force: Medium
Diaphragm Effective Area: 6.6 sq in. (43 sq cm)
Humidity Range: 5 to 95% RH

Accessories:

14002850-001 Angle Bracket 5 3/8 in, 137 mm, long, 5 in, 127 mm, wide
14003640-001 Angle Bracket 3 in. (76 mm) long, 3 3/4 in. (95 mm) wide, 2 3/4 in. (70 mm) high
14004062-001 External Trunnion Mounting Bracket
14004062-002 Internal N.C. Trunnion Mounting Bracket
14004062-003 Internal N.O. Trunnion Mounting Bracket
14004106-001 Actuator pushrod for conversion of internal N.C. to external
14004107-001 Crankarm Assembly for conversion from internal N.C. to external Trunnion mounting
14004210-001 Feedback Spring Kit includes orange spring (3 psi [21kPa]), yellow spring (5 psi [34 kPa]), and blue spring (10 psi [69 kPa]).
14004236-001 Coupler, actuator shaft to 5/16 in, 8 mm, pushrod
14004241-002 Hitch Pin (Six Sets)
14004242-001 MP918 Top Mount Operator Assembly
14004667-001 Offset Crank arm assembly with 2 screws (304725-062), nuts (14004102-001), crank arm (14004655-001) for 1/2 in. Drive Axle

26025B Damper crank arm for 3/8 in. (9.5 mm) diameter axle. Elongated slot for linkage connection. Slot scaled for 40-50-60-75-90 degrees.
27174B Damper Crank Arm for 7/16 in (11 mm) Axle
27518 Crankarm balljoint with 1/4 - 28 UNF male threads, fits 5-16 inch diameter push rods
27520C Push Rod (5/16 in. dia., 12 in. length)
27520G Push Rod (5/16 in. dia., 24 in. length)
27520K Push Rod (5/16 in. dia., 36 in. length)
27520L Push Rod (5/16 in. dia., 48 in. length)
312867C Damper Crank Arm for 1/2 in. (12.7mm) diameter axle. Elongated slot for linkage connection. Slot scaled for 45-60-75-90 degrees
312867H Externally mounted Linkage Kit
314440A MP909 - Clevis, Clevis Pin and Cotter Pin Assembly
315321 Crankarm Balljoint (with 1/4 in male threads), fits 5/16 in. diameter pushrod
315781 Motor shaft balljoint with 3/8 - 16 UNC female threads, fits 5/16 inch diameter pushrods.

Replacement Parts:
14004137-001 Retrofit Kit for adding positive positioner to MP909E or repair of MP909H

Product Number	Air Connections	Temperature Range		Maximum Operating Pressure		Spring Range		Stroke		Includes
		(F)	(C)	(psi)	(kPa)	(psi)	(kPa)	(inch)	(mm)	
MP909E1018	Dual Barbed fitting for 5/32 in. or 1/4 in. O.D. tubing	-28 F to +160 F	-33 C to +71 C	29 psi	200 kPa	3 psi to 13 psi	21 kPa to 90 kPa	4 in.	102 mm	315781 Balljoint, Linkage Kit 14002061-006 and 14002850-001 Fixed External Mounting Bracket with Balljoint
MP909E1026	Dual Barbed fitting for 5/32 in. or 1/4 in. O.D. tubing	-28 F to +160 F	-33 C to +71 C	29 psi	200 kPa	3 psi to 13 psi	21 kPa to 90 kPa	4 in.	102 mm	Actuator only. 3/8 in.-16 Threaded Shaft. No Mounting Bracket or linkage
MP909E1034	Dual Barbed fitting for 5/32 in. or 1/4 in. O.D. tubing	-28 F to +160 F	-33 C to +71 C	29 psi	200 kPa	5 psi to 10 psi	34 kPa to 69 kPa	4 in.	102 mm	315781 Balljoint, Linkage Kit 14002061-006 and 14002850-001 Fixed External Mounting Bracket with Balljoint
MP909E1059	Dual Barbed fitting for 5/32 in. or 1/4 in. O.D. tubing	-28 F to +160 F	-33 C to +71 C	29 psi	200 kPa	5 psi to 10 psi	34 kPa to 69 kPa	2 3/4 in.	70 mm	Actuator only. 3/8 in.-16 Threaded Shaft with stroke stops. No Mounting Bracket
MP909E1067	Dual Barbed fitting for 5/32 in. or 1/4 in. O.D. tubing	-28 F to +160 F	-33 C to +71 C	29 psi	200 kPa	5 psi to 10 psi	34 kPa to 69 kPa	3 in.	79 mm	Fixed external unitary mounting bracket and clevis shaft with stroke stops
MP909E1083	Dual Barbed fitting for 5/32 in. or 1/4 in. O.D. tubing	-28 F to +160 F	-33 C to +71 C	29 psi	200 kPa	2.5 psi to 6.5 psi	17 kPa to 45 kPa	3 in.	79 mm	315781 Balljoint, Linkage Kit 14002061-006 and 14002850-001 Fixed External Mounting Bracket with Balljoint
MP909E1109	Dual Barbed fitting for 5/32 in. or 1/4 in. O.D. tubing	-28 F to +160 F	-33 C to +71 C	29 psi	200 kPa	2.5 psi to 6.5 psi	17 kPa to 45 kPa	2 3/4 in.	70 mm	Actuator only. 3/8 in.-16 Threaded Shaft with stroke stops. No Mounting Bracket
MP909E1158	Dual Barbed fitting for 5/32 in. or 1/4 in. O.D. tubing	-28 F to +160 F	-33 C to +71 C	29 psi	200 kPa	9 psi to 13 psi	62 kPa to 90 kPa	3 in.	79 mm	Actuator only. 3/8 in.-16 Threaded Shaft. No Mounting Bracket
MP909E1174	Dual Barbed fitting for 5/32 in. or 1/4 in. O.D. tubing	-28 F to +160 F	-33 C to +71 C	29 psi	200 kPa	9 psi to 13 psi	62 kPa to 90 kPa	3 in.	70 mm	14002850-001 - Fixed External Mounting Bracket with 315781 Balljoint
MP909E1240	Dual Barbed fitting for 5/32 in. or 1/4 in. O.D. tubing	-28 F to +160 F	-33 C to +71 C	29 psi	200 kPa	5 psi to 10 psi	35 kPa to 70 kPa	3 in.	79 mm	Actuator only. 3/8 in.-16 Threaded Shaft. No Mounting Bracket
MP909E1349	Dual Barbed fitting for 5/32 in. or 1/4 in. O.D. tubing	-28 F to +160 F	-33 C to +71 C	29 psi	200 kPa	3 psi to 13 psi	21 kPa to 90 kPa	4 in.	102 mm	Internal N.C. trunnion mounting bracket
MP909E1356	Dual Barbed fitting for 5/32 in. or 1/4 in. O.D. tubing	-28 F to +160 F	-33 C to +71 C	29 psi	200 kPa	3 psi to 13 psi	21 kPa to 90 kPa	4 in.	102 mm	External trunnion mounting bracket

Damper Actuator

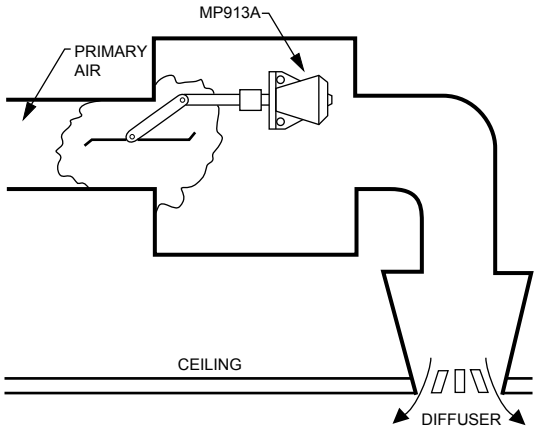
Product Number	Air Connections	Temperature Range		Maximum Operating Pressure		Spring Range		Stroke		Includes
		(F)	(C)	(psi)	(kPa)	(psi)	(kPa)	(inch)	(mm)	
MP909E1364	Dual Barbed fitting for 5/32 in. or 1/4 in. O.D. tubing	-28 F to +160 F	-33 C to +71 C	29 psi	200 kPa	5 psi to 10 psi	34 kPa to 69 kPa	4 in.	102 mm	External trunnion mounting bracket
MP909E1372	Dual Barbed fitting for 5/32 in. or 1/4 in. O.D. tubing	-28 F to +160 F	-33 C to +71 C	29 psi	200 kPa	2.5 psi to 6.5 psi	17 kPa to 45 kPa	3 in.	70 mm	External trunnion mounting bracket
MP909E1380	Dual Barbed fitting for 5/32 in. or 1/4 in. O.D. tubing	-28 F to +160 F	-33 C to +71 C	29 psi	200 kPa	9 psi to 13 psi	62 kPa to 90 kPa	3 in.	79 mm	External trunnion mounting bracket
MP909E1398	Dual Barbed fitting for 5/32 in. or 1/4 in. O.D. tubing	-28 F to +160 F	-33 C to +71 C	29 psi	200 kPa	9 psi to 13 psi	62 kPa to 90 kPa	3 in.	79 mm	Internal N.C. trunnion mounting bracket
MP909E1422	Dual Barbed fitting for 5/32 in. or 1/4 in. O.D. tubing	-28 F to +160 F	-33 C to +71 C	29 psi	200 kPa	5 psi to 10 psi	35 kPa to 70 kPa	4 in.	102 mm	14004062-003 Internal N.O. Mounting Bracket with crankarm and pushrod assembly
MP909E1463	Dual Barbed fitting for 5/32 in. or 1/4 in. O.D. tubing	-28 F to +160 F	-33 C to +71 C	29 psi	200 kPa	5 psi to 10 psi	35 kPa to 70 kPa	4 in.	102 mm	14002850-001 - Fixed External Mounting Bracket
MP909H1331	Positioner: Pilot 5/32 in. barb, Main 1/4 in. barb, Branch 1/4 in. barb. Actuator: combination 5/32 in. and 1/4 in. barb	-20 F to +160 F	-29 C to +71 C	25 psi	172 kPa	Positive positioner 10 psi span (5 psi spring included)	Positive positioner 69 kPa span (34 kPa spring included)	4 in.	102 mm	315781 Balljoint, Positive Positioner, and 14002850-001 - Fixed External Mounting Bracket with Balljoint
MP909H1368	Positioner: Pilot 5/32 in. barb, Main 1/4 in. barb, Branch 1/4 in. barb. Actuator: combination 5/32 in. and 1/4 in. barb	-20 F to +160 F	-29 C to +71 C	25 psi	172 kPa	Positive positioner 10 psi span (5 psi spring included)	Positive positioner 69 kPa span (34 kPa spring included)	4 in.	102 mm	External Trunnion Bracket, Positive Positioner
MP909H1392	Positioner: Pilot 5/32 in. barb, Main 1/4 in. barb, Branch 1/4 in. barb. Actuator: combination 5/32 in. and 1/4 in. barb	-20 F to +160 F	-29 C to +71 C	25 psi	172 kPa	Positive positioner 10 psi span (5 psi spring included)	Positive positioner 69 kPa span (34 kPa spring included)	4 in.	102 mm	Mounting bracket for internal N.C. Trunnion mounting, positive positioner

MP913 Pneumatic Variable Volume Damper Actuator

Provides proportional control of variable volume dampers in small high velocity mixing boxes. Replacement devices are available for Johnson and Robertshaw devices. Suitable for direct replacement only, do not attempt to replace larger damper actuators with this unit.

- Compact in size.
- Neoprene rolling diaphragm.
- The MP913 Operator can be used with or without a crankarm.

MP913A Typical Piping



M5438

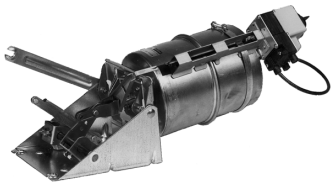
Actuator Type: Damper
Dimensions, Approximate: 2 5/8 in. high (add 3/4 in. for shaft) x 2 1/4 in. diameter (67 mm high (add 19 mm for shaft) x 57 mm diameter)
Actuator Force: Low
Fail Safe Mode: Spring Return
Air Connections: Barbed fitting for 1/4 in. O.D. plastic tubing
Temperature Range: 50 F to 140 F (10 C to 60 C)
Maximum Operating Pressure: 30 psi (207 kPa)
Humidity Range: 5 to 95% RH

Accessories:
315321 Crankarm Balljoint (with 1/4 in male threads), fits 5/16 in. diameter pushrod
315781 Motor shaft balljoint with 3/8 - 16 UNC female threads, fits 5/16 inch diameter pushrods.
27520C Push Rod (5/16 in. dia., 12 in. length)
27520G Push Rod (5/16 in. dia., 24 in. length)
27520K Push Rod (5/16 in. dia., 36 in. length)
27520L Push Rod (5/16 in. dia., 48 in. length)

Product Number	Diaphragm Effective Area		Spring Range		Stroke		Includes
	sq in.	sq cm	(psi)	(kPa)	(inch)	(mm)	
MP913A1003	2.2 sq in.	14 sq cm	10 psi to 15 psi	69 kPa to 103 kPa	1 in.	25 mm	14002808-001 - Flat Mounting Bracket. Shaft has 1/8 in. diameter hole for a roll pin.
MP913A1011	2.2 sq in.	14 sq cm	10 psi to 15 psi	69 kPa to 103 kPa	1 in.	25 mm	14003640-001 - 90 degree Angled Mounting Bracket and 3/8 in.-16 Threaded Shaft
MP913A1029	2.2 sq in.	14 sq cm	5 psi to 10 psi	34 kPa to 69 kPa	1 in.	25 mm	14003640-001 - 90 degree Angled Mounting Bracket and 3/8 in.-16 Threaded Shaft
MP913A1037	2.2 sq in.	14 sq cm	5 psi to 10 psi	34 kPa to 69 kPa	1 in.	25 mm	14003640-001 - 90 degree Angled Mounting Bracket. Shaft has 1/8 in. diameter hole for a roll pin.
MP913A1177	2.2 sq in.	14 sq cm	3 psi to 13 psi	21 kPa to 90 kPa	1 in.	25 mm	14002809-001 - 90 degree Angled Mounting Bracket (3-point attachment) and 3/8 inch - 16 threaded shaft

Damper Actuator

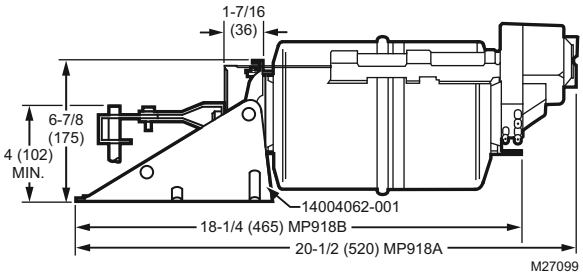
MP918A,B Pneumatic Damper Actuators



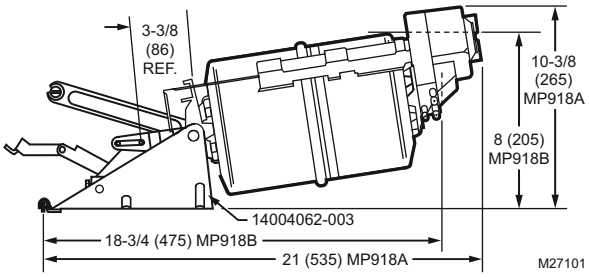
Used for proportional control of medium- to large-size dampers in HVAC systems. The MP918A,B are rolling diaphragm, piston-type actuators. The MP918A has a positive positioner. Replacement devices are available for Johnson, Powers, Robertshaw, Barber-Colman, and older Honeywell actuator models.

- Rolling diaphragm operated.
- Low friction shaft bearing.
- Close tolerance on operating range and stroke.
- Versatile mounting and connecting hardware.
- Non-overlapping spring ranges for sequencing.
- Reliable-long life.

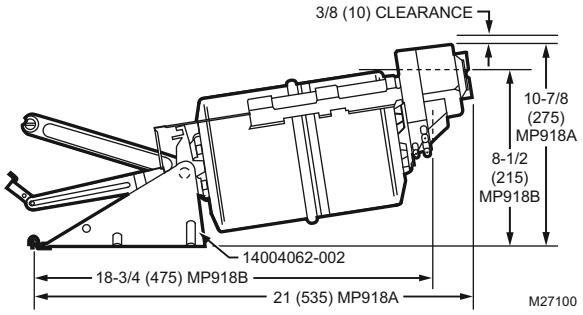
Dimensions in inches (millimeters)
Actuator with External Trunnion Mounting Bracket



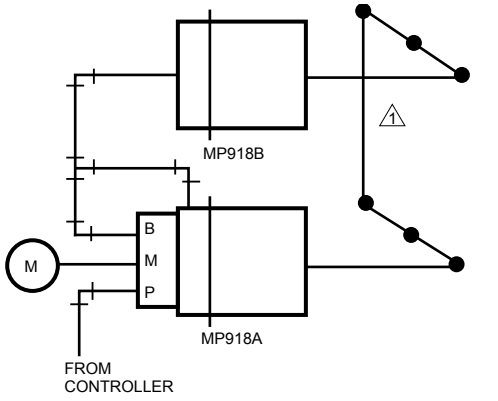
Dimensions in inches (millimeters)
Actuator with Internal N.O. Trunnion Mounting Bracket



Dimensions in inches (millimeters)
Actuator with Internal N.C. Trunnion Mounting Bracket



MP918A and B Typical Piping



Actuator Type: Damper
Fail Safe Mode: Spring Return
Actuator Force: High
Diaphragm Effective Area: 23.8 sq in. (154 sq cm)
Stroke: 3 1/2 in. (90 mm)
Humidity Range: 5 to 95% RH

Accessories:

14004062-001 External Trunnion Mounting Bracket
14004062-002 Internal N.C. Trunnion Mounting Bracket
14004062-003 Internal N.O. Trunnion Mounting Bracket
14004106-001 Actuator pushrod for conversion of internal N.C. to external
14004107-001 Crankarm Assembly for conversion from internal N.C. to external Trunnion mounting
14004210-001 Feedback Spring Kit includes orange spring (3 psi [21kPa]), yellow spring (5 psi [34 kPa]), and blue spring (10 psi [69 kPa]).
14004241-002 Hitch Pin (Six Sets)
14004242-001 MP918 Top Mount Operator Assembly
14004667-001 Offset Crank arm assembly with 2 screws (304725-062), nuts (14004102-001), crank arm (14004655-001) for 1/2 in. Drive Axle
14004264-001 MP918 Repair kit including Positive Positioner, bracket assembly and fittings
14004236-001 Coupler, actuator shaft to 5/16 in, 8 mm, pushrod
CCT2718 Threaded rod for shaft extension
CCT2725 Rod coupling for shaft extension

Replacement Parts:

14004264-002 MP918 Positive Positioner Retrofit Kit - includes 10 psi feedback spring

Product Number	Air Connections	Temperature Range		Maximum Operating Pressure		Spring Range		Includes
		(F)	(C)	(psi)	(kPa)	(psi)	(kPa)	
MP918A1024	5/32 in. push-on barb (Pilot), 1/4 in. push-on barb (main.)	-20 F to +158 F	-29 C to +70 C	25 psi	172 kPa	Positive positioner 10 psi span (5 psi spring included)	Positive positioner 69 kPa span (34 kPa spring included)	14004062-001 - External Trunnion Mounting Bracket with crankarm assembly. Positive Positioner
MP918A1057	5/32 in. push-on barb (Pilot), 1/4 in. push-on barb (main.)	-20 F to +158 F	-29 C to +70 C	25 psi	172 kPa	Positive positioner 10 psi span (5 psi spring included)	Positive positioner 69 kPa span (34 kPa spring included)	14004062-002 - Internal N.C. Trunnion Mounting Bracket with pushrod assembly. Positive Positioner
MP918A1081	5/32 in. push-on barb (Pilot), 1/4 in. push-on barb (main.)	-20 F to +158 F	-29 C to +70 C	25 psi	172 kPa	Positive positioner 10 psi span (5 psi spring included)	Positive positioner 69 kPa span (34 kPa spring included)	14004062-003 - Internal N.O. Trunnion Mounting Bracket with pushrod assembly. Positive Positioner
MP918B1006	Barbed fitting for 1/4 in. O.D. plastic tubing	-40 F to +158 F	-40 C to +70 C	29 psi	200 kPa	3 psi to 13 psi	20 kPa to 90 kPa	14004062-001 - External Trunnion Mounting Bracket with crankarm assembly
MP918B1014	Barbed fitting for 1/4 in. O.D. plastic tubing	-40 F to +158 F	-40 C to +70 C	29 psi	200 kPa	3 psi to 13 psi	20 kPa to 90 kPa	14004062-001 - Internal N.C. Trunnion Mounting Bracket with pushrod assembly
MP918B1022	Barbed fitting for 1/4 in. O.D. plastic tubing	-40 F to +158 F	-40 C to +70 C	29 psi	200 kPa	3 psi to 13 psi	20 kPa to 90 kPa	14004062-003 Internal N.O. Trunnion Mounting Bracket with pushrod assembly
MP918B1030	Barbed fitting for 1/4 in. O.D. plastic tubing	-40 F to +158 F	-40 C to +70 C	29 psi	200 kPa	3 psi to 13 psi	20 kPa to 90 kPa	Actuator only. No Mounting Bracket
MP918B1048	Barbed fitting for 1/4 in. O.D. plastic tubing	-40 F to +158 F	-40 C to +70 C	29 psi	200 kPa	5 psi to 10 psi	34 kPa to 69 kPa	14004062-001 - External Trunnion Mounting Bracket with crankarm assembly
MP918B1063	Barbed fitting for 1/4 in. O.D. plastic tubing	-40 F to +158 F	-40 C to +70 C	29 psi	200 kPa	3 psi to 7 psi	20 kPa to 48 kPa	14004062-001 - External Trunnion Mounting Bracket with crankarm assembly
MP918B1071	Barbed fitting for 1/4 in. O.D. plastic tubing	-40 F to +158 F	-40 C to +70 C	29 psi	200 kPa	3 psi to 7 psi	20 kPa to 48 kPa	14004062-002 Internal N.C. Trunnion Mounting Bracket with pushrod assembly
MP918B1089	Barbed fitting for 1/4 in. O.D. plastic tubing	-40 F to +158 F	-40 C to +70 C	29 psi	200 kPa	8 psi to 13 psi	55 kPa to 90 kPa	14004062-001 - External Trunnion Mounting Bracket with crankarm assembly
MP918B1097	Barbed fitting for 1/4 in. O.D. plastic tubing	-40 F to +158 F	-40 C to +70 C	29 psi	200 kPa	8 psi to 13 psi	55 kPa to 90 kPa	14004062-002 Internal N.C. Trunnion Mounting Bracket with pushrod assembly
MP918B1105	Barbed fitting for 1/4 in. O.D. plastic tubing	-40 F to +158 F	-40 C to +70 C	29 psi	200 kPa	8 psi to 13 psi	55 kPa to 90 kPa	14004062-003 Internal N.O. Trunnion Mounting Bracket with pushrod assembly
MP918B1113	Barbed fitting for 1/4 in. O.D. plastic tubing	-40 F to +158 F	-40 C to +70 C	29 psi	200 kPa	8 psi to 13 psi	55 kPa to 90 kPa	Actuator only. No Mounting Bracket
MP918B1196	Barbed fitting for 1/4 in. O.D. plastic tubing	-40 F to +158 F	-40 C to +70 C	29 psi	200 kPa	8 psi to 13 psi	55 kPa to 90 kPa	14004062-001 - External Trunnion Mounting Bracket with crankarm assembly

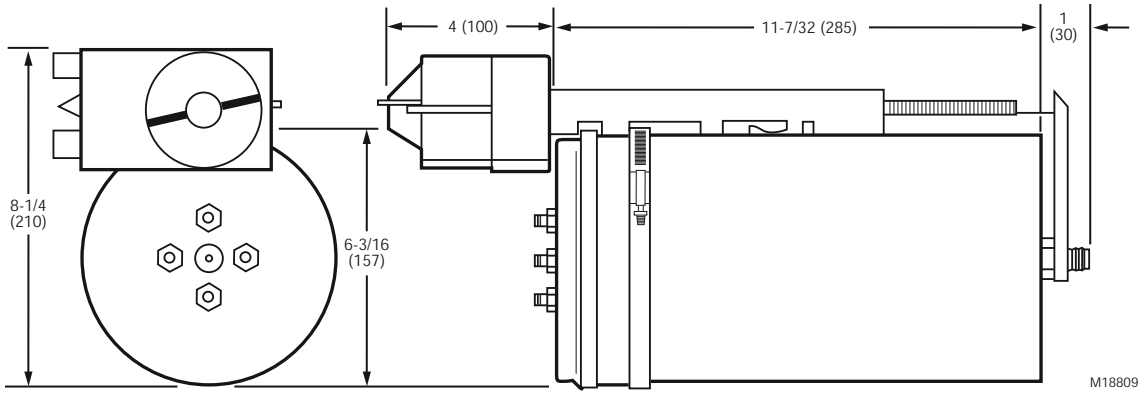
Damper Actuator

MP920 Pneumatic Damper Actuator

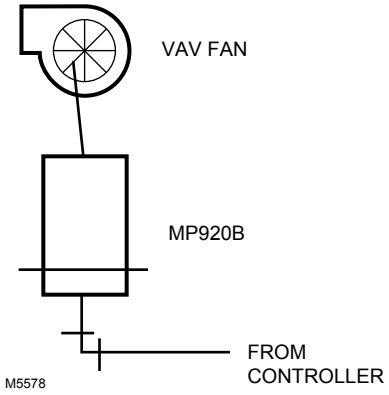
Provides proportional control of large dampers in HVAC systems or inlet vanes on a VAV fan. Positive positioner available separately. Replacement devices are available for Robertshaw actuator models.

- Rolling diaphragm operated.
- Fail safe on over pressure.
- Actuator can be swivel mounted from either end to pipe, floor, or wall surface.
- Optional positive positioner provides accurate positioning under varying load conditions.

Dimensions in inches (millimeters)



MP920B Typical Piping



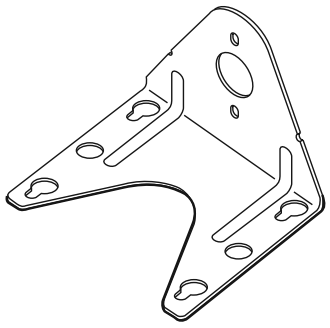
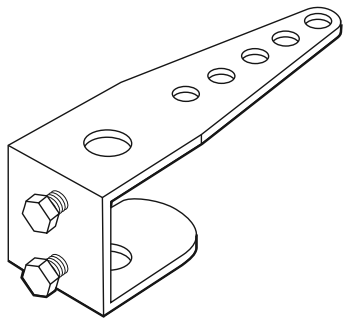
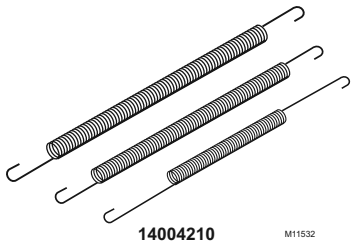
Actuator Type: Damper

Fail Safe Mode: Spring Return
Actuator Force: High
Air Connections: Barbed fitting for 1/4 in. O.D. plastic tubing
Temperature Range: -20 F to +158 F (-30 C to +70 C)
Maximum Operating Pressure: 29 psi (200 kPa)
Humidity Range: 5 to 95% RH

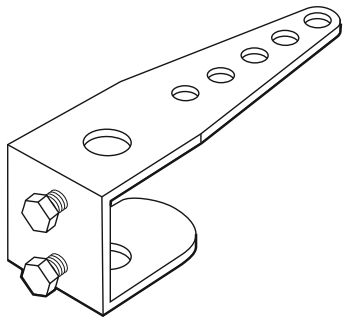
Accessories:
14004062-001 External Trunnion Mounting Bracket
14004241-002 Hitch Pin (Six Sets)
14004345-001 Positive Positioner Kit, 10 psi feedback spring
AK3556 Pipe Mounting Assembly for 1-1/4 in. pipe
AK3557 Short Clevis Bag Assembly for 3/8-16 threaded rod
AK3558 Swivel Bracket Bag Assembly
AK3559 Long Clevis Bag Assembly with actuator shaft coupling for 5/8-11 threaded rod
AK3560 Balljoint, 3/8-24 threaded stud with couplings for 5/8-11 threaded rod and actuator shaft
AK3561 Balljoint, 3/8-24 threaded stud with couplings for 3/8-16 threaded rod

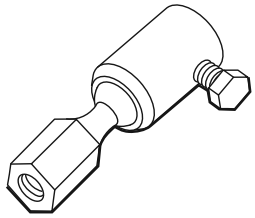
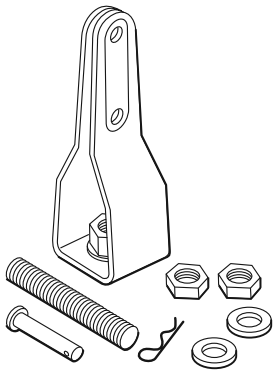
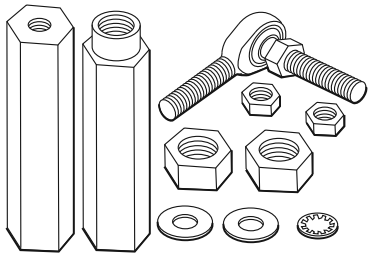
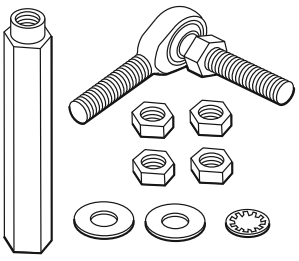
	Diaphragm Effective Area		Spring Range		Stroke		
Product Number	**sq in.**	**sq cm**	**(psi)**	**(kPa)**	**(inch)**	**(mm)**	**Includes**
MP920B1002	24.8 sq in.	160 sq cm	7.25 psi to 13 psi	50 kPa to 90 kPa	6 in.	150 mm	Actuator only. No Bracket. Order positive positioner, mounting and connecting hardware separately. See Installation Instructions form no. 95-6053

Pneumatic Damper Actuator Parts and Accessories

Product Number	Description	Used With	
14000716-001	Internal, Normally Closed, Motor Mounting Kit with Right Drive Ear, For MP909E and MP918.	MP909E,H	
14001213-001	MP904A and B Diaphragm	MP904A,B	
14002061-001	Damper Linkage Kit w/ Template	MP909E,F	
14002850-001	Angle Bracket 5 3/8 in, 137 mm, long, 5 in, 127 mm, wide	MP909D,E	
14003640-001	Angle Bracket 3 in. (76 mm) long, 3 3/4 in. (95 mm) wide, 2 3/4 in. (70 mm) high	MP913; MP909D	 **14003640** M11504
14003820-019	MP516 Bracket and Linkage Assembly	MP516; MP909D	
14004062-001	External Trunnion Mounting Bracket	MP918A,B; MP909E,H	
14004062-002	Internal N.C. Trunnion Mounting Bracket	MP918A,B; MP909E,H	
14004062-003	Internal N.O. Trunnion Mounting Bracket	MP918A,B; MP909E,H	
14004106-001	Actuator pushrod for conversion of internal N.C. to external	MP918A,B; MP909E,H	
14004106-002	Push rod assembly for internal N.C.	MP918A,B; MP909E,H	
14004107-001	Crankarm Assembly for conversion from internal N.C. to external Trunnion mounting	MP918A,B; MP909E,H	 **14004107** M11530
14004136-001	MP904 Positive Positioner Retrofit Kit	MP904A	
14004137-001	Retrofit Kit for adding positive positioner to MP909E or repair of MP909H	MP909E; MP909H	
14004210-001	Feedback Spring Kit includes orange spring (3 psi [21kPa]), yellow spring (5 psi [34 kPa]), and blue spring (10 psi [69 kPa]).	MP909H; MP918A	 **14004210** M11532
14004236-001	Coupler, actuator shaft to 5/16 in, 8 mm, pushrod	MP918;	
14004237-002	Bag assembly including 4 hex head slotted drill point screws (14004513-001)	MP918A,B; MP909E,H	
14004241-002	Hitch Pin (Six Sets)	MP918A,B; MP909E,H	

Damper Actuator

Product Number	Description	Used With	
14004242-001	MP918 Top Mount Operator Assembly	MP918A,B	
14004264-001	MP918 Repair kit including Positive Positioner, bracket assembly and fittings	MP918A	
14004264-002	MP918 Positive Positioner Retrofit Kit - includes 10 psi feedback spring	MP918B	
14004313-003	Hardware Bag assembly kit including Drive Axle (14004145-001), Screw (15753279-001), Nut (7289-21), and Instruction sheet in a Cloth Bag (7640)	MP918A; MP918B	
14004324-001	Kit for Alternate External Top-Mount, MP909E,H MP918A,B	MP918A,B; MP909E,H	
14004345-001	Positive Positioner Kit, 10 psi feedback spring	MP920B	 **14004107** M11530
14004350-001	Steel Clevis Pin (1/4 x 7/8)	MP918	
14004577-001	MP953 A, C, and E (Direct Acting, 5 in. diameter) Yoke/Base Assembly	MP953A,C,E	
15753692-001	Modular Kit for Jack Shaft Installation of MP909E and MP918B Actuators	MP909E; MP918B	
15753693-001	End kit for Jack Shaft Installation of MP909E and MP918B Actuators	MP909E; MP918B	
15753694-001	Operator kit for Jack Shaft Installation of MP909E and MP918B Actuators	MP909E; MP918B	
26025B	Damper crank arm for 3/8 in. (9.5 mm) diameter axle. Elongated slot for linkage connection. Slot scaled for 40-50-60-75-90 degrees.	MP516; MP909D; MP909E, H	
27174B	Damper crank arm for 7/16 in. (11.1 mm) diameter axle. Elongated slot for linkage connection. Slot scaled for 40-50-60-75-90 degrees.	MP516; MP513	
309292	MP516A Diaphragm	MP516	
309389J	Mounting Bracket and Linkage	MP516	
312809C	MP904A and B Tube and Diaphragm Assembly	MP904A,B	
312817	MP953C (5 in. diameter) Cover	MP953C (5 in.)	
312867C	Damper Crank Arm for 1/2 in. (12.7mm) diameter axle. Elongated slot for linkage connection. Slot scaled for 45-60-75-90 degrees	MP516; MP909D; MP909E; MP909H	
312867H	Externally mounted Linkage Kit	MP516; MP909D,E,H	
314100	MP909A Replacement Diaphragm	MP909A	
314231	MP909B Replacement Diaphragm	MP909B	
314316A	Crank Arm Assembly	MP516	
314440A	MP909 - Clevis, Clevis Pin and Cotter Pin Assembly	MP909	
314503	MP909C Replacement Diaphragm	MP909C	
315321	Crankarm Balljoint (with 1/4 in male threads), fits 5/16 in. diameter pushrod	MP516; MP909D,E,H; MP913	
315321G	Crankarm and Linkage	MP909A,D	
315439/0062	Clevis	MP909D	

Product Number	Description	Used With	
315781	Motor shaft balljoint with 3/8 - 16 UNC female threads, fits 5/16 inch diameter pushrods.	MP909D,E,H; MP913	 **315781** M11503
315782	Balljoint (9/16 in.-18 UNC) accepts 5/16 in. Pushrod	MP920B	
AK3557	Short Clevis Bag Assembly for 3/8-16 threaded rod	MP920B	 **AK3557** M11509
AK3558	Swivel Bracket Bag Assembly	MP920B	
AK3560	Balljoint, 3/8-24 threaded stud with couplings for 5/8-11 threaded rod and actuator shaft	MP920B	 **AK3560** M11507
AK3561	Balljoint, 3/8-24 threaded stud with couplings for 3/8-16 threaded rod	MP920B	 **AK3561** M11506
CCT2718	Threaded rod for shaft extension	MP918	
CCT2725	Rod coupling for shaft extension	MP918	

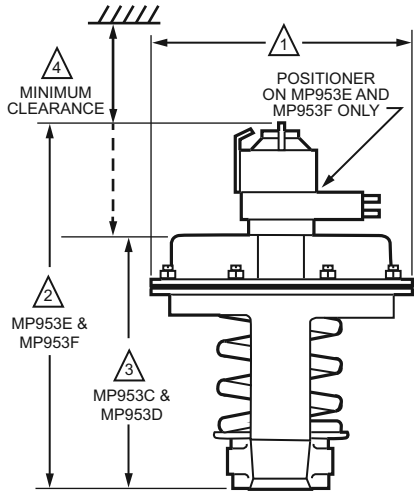
Valve Actuator

MP953C,D Pneumatic Coil Valve Actuators

Pneumatic actuators provide proportional control of steam or hot or cold liquids in HVAC systems by operating V5011, V5013, and VGF valve assemblies. Replacement devices are available for older Honeywell actuators.

- Rolling diaphragm for long life and low hysteresis.
- Easily attached to valve.
- Can be installed after piping valve.
- Slide lock feature permits simple engagement to valve stem.
- Direct- or reverse-action control.
- Does not include positive positioner.

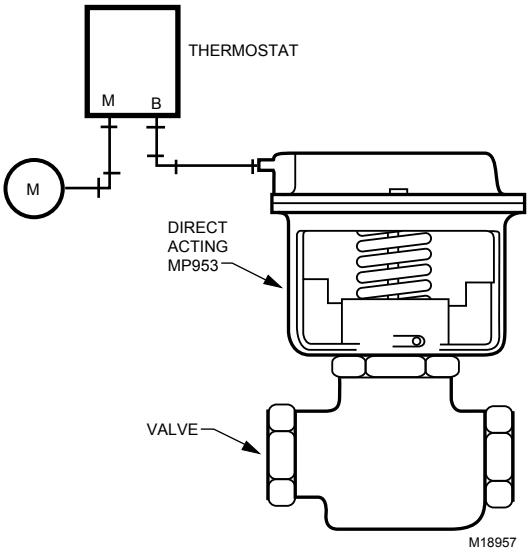
Dimensions in inches (millimeters)



OPERATION SIZE NOMINAL DIA.	1	2	3	4
5 INCH	5-1/8 (130)	9-1/4 (235)	4-5/8 (117)	4-3/8 (111)
7-1/8 INCH	7-1/8 (181)	10-1/2 (267)	5-5/8 (143)	4-3/8 (111)
8 INCH	8-1/4 (210)	11-1/8 (283)	6-1/2 (165)	5-3/8 (137)
13 INCH	13-1/2 (343)	18-1/8 (460)	10 (254)	7-11/16 (195)

M13903

Typical MP953C,D Operation



M18957

Actuator Type: Valve
Fail Safe Mode: Spring Return
Air Connections: Dual barbed fitting for 5/32 in. O.D. and 1/4 in. O.D. plastic tubing
Temperature Range: 0 F to 140 F (-18 C to +60 C)
Maximum Operating Pressure: 25 psi (172 kPa)
Humidity Range: 5 to 95% RH

Product Number	Action	Actuator Force	Spring Range (psi)	Spring Range (kPa)	Diameter (in.)	Stroke (inch)	Stroke (mm)	Includes
MP953C1000	Direct Acting	Low	2 psi to 7 psi	14 kPa to 48 kPa	5 in.	3/4 in.	19 mm	—
MP953C1018	Direct Acting	Low	8 psi to 12 psi	55 kPa to 83 kPa	5 in.	3/4 in.	19 mm	—
MP953C1026	Direct Acting	Low	4 psi to 11 psi	28 kPa to 76 kPa	5 in.	3/4 in.	19 mm	—
MP953C1067	Direct Acting	Medium	2 psi to 7 psi	14 kPa to 48 kPa	8 in.	3/4 in.	19 mm	311851-062 Stem Extension Assembly
MP953C1075	Direct Acting	Medium	8 psi to 12 psi	55 kPa to 83 kPa	8 in.	3/4 in.	19 mm	311851-062 Stem Extension Assembly
MP953C1083	Direct Acting	Medium	4 psi to 11 psi	28 kPa to 76 kPa	8 in.	3/4 in.	19 mm	311851-062 Stem Extension Assembly
MP953C1471	Direct Acting	High	2 psi to 7 psi	14 kPa to 48 kPa	13 in.	1 1/2 in.	38 mm	312466-605 Stem Extension Assembly
MP953C1489	Direct Acting	High	4 psi to 11 psi	28 kPa to 76 kPa	13 in.	1 1/2 in.	38 mm	312466-605 Stem Extension Assembly
MP953C1547	Direct Acting	Medium	3 psi to 15 psi	21 kPa to 104 kPa	8 in.	1 1/2 in.	38 mm	—
MP953C1554	Direct Acting	High	2 psi to 7 psi	14 kPa to 48 kPa	13 in.	3/4 in.	19 mm	14004697-001 Stem Extension Assembly
MP953C1562	Direct Acting	High	4 psi to 11 psi	28 kPa to 76 kPa	13 in.	3/4 in.	19 mm	14004697-001 Stem Extension Assembly

Product Number	Action	Actuator Force	Spring Range		Diameter (in.)	Stroke		Includes
			(psi)	(kPa)		(inch)	(mm)	
MP953D1107	Reverse Acting	Medium	8 psi to 13 psi	55 kPa to 90 kPa	7 1/8 in.	3/4 in.	19 mm	—
MP953D1131	Reverse Acting	Medium	4 psi to 11 psi	28 kPa to 76 kPa	7 1/8 in.	3/4 in.	19 mm	—
MP953D1172	Reverse Acting	Medium	3 psi to 7 psi	21 kPa to 48 kPa	7 1/8 in.	3/4 in.	19 mm	—
MP953D1230	Reverse Acting	Medium	4 psi to 11 psi	28 kPa to 76 kPa	7 1/8 in.	3/4 in.	19 mm	—

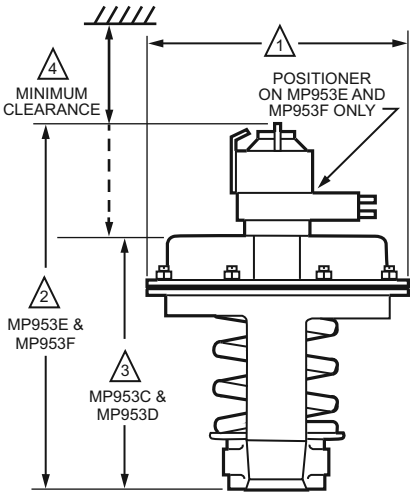
Valve Actuator

MP953E, F Pneumatic Coil Valve Actuators

Pneumatic actuators provide proportional control of steam or hot or cold liquids in HVAC systems by operating V5011, V5013, and VGF valve assemblies. Replacement devices are available for older Honeywell actuators.

- Rolling diaphragm for long life and low hysteresis.
- Easily attached to valve.
- Can be installed after piping valve.
- Slide lock feature permits simple engagement to valve stem.
- Direct- or reverse-action control.
- Integral positive positioner relay provides positive positioning under varying load conditions.

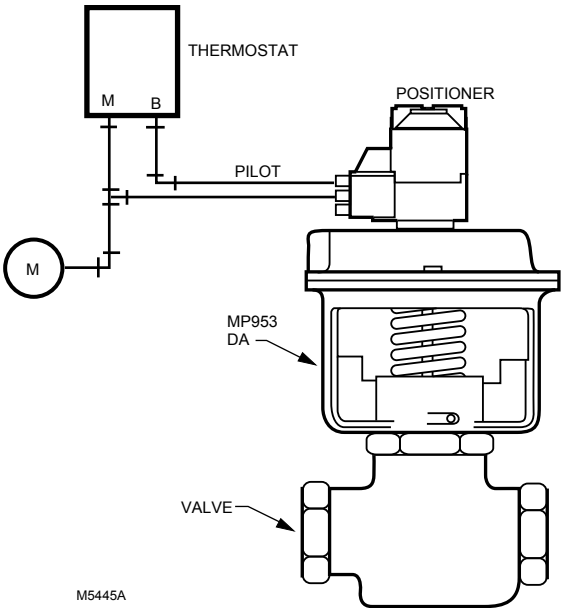
Dimensions in inches (millimeters)



OPERATION SIZE NOMINAL DIA.	1	2	3	4
5 INCH	5-1/8 (130)	9-1/4 (235)	4-5/8 (117)	4-3/8 (111)
7-1/8 INCH	7-1/8 (181)	10-1/2 (267)	5-5/8 (143)	4-3/8 (111)
8 INCH	8-1/4 (210)	11-1/8 (283)	6-1/2 (165)	5-3/8 (137)
13 INCH	13-1/2 (343)	18-1/8 (460)	10 (254)	7-11/16 (195)

M13903

Typical Piping for MP953E,F Pneumatic Valve Actuator Wiring



Actuator Type: Valve
Fail Safe Mode: Spring Return
Air Connections: Pilot: Barbed fitting for 5/32 in. O.D. plastic tubing
Main: Barbed fitting for 1/4 in. O.D. plastic tubing
Temperature Range: 0 F to 140 F (-18 C to +60 C)
Maximum Operating Pressure: 25 psi (172 kPa)
Humidity Range: 5 to 95% RH

Product Number	Action	Actuator Force	Spring Range (psi)	Spring Range (kPa)	Diameter (in.)	Stroke (inch)	Stroke (mm)	Includes
MP953E1285	Direct Acting	Medium	4 psi to 11 psi	28 kPa to 76 kPa	8 in.	1 1/2 in.	38 mm	Positive Positioner with 5 psi (35 kPa) range
MP953E1301	Direct Acting	Low	4 psi to 11 psi	28 kPa to 76 kPa	5 in.	3/4 in.	19 mm	Positive Positioner with 3 psi range (21kPa)
MP953E1319	Direct Acting	Low	4 psi to 11 psi	28 kPa to 76 kPa	5 in.	3/4 in.	19 mm	Positive Positioner with 5 psi range (35 kPa)
MP953E1327	Direct Acting	Low	4 psi to 11 psi	28 kPa to 76 kPa	5 in.	3/4 in.	19 mm	Positive Positioner with 10 psi range (70 kPa)
MP953E1368	Direct Acting	Medium	4 psi to 11 psi	28 kPa to 76 kPa	8 in.	3/4 in.	19 mm	311851-062 Stem Extension Assembly and Positive Positioner with 3 psi range
MP953E1376	Direct Acting	Medium	4 psi to 11 psi	28 kPa to 76 kPa	8 in.	3/4 in.	19 mm	311851-062 Stem Extension Assembly and Positive Positioner with 5 psi range

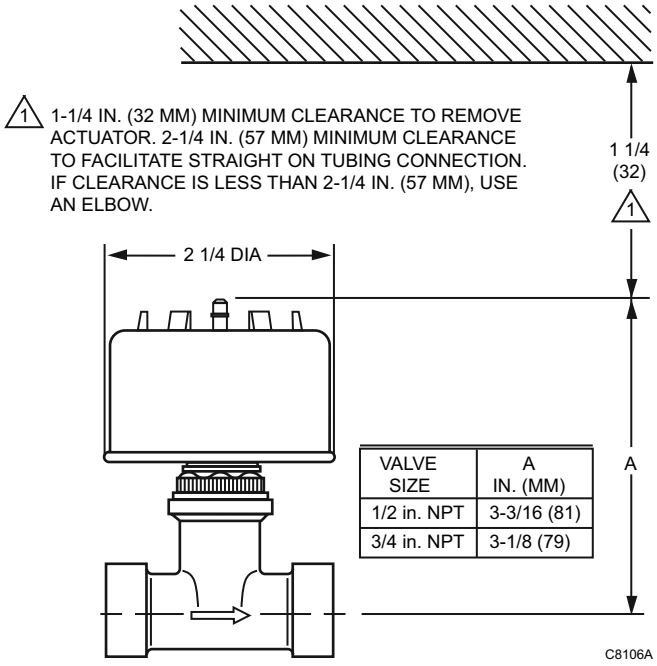
Product Number	Action	Actuator Force	Spring Range (psi)	Spring Range (kPa)	Diameter (in.)	Stroke (inch)	Stroke (mm)	Includes
MP953E1384	Direct Acting	Medium	4 psi to 11 psi	28 kPa to 76 kPa	8 in.	3/4 in.	19 mm	311851-062 Stem Extension Assembly and Positive Positioner with 10 psi range
MP953E1400	Direct Acting	High	4 psi to 11 psi	28 kPa to 76 kPa	13 in.	1 1/2 in.	38 mm	312466-605 Stem Extension Assembly and Positive Positioner with 5 psi range
MP953E1418	Direct Acting	High	4 psi to 11 psi	28 kPa to 76 kPa	13 in.	1 1/2 in.	38 mm	312466-605 Stem Extension Assembly and Positive Positioner with 10 psi range
MP953E1435	Direct Acting	High	4 psi to 11 psi	28 kPa to 76 kPa	13 in.	3/4 in.	19 mm	14004697-001 Stem Extension Assembly and Positive Positioner with 5 psi range (35 kPa)
MP953E1443	Direct Acting	High	4 psi to 11 psi	28 kPa to 76 kPa	13 in.	3/4 in.	19 mm	Positive Positioner with 10 psi range and 14004697-001 Stem Extension Assembly
MP953F1093	Reverse Acting	Medium	8 psi to 13 psi	55 kPa to 90 kPa	7 1/8 in.	3/4 in.	19 mm	Positive Positioner with 3 psi range and EPDM diaphragm
MP953F1101	Reverse Acting	Medium	8 psi to 13 psi	55 kPa to 90 kPa	7 1/8 in.	3/4 in.	19 mm	Positive Positioner with 5 psi range and EPDM diaphragm
MP953F1119	Reverse Acting	Medium	8 psi to 13 psi	55 kPa to 90 kPa	7 1/8 in.	3/4 in.	19 mm	Positive Positioner with 10 psi range and EPDM diaphragm

Valve Actuator

MP958 Pneumatic Valve Actuators

The MP958 Pneumatic Valve Actuator is direct-acting and used only with Honeywell V5852A2xx, V5862A2xx, V5853A2xx, and V5863A2xx Terminal Unit Valves to control hot and/or chilled water.

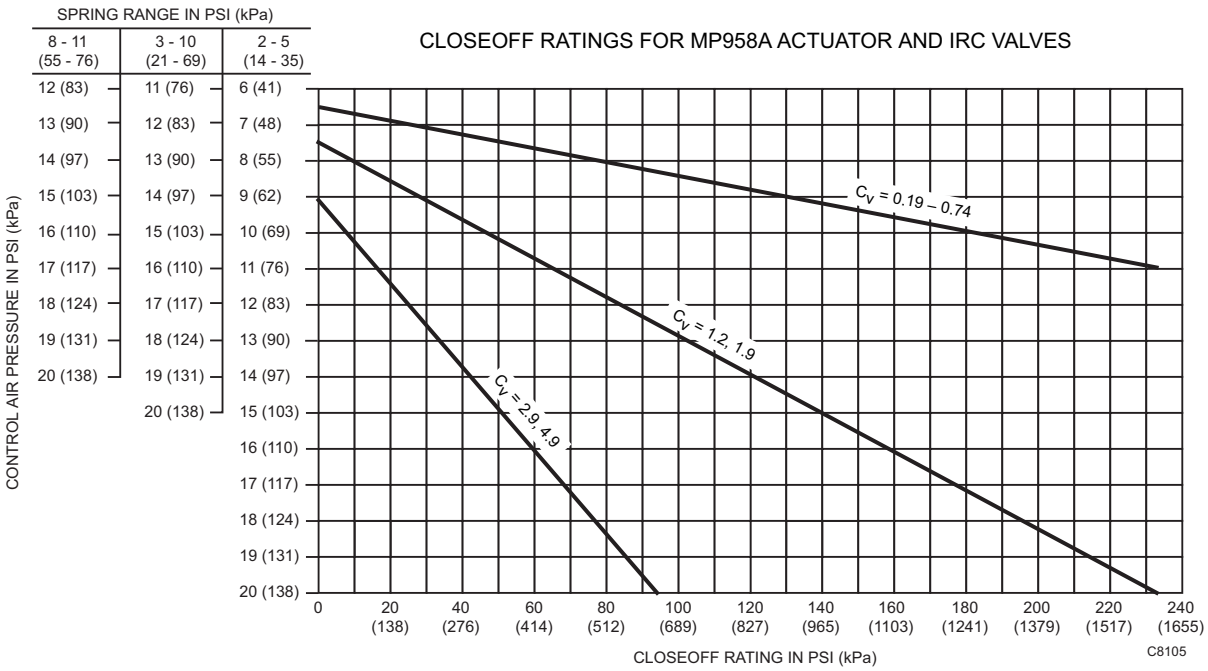
Dimensions in inches (millimeters)



Actuator Type: Valve
Action: Direct Acting
Fail Safe Mode: Spring Return
Air Connections: Barbed fitting for 1/4 in. O.D. plastic tubing
Maximum Operating Pressure: 30 psi

Product Number	Actuator Force	Spring Range (psi)	Spring Range (kPa)	Comments
MP958A1009	Low	2 psi to 5 psi	14 kPa to 35 kPa	Only works with V5852A2xx, V5862A2xx, V5853A2xx, V5863A2xx
MP958A1017	Low	3 psi to 10 psi	21 kPa to 69 kPa	Only works with V5852A2xx, V5862A2xx, V5853A2xx, V5863A2xx
MP958A1025	Low	8 psi to 11 psi	55 kPa to 76 kPa	Only works with V5852A2xx, V5862A2xx, V5853A2xx, V5863A2xx

Close-off ratings



Valve Actuator

Pneumatic Valve Actuator Parts and Accessories

Product Number	Description	Used With
14002039-001	MP953D Diaphragm Sleeve	MP953B,D,F
14002040-002	MP953D Diaphragm	MP953B,D,F
14003124-002	MP953B,D,F Diaphragm Repair Kit (includes 14002039-001 and 14002040-002)	MP953B,D,F
14004138-001	MP953B,F (Reverse Acting) Positive Positioner Retrofit Kit	MP953B,F
14004139-001	MP953A,E (Direct Acting, 8 in. and 13 in. diameter, 3/4 in. stroke) Positive Positioner Retrofit Kit	MP953A,E
14004140-001	MP953A,E (Direct Acting, 8 in. and 13 in. diameter, 1-1/2 in. stroke) Positive Positioner Retrofit Kit	MP953A,E
14004211-001	MP953E (8 in. and 13 in. diameter, 3/4 in. stroke) Feedback Spring Kit	MP953E
14004212-001	MP953E (8 in. and 13 in. diameter, 1-1/2 in. stroke) Feedback Spring Kit	MP953E
14004213-001	MP953F (Reverse Acting) Feedback Spring Kit	MP953F
14004214-001	MP953A,E (5 in. diameter) 3/4 inch stroke Positive Positioner Retrofit Kit	MP953A,E
14004298-001	Thread forming Screw, Size 4-40	MP953D,F
14004298-003	MP953C,E (5 in. dia.) and MP953B,D,F (7-1/8 in. dia.) Actuator Base Screw, size 1/4-20	MP953B,D,F; MP953C,E (5 in.)
14004578-001	MP953 B, D, and F (Reverse Acting, 7-1/8 in. diameter) Yoke/Base Assembly	MP953B,D,F
14004667-001	Offset Crank arm assembly with 2 screws (304725-062), nuts (14004102-001), crank arm (14004655-001) for 1/2 in. Drive Axle	Pneumatic Actuators
14004697-001	Stem extension for 13 in. MP953C,E with 3/4 in. Stroke	MP953C,E
310664	MP953A, C and E (5 in. and 8 in. models only) Tension Spring	MP953A,C,E
310665/0062	Spring Support for MP953	MP953A,C,E (5 in.)
310668	MP953A, C and E (5 in. diameter) High Temperature Silicone Diaphragm - Old Style	MP953A,C,E
311393	White Spring, 4-11 psi	MP953C,E
311616	MP953A, C and E (5 in. diameter) Main Spring (2-7 psi spring range - Brown)	MP953A,C,E (5 in.)
311618	MP953A, C and E (5 in. diameter) Main Spring (8-12 psi spring range - Gray)	MP953A,C,E (5 in.)
311749/0605	Cup diaphragm, 8 in. for MP953A, C, E	MP953A,C,E (8 in.)
311750	MP953A, C and E (8 in. diameter) Regular Temperature Neoprene Diaphragm - New Style	MP953A,C,E
311851/0062	Stem extension for 8 in. dia. 3/4 in. stroke MP953A,C,E	MP953A,C,E (8 in.)
311852	Brown Spring for MP953A,C 3/4 inch stroke (8 inch diameter), 2-7 psi range	MP953A,C (8 in., 2-7 psi)
311855	Gray spring for MP953C (8 inch diameter), 8-12 psi range	MP953C
311863	Stem Retainer for the MP953C,E (8 in. diameter)	MP953C,E
312099	1-1/2 in. stroke Spider for 13 in. MP953C and E	MP953C,E
312203	Black Spring for MP953D,F for 8-13 psi range	MP953D,F
312466/0605	Stem Extension for MP953C1489, MP953C1471, MP953E1392, MP953E1400, and MP953E1418	MP953C,E
312471	White Spring for MP953C,E (13 in. dia. 1/2 in. stroke)	MP953C,E (13 in.)
312505	MP953A,C,E (13 in. diameter) regular temperature Neoprene diaphragm - new style	MP953A,C,E
312760	MP953A,C,E (5 in. diameter) regular temperature Neoprene diaphragm - new style	MP953A,C,E
313745	MP953A, C and E (5 in. diameter) High Temperature Silicone Diaphragm - New Style	MP953A,C,E
314153	MP953A, C and E (8 in. diameter) High Temperature Silicone Diaphragm - New Style	MP953A,C,E
314313	White Spring for MP953D, 4-11 psi range	MP953D
314646A/0062	Plate, Spring for 13 in. diameter MP953A,C,E	MP953A,C,E
314650A	MP953B, D and F (Reverse Acting) Support Assembly (for Series-2 actuators only, use this Support Assembly and 316059A Yoke Assembly to Convert Series-1 MO/MP953)	MP953B,D,F
314651A	MP953B,D,F (Reverse Acting) yoke assembly for support assembly- with nylon insert for use with old style actuators not made with a Helicoil insert in yoke	MP953B,D,F
314652	Spring for MP953D,F (used in yoke assembly)	MP953D,F
314683/0062	Stem Retainer for 13 in. diameter MP953A,C,E (Latches on Stem Button)	MP953A,C,E (13 in.)
315020	Cup for MP953C,E (13 inch diameter)	MP593C,E (13 in.)
316059A	MP953B, D and F (Reverse Acting) Yoke Assembly for Support Assembly- with helicoil insert	MP953B,D,F

Valves

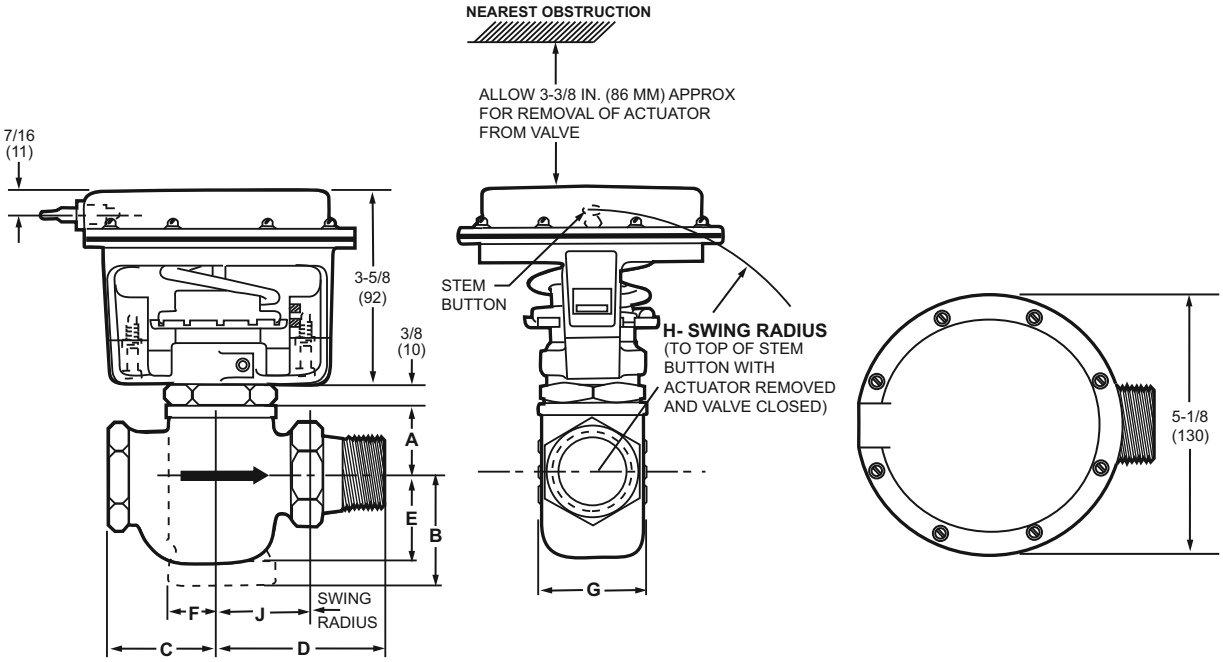
Valves

VP512 Unit Vent Pneumatic Control Valve

A normally open, single seated, straight-through or angle globe valve used for proportional control of steam or hot water in unit ventilator applications. Replacement devices are available for Johnson, Powers, Robertshaw, Barber-Colman, and older Honeywell devices.

- Equal percentage, high lift throttling guide provides accurate control over wide load variations.
- Molded replaceable composition disc for tight shut-off.
- Replaceable brass seat.
- Self-adjusting, spring-loaded Teflon™ packing.
- Back-seating allows repacking without shutting down or draining system.
- Rotatable actuator for aligning air connection with control air piping.
- Integral union connection to simplify installation and service.

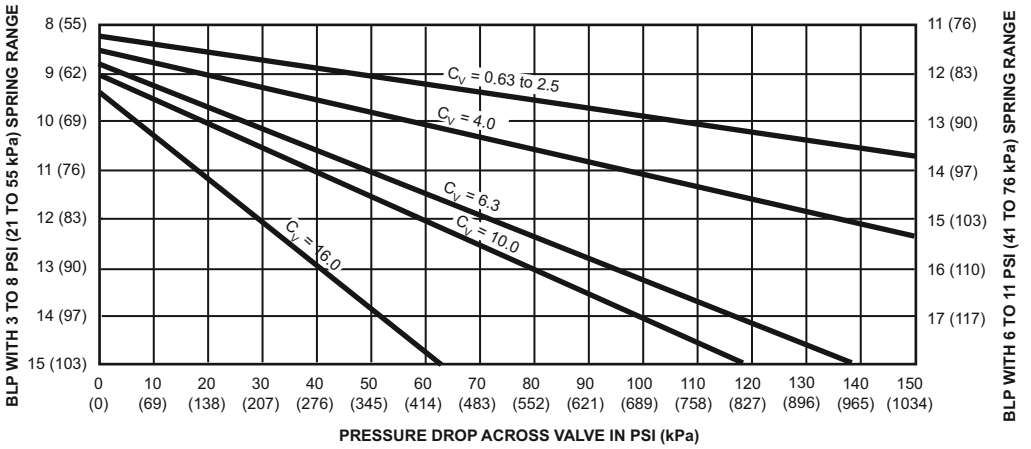
Dimensions in inches (millimeters)



VALVE SIZE	BODY TYPE	A	B	C	D	E	F	G	H	J
1	STRAIGHT	1-3/8 (35)	---	2-1/4 (57)	3 (76)	1-5/8 (41)	---	1-31/32 (50)	4-1/2 (114)	---
	ANGLE	1-3/8 (35)	2-1/8 (54)	---	3 (76)	---	1-1/16 (27)	1-31/32 (50)	---	1-29/32 (48)
1 1/4	STRAIGHT	1-9/16 (40)	---	2-1/2 (64)	3-3/4 (95)	1-1/2 (38)	---	2-9/16 (65)	4-13/16 (122)	---
	ANGLE	1-9/16 (40)	2-1/8 (54)	---	3-3/4 (95)	---	1-3/16 (30)	2-9/16 (65)	---	2-15/32 (63)
1 1/2	STRAIGHT	1-11/16 (43)	---	2-7/8 (73)	4-1/4 (108)	1-3/8 (35)	---	3-9/32 (83)	5-5/32 (131)	---
	ANGLE	1-11/16 (43)	2-1/8 (54)	---	4-1/4 (108)	---	1-3/8 (35)	3-9/32 (83)	---	2-15/16 (75)

M18805A

Close-off Ratings at various Branchline Pressures



CLOSE-OFF RATINGS AT VARIOUS BRANCH LINE PRESSURES M18956B

Valve Type: Globe Valve
Body Pressure: 150 psi
Air Connections: Dual barbed for 5/32 in. or 1/4 in. plastic tubing
Valve Action: Proportional Normally Open
Controlled Medium: Water; Steam
Operating Humidity Range (% RH): 5 to 95% RH
Temperature Range: For Water: 115 F to 240 F;
For Steam: 212 F to 275 F
Maximum Temperature Differential: For Water: 140 F
Maximum Actuator Temperature: 160 F
Maximum Diaphragm Pressure: 25 psi (172 kPa)

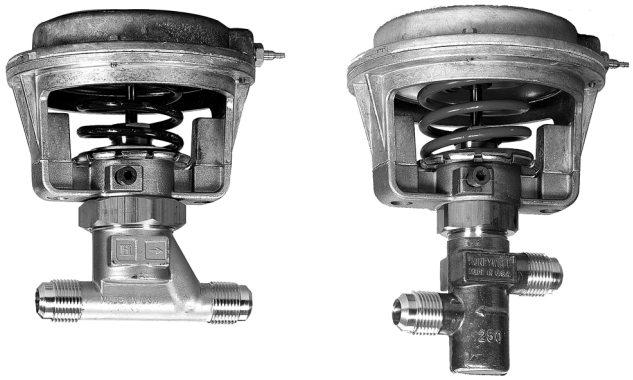
Accessories:
312817AA Actuator Assembly, 3 to 8 psi, 21 to 55 kPa, and 1/2 in. stroke.
312817AB Actuator Assembly, 6 to 11 psi, 41 to 76 kPa and 1/2 in. stroke.

Replacement Parts:
14002863-001 Valve rebuild kit for 3/4 to 1 1/4 in valves with Cv of 6.3 or 10

Product Number	End Connection Size (inch)	End Connection Size (mm)	Type of End Connection	Body Pattern	Capacity (Cv)	Capacity (Kv)	Close-off Ratings at Branchline Pressure	Spring Range (psi)	Spring Range (kPa)
VP512A1726	1 in.	25 mm	Inlet - Internal NPT; Outlet - External NPT Union	Two-way, Straight-through	10 Cv	8.57 Kv	78 psi at 13 psi	3 psi to 8 psi	21 kPa to 55 kPa
VP512A1742	1 in.	25 mm	Inlet - Internal NPT; Outlet - External NPT Union	Two-way, Right Angle	10 Cv	8.57 Kv	78 psi at 13 psi	3 psi to 8 psi	21 kPa to 55 kPa
VP512A1767	1 1/4 in.	32 mm	Inlet - Internal NPT; Outlet - External NPT Union	Two-way, Straight-through	16 Cv	13.7 Kv	40 psi at 13 psi	3 psi to 8 psi	21 kPa to 55 kPa
VP512A1783	1 1/4 in.	32 mm	Inlet - Internal NPT; Outlet - External NPT Union	Two-way, Right Angle	16 Cv	13.7 Kv	40 psi at 13 psi	3 psi to 8 psi	21 kPa to 55 kPa

Valves

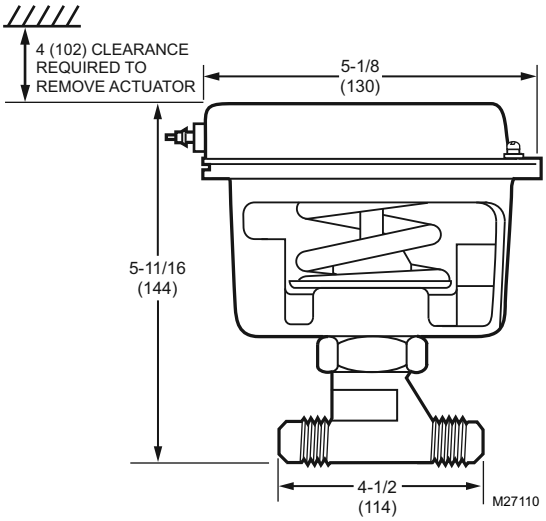
VP513 Pneumatic Water Valve



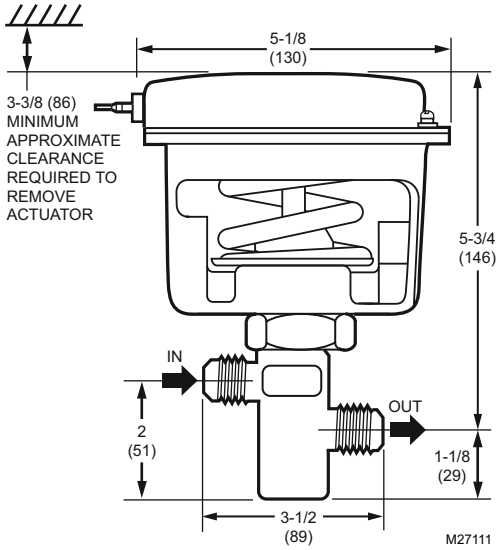
Single-seated, straight-through, pneumatic valves used for proportional control of unit air conditioners using hot and/or chilled water. Replacement devices are available for Johnson, Powers, Robertshaw, Barber-Colman, and older Honeywell devices.

- Available in normally-open (A models) or normally-closed models (B models).
- Straight-through pattern.
- Rotating actuator for aligning air connection with control air piping.
- Molded replaceable composition disc for tight shut-off.
- Flare tube connections.
- Small physical size.

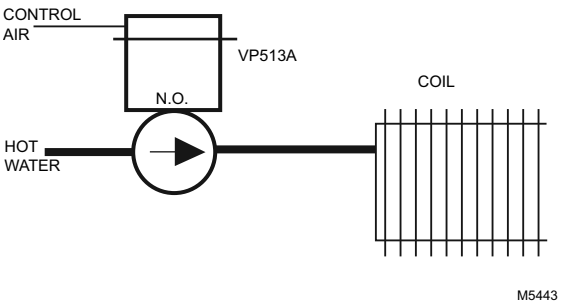
Dimensions in inches (millimeters)



Dimensions in inches (millimeters)



VP513 Typical Piping Diagram



Valve Type: Unitary
Body Pressure: 250 psi (1724 kPa)
Air Connections: 1/8 in. NPT
Controlled Medium: Water

Type of End Connection: 45 deg. SAE flare
Operating Humidity Range (% RH): 5 to 95% RH
Temperature Range: 35 F to 250 F (2 C to 121 C)
Maximum Actuator Temperature: 160 F (71 C)
Maximum Diaphragm Pressure: 25 psi (172 kPa)

Replacement Parts:
14002734-002 Lubricant, packing, AMOCO H-100
310143 Black Packing, 3 required
310135 Packing Spring, 1 Required
312760 MP953A,C,E (5 in. diameter) regular temperature Neoprene diaphragm - new style

Accessories:
312817T Actuator assembly, 3 to 10 psi, 21 to 69 kPa, and 1/2 in. stroke.
312817U Actuator Assembly, 3 to 7 psi, 21 to 48 kPa, and 1/2 in. stroke.
312817V Actuator Assembly, 8 to 12 psi, 55 to 83 kPa, and 1/2 in. stroke.

Product Number	End Connection Size (inch)	End Connection Size (mm)	Body Pattern	Valve Action	Capacity (Cv)	Capacity (Kv)	Close-off Ratings at Branchline Pressure	Spring Range (psi)	Spring Range (kPa)
VP513A1048	O.D.: 7/8 in.; Nominal: 3/4 in.	O.D.: 22.2 mm; Nominal: 19.1 mm	Two-way, Straight-through	Proportional Normally Open	2.5 Cv	2.16 Kv	79 psid (545 kPa) at 13 psi (90 kPa)	3 psi to 10 psi	21 kPa to 69 kPa
VP513A1055	O.D.: 7/8 in.; Nominal: 3/4 in.	O.D.: 22.2 mm; Nominal: 19.1 mm	Two-way, Straight-through	Proportional Normally Open	4 Cv	3.46 Kv	79 psid (545 kPa) at 13 psi (90 kPa)	3 psi to 10 psi	21 kPa to 69 kPa
VP513A1188	O.D.: 5/8 in.; Nominal: 1/2 in.	O.D.: 15.9 mm; Nominal: 12.7 mm	Two-way, Straight-through	Proportional Normally Open	2.5 Cv	2.16 Kv	79 psid (545 kPa) at 13 psi (90 kPa)	3 psi to 7 psi	21 kPa to 48 kPa
VP513A1204	O.D.: 5/8 in.; Nominal: 1/2 in.	O.D.: 15.9 mm; Nominal: 12.7 mm	Two-way, Straight-through	Proportional Normally Open	2.5 Cv	2.16 Kv	79 psid (545 kPa) at 13 psi (90 kPa)	3 psi to 10 psi	21 kPa to 69 kPa
VP513B1012	O.D.: 5/8 in.; Nominal: 1/2 in.	O.D.: 15.9 mm; Nominal: 12.7 mm	Two-way, Straight-through, Offset	Proportional Normally Closed	1.0 Cv	0.86 Kv	50 psid (345 kPa) at 7 psi (48 kPa)	9 psi to 13 psi	62 kPa to 90 kPa
VP513B1038	O.D.: 5/8 in.; Nominal: 1/2 in.	O.D.: 15.9 mm; Nominal: 12.7 mm	Two-way, Straight-through, Offset	Proportional Normally Closed	1.6 Cv	1.38 Kv	50 psid (345 kPa) at 7 psi (48 kPa)	9 psi to 13 psi	62 kPa to 90 kPa
VP513B1053	O.D.: 5/8 in.; Nominal: 1/2 in.	O.D.: 15.9 mm; Nominal: 12.7 mm	Two-way, Straight-through, Offset	Proportional Normally Closed	2.5 Cv	2.16 Kv	50 psid (345 kPa) at 7 psi (48 kPa)	9 psi to 13 psi	62 kPa to 90 kPa

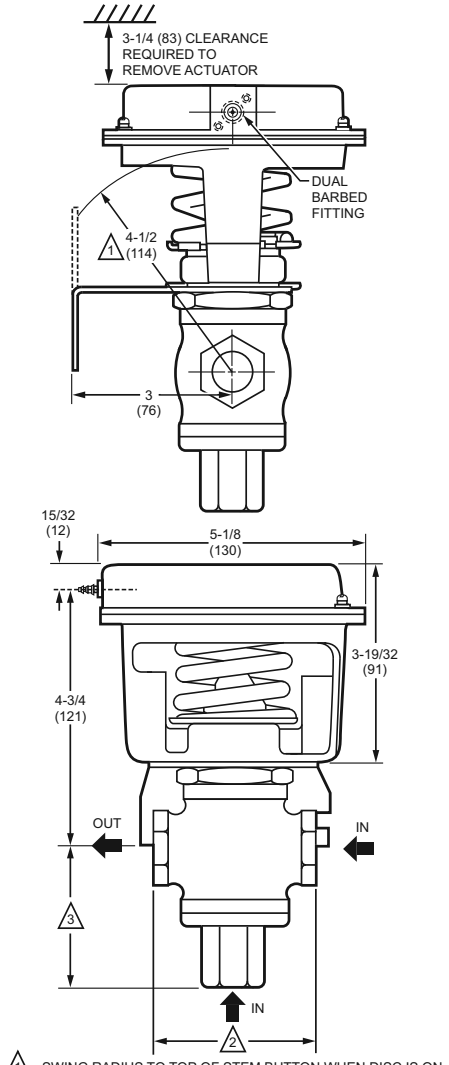
Valves

VP519 Two-Position Three-Way Air Valve

Two-position, three-way, pneumatic air valve used to control main airflow in large Day-Night or Summer-Winter pneumatic control systems. Replacement device is available for Johnson, Powers, Robertshaw, Barber-Colman, and older Honeywell devices.

- Spring-loaded, self-adjusting Teflon™ cone packing.
- Removable composition upper and lower discs.
- Actuator can be rotated on valve bonnet for alignment with air piping.
- Right-angle mounting bracket permits mounting on a wall or panel.
- Cast bronze body, 1/4 in. stroke.

Dimensions in inches (millimeters)

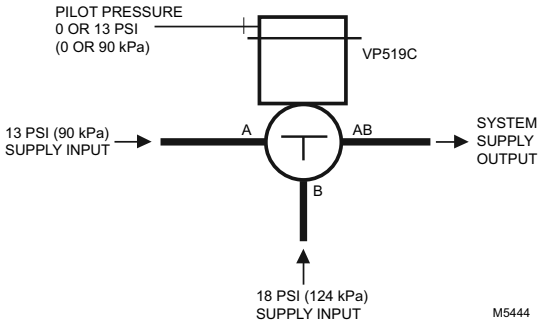


1 SWING RADIUS TO TOP OF STEM BUTTON WHEN DISC IS ON LOWER SEAT AND OPERATOR IS REMOVED.

VALVE SIZE	2	3
1/2 INCH	3-1/8 (79)	2-3/4 (70)
3/4 INCH	3-3/8 (86)	2-19/32 (66)

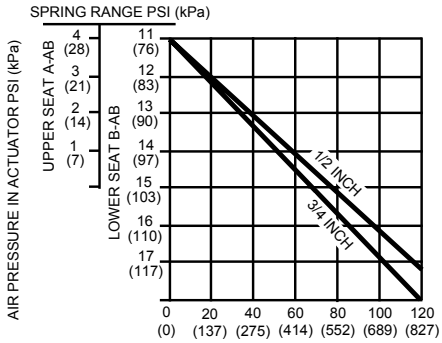
M27109

VP519 Typical Piping Diagram



M5444

Close-off Ratings for the VP519



M18958

Valve Type: Globe Valve
Body Pattern: Three-way
Body Pressure: 150 psi (1034 kPa)
Air Connections: Dual barbed for 5/32 in. or 1/4 in. plastic tubing
Valve Action: Two Position
Type of End Connection: NPT
Operating Humidity Range (% RH): 5 to 95% RH
Temperature Range: 35 F to 115 F (2 C to 46 C)
Maximum Actuator Temperature: 160 F (71 C)
Maximum Diaphragm Pressure: 25 psi (172 kPa)

Replacement Parts:
14003294-002 Valve Repack Kit, Steam or water application
312760 MP953A,C,E (5 in. diameter) regular temperature Neoprene diaphragm - new style
313744A Actuator Replacement Assembly for the VP519 Valve

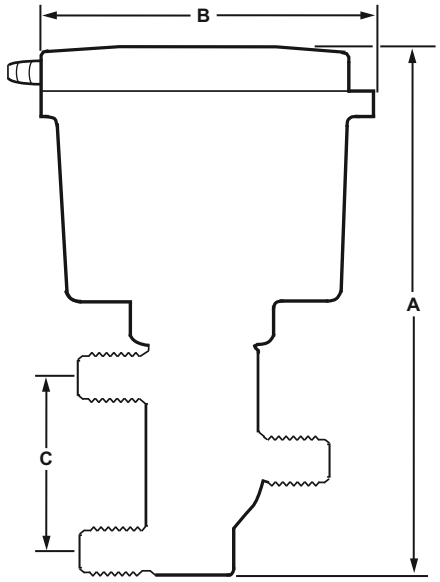
Product Number	End Connection Size (inch)	End Connection Size (mm)	Capacity (Cv)	Capacity (Kv)	Close-off Ratings at Branchline Pressure	Spring Range (psi)	Spring Range (kPa)
VP519C1006	1/2 in.	12.7 mm	5.5 Cv	4.75 kV	120 psid at 18 psi	6 psi to 9 psi	41 kPa to 62 kPa

VP522 Pneumatic Sequencing Water Valve

Three-pipe, sequencing, pneumatically operated water valve for controlling both hot and cold water flow in fan-coil and induction units. Replacement devices are available for Johnson, Powers, Robertshaw, Barber-Colman, and older Honeywell devices.

- Corrosion resistant.
- Molded-in composition discs for tight shutoff.
- Flare connections for easy installation.
- Operator rotates 360 degrees for convenient air piping alignment.

Dimensions in inches (millimeters)



VALVE SIZE	A IN INCHES (mm)	B IN INCHES (mm)	C IN INCHES (mm)
3/8 IN.	9-13/16 (249)	5-1/8 (130)	3-5/8 (92)
1/2 IN.	9-15/16 (252)	5-1/8 (130)	3-5/32 (80)
3/4 IN.	9-15/16 (252)	5-1/8 (130)	3-5/32 (80)

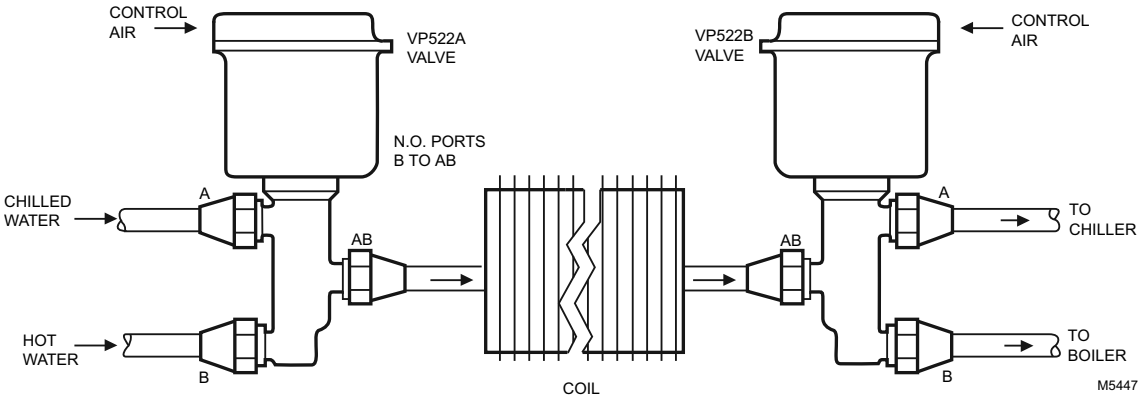
C4671A

Operating Sequence on Control Air Pressure Increase

VP522A		AIR PRESSURE	VP522B
3/8 IN.	1/2 IN. & 3/4 IN.	psi (kPa)	ALL SIZES
HOT PORT OPEN 100%	HOT PORT OPEN 100%	0 (0)	HOT PORT OPEN 100%
		1 (7)	
		2 (14)	
HOT PORT CLOSES	HOT PORT CLOSES	3 (21)	
		4 (28)	
		5 (34)	HOT PORT CLOSES
		6 (41)	
BOTH PORTS CLOSED	BOTH PORTS CLOSED	7 (48)	
		8 (55)	BOTH PORTS CLOSED
		9 (62)	COLD PORT OPENS
COLD PORT OPENS	COLD PORT OPENS	10 (69)	
		11 (76)	
		12 (83)	
		13 (90)	COLD PORT OPEN 100%
COLD PORT OPEN 100%	COLD PORT OPEN 100%	14 (97)	
		15 (103)	

M13864

Typical VP522 Operation Diagram



M5447

Valves

Valve Type: Unitary
Body Pressure: 250 psi (1724 kPa)
Air Connections: 1/8 in. NPT
Controlled Medium: Water
Type of End Connection: 45 deg. SAE flare
Operating Humidity Range (% RH): 5 to 95% RH
Temperature Range: 35 F to 250 F (2 C to 121 C)
Maximum Actuator Temperature: 160 F (71 C)
Maximum Diaphragm Pressure: 25 psi (172 kPa)

Replacement Parts:

313824A Rebuild kit, include Stem and Disc holder, button with screw, packing and instruction, VP522A1005
314459A Rebuild kit, include Stem and Disc holder, button with screw, packing and instruction, VP522A1039
314459B Rebuild kit, includes stem and disc holder, Button with screw, packing and instructions, VP522A1047
315407A Rebuild kit, include Stem and Disc holder, button with screw, packing and instruction for the VP522B1003
312760 MP953A,C,E (5 in. diameter) regular temperature Neoprene diaphragm - new style
312817S Actuator for VP522A1039, VP522A1047, VP522A1237
312817W Actuator for VP522B1003
312817Y Actuator assembly for VP522B1011 andVP522B1029

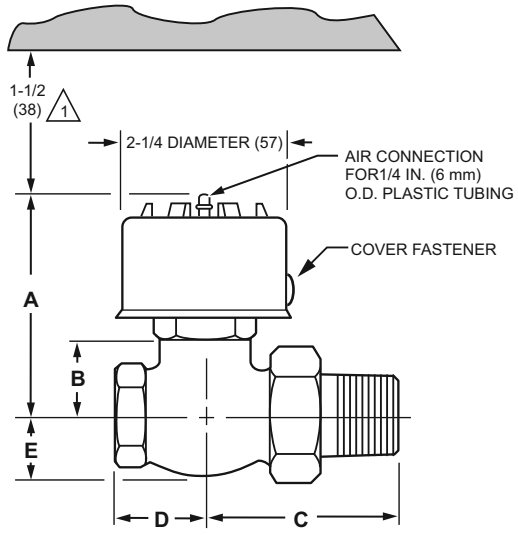
Product Number	End Connection Size (inch)	End Connection Size (mm)	Body Pattern	Valve Action	Capacity (Cv)	Capacity (Kv)	Close-off Ratings at Branchline Pressure	Spring Range (psi)	Spring Range (kPa)
VP522A1005	O.D.: 1/2 in.; Nominal: 3/8 in.	O.D.: 12.7 mm; Nominal: 9.5 mm	Three-way Mixing	Proportional/ Sequencing	Port A: 1.5 Cv, Port B: 1.5 Cv	Port A: 1.3 Kv, Port B: 1.3 Kv	50 psid at 13 psi	3 psi to 11.5 psi	21 kPa to 79 kPa
VP522A1039	O.D.: 5/8 in.; Nominal: 1/2 in.	O.D.: 15.9 mm; Nominal: 12.7 mm	Three-way Mixing	Proportional/ Sequencing	Port A: 2.5 Cv, Port B: 1.6 Cv	Port A: 2.2 Kv, Port B: 1.4 Kv	50 psid at 13 psi	2 psi to 13 psi	14 kPa to 90 kPa
VP522A1047	O.D.: 7/8 in.; Nominal: 3/4 in.	O.D.: 22.2 mm; Nominal: 19.1 mm	Three-way Mixing	Proportional/ Sequencing	Port A: 4 Cv, Port B: 2.5 Cv	Port A: 3.5 Kv, Port B: 2.2 Kv	45 psid at 13 psi	2 psi to 13 psi	14 kPa to 90 kPa
VP522B1003	O.D.: 1/2 in.; Nominal: 3/8 in.	O.D.: 12.7 mm; Nominal: 9.5 mm	Three-way Diverting, Sequencing	Diverting/ Sequencing	Port A: 1.5 Cv, Port B: 1.5 Cv	Port A: 1.3 Kv, Port B: 1.3 Kv	15 psid at 13 psi	Adjustable	Adjustable
VP522B1011	O.D.: 5/8 in.; Nominal: 1/2 in.	O.D.: 15.9 mm; Nominal: 12.7 mm	Three-way Diverting, Sequencing	Diverting/ Sequencing	Port A: 2.5 Cv, Port B: 2.5 Cv	Port A: 2.2 Kv, Port B: 2.2 Kv	15 psid at 13 psi	Adjustable	Adjustable
VP522B1029	O.D.: 7/8 in.; Nominal: 3/4 in.	O.D.: 22.2 mm; Nominal: 19.1 mm	Three-way Diverting, Sequencing	Diverting/ Sequencing	Port A: 4 Cv, Port B: 3.5 Cv	Port A: 3.5 Kv, Port B: 3.0 Kv	15 psid at 13 psi	Adjustable	Adjustable

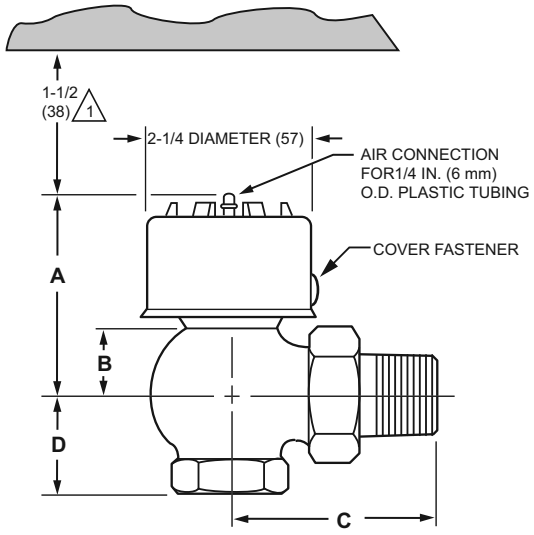
VP525C Pneumatic Radiator Valve

Normally-open, single-seated pneumatic radiator valve with straight through or angle body construction provides proportional control of two-pipe, hot water or steam systems. Replacement devices are available for Johnson, Powers, Robertshaw, Barber-Colman, and older Honeywell devices.

- Available in several capacities and spring ranges for various application requirements.
- Easily replaceable actuator assembly for convenience of service.
- Compact size for installation where space is limited.
- Can be repacked without shutting down system.

Dimensions in inches (millimeters)



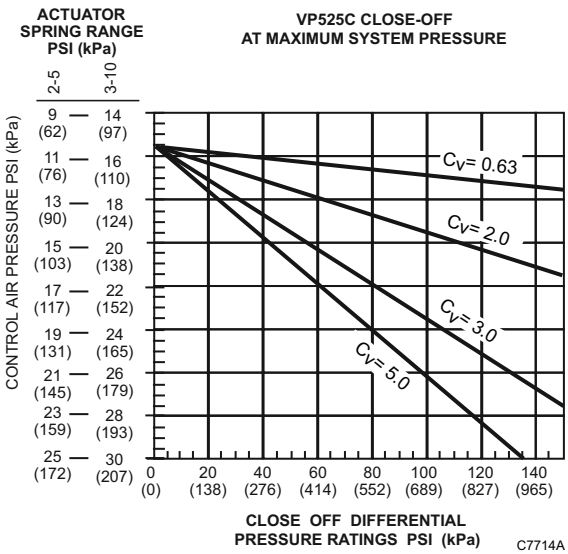


1 1-1/2 in. (38 mm) MINIMUM CLEARANCE TO REMOVE ACTUATOR. 2 1/2 in. (63 mm) MINIMUM CLEARANCE TO FACILITATE STRAIGHT ON TUBING CONNECTION. IF CLEARANCE IS LESS THAN 2 1/2 in. (63 mm) USE AN ELBOW.

M16449A

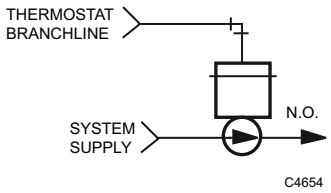
BODY STYLE	SIZE NPT	A	B	C	D	E
STRAIGHT THRU – MALE UNION OUTLET	1/2	3-1/2 (90)	1-3/8 (35)	2-1/2 (63)	1-3/8 (35)	3/4 (19)
	3/4	3-1/2 (90)	1-3/8 (35)	3 (76)	1-5/8 (41)	1-1/8 (29)
ANGLE – MALE UNION OUTLET	1/2	3-1/4 (83)	1 (25)	2-5/8 (66)	1-1/8 (29)	
	3/4	3-1/8 (80)	1 (25)	3 (76)	1-1/4 (32)	

Close-off Ratings at various Control Air Pressures



C7714A

VP525C Typical Piping Diagram



C4654

Valve Type: Unitary
Body Pattern: Two-way
Body Pressure: 150 psi (1034 kPa)
Air Connections: Push on for 1/4 in. O.D. plastic tubing
Valve Action: Proportional Normally Open
Controlled Medium: Water; Steam
Operating Humidity Range (% RH): 5 to 95% RH
Temperature Range: 40 F to 240 F (4 C to 116 C)
Maximum Safe Actuator Diaphragm Temperature: 230 F (110 C)
Maximum Diaphragm Pressure: 30 psi (205 kPa)

Accessories:
14004932-001 Pneumatic Valve Adapter (M6410/M7410 linkage and a green main spring to allow to retrofit an electric actuator)

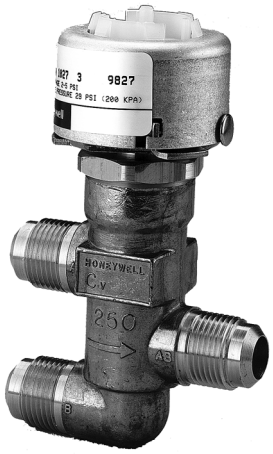
Valves

Replacement Parts:

14002560-007 Repair stem assembly for 1/2 inch, 2.0 Cv VP525C or to Upgrade, 2.0 Cv VP525A
14002560-008 Repair stem assembly for 1/2 and 3/4 inch, 3.0 Cv VP525C or to Upgrade 1/2 and 3/4 inch, 3.0 Cv VP525A
14002560-009 Repair stem assembly for 3/4 inch, 5.0 Cv VP525C or to Upgrade, 5.0 Cv VP525A
14002560-013 Repair stem assembly for 1/2 inch, 0.63 Cv VP525C or to Upgrade, 0.63 Cv VP525A
14003299-001 Repair Top & Insert for 5/8 in. OD, 1.6 Cv VP525A solder body
14003300-001 Repair Top & Insert for 7/8 in. OD, 2.5 Cv VP525A solder body
14003648-001 Vandalism Resistant Assembly, Cover assembly with 1/8 in NPT air Connection and push-in retainer to replace standard Cover
14004897-001 Repair Top & Insert for 1/2 inch NPT, 0.63 Cv VP525C or to upgrade 1/2 NPT, 0.63 Cv VP525A
14004897-002 Repair Top & Insert for 1/2 inch NPT, 2.0 Cv VP525C or to upgrade 1/2 NPT, 2.0 Cv VP525A
14004897-003 Repair Top & Insert for 3/4 inch NPT, 3.0 Cv VP525C or to upgrade 3/4 NPT, 3.0 Cv VP525A
14004897-004 Repair Top & Insert for 3/4 inch NPT, 5.0 Cv VP525C or to upgrade 3/4 NPT, 5.0 Cv VP525A
316027/0042 Green Spring, 2 to 5 psi
310208 White Packing

Product Number	End Connection Size (inch)	End Connection Size (mm)	Type of End Connection	Capacity (Cv)	Capacity (Kv)	Close-off Ratings at Branchline Pressure	Spring Range (psi)	Spring Range (kPa)	Comments	Includes
VP525C1008	1/2 in.	12.7 mm	NPT- Straight Male Union	0.63 Cv	0.54 Kv	150 psid (1034 kPa) at 20 psi (138 kPa)	3 psi to 10 psi	21 kPa to 69 kPa	Replacement for VP525A1408	2-5 psi spring is packed in box
VP525C1016	1/2 in.	12.7 mm	NPT- Straight Male Union	2 Cv	1.73 Kv	110 psid (759 kPa) at 20 psi (138 kPa)	3 psi to 10 psi	21 kPa to 69 kPa	Replacement for VP525A1077 and VP525A1416	2-5 psi spring is packed in box
VP525C1024	3/4 in.	19.1 mm	NPT- Straight Male Union	3 Cv	2.59 Kv	55 psid (379 kPa) at 20 psi (138 kPa)	3 psi to 10 psi	21 kPa to 69 kPa	Replacement for VP525A1150	2-5 psi spring is packed in box
VP525C1032	3/4 in.	19.1 mm	NPT- Straight Male Union	5 Cv	4.32 Kv	42 psid (290 kPa) at 20 psi (138 kPa)	3 psi to 10 psi	21 kPa to 69 kPa	Replacement for VP525A1192 and VP525A1200	2-5 psi spring is packed in box
VP525C1040	1/2 in.	12.7 mm	NPT- Angle Male union	2 Cv	1.73 Kv	110 psid (759kPa) at 20 psi (138 kPa)	3 psi to 10 psi	21 kPa to 69 kPa	Replacement for VP525A1085	2-5 psi spring is packed in box
VP525C1057	3/4 in.	19.1 mm	NPT- Angle Male union	3 Cv	2.59 Kv	55 psid (379 kPa) at 20 psi (138 kPa)	3 psi to 10 psi	21 kPa to 69 kPa	Replacement for VP525A1168	2-5 psi spring is packed in box
VP525C1065	3/4 in.	19.1 mm	NPT- Angle Male union	5 Cv	4.32 Kv	42 psid (290 kPa) at 20 psi (138 kPa)	3 psi to 10 psi	21 kPa to 69 kPa	Replacement for VP525A1218 and VP525A1226	2-5 psi spring is packed in box
VP525C1073	1/2 in.	12.7 mm	NPT- Straight Male Union	3 Cv	2.59 Kv	55 psid (379 kPa) at 20 psi (138 kPa)	3 psi to 10 psi	21 kPa to 69 kPa	Replacement for VP525A1101 and VP525A1119	2-5 psi spring is packed in box
VP525C1081	1/2 in.	12.7 mm	NPT- Angle Male union	3 Cv	2.59 Kv	55 psid (379 kPa) at 20 psi (138 kPa)	3 psi to 10 psi	21 kPa to 69 kPa	Replacement for VP525A1127 and VP525A1135	2-5 psi spring is packed in box

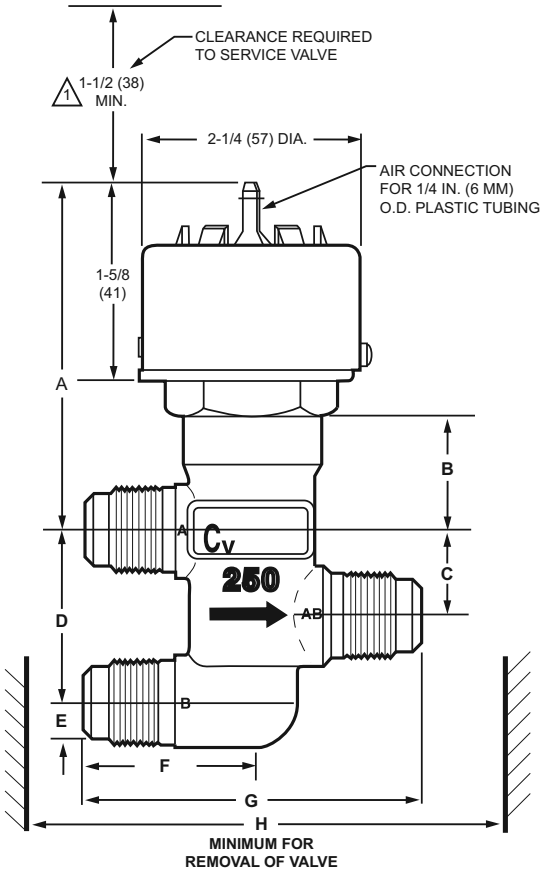
VP526 Three-Way High Pressure Water Valve



Three-way pneumatic mixing valve provides proportional control of hot and/or cold water in unit air conditioners and fan coil systems. Replacement devices are available for Johnson, Powers, Robertshaw, Barber-Colman, and older Honeywell devices.

- Small size permits installation where space is limited.
- Direct-acting, rolling diaphragm actuator with integral high temperature plastic air connector for 1/4 in. (6-mm) O.D. plastic tubing.
- Spring loaded, self-adjusting Buna-N “V”-ring packing replaceable.
- Brass seats (integral lower, removable upper) and contoured plug provide metal-to-metal seating.
- Stainless steel stem.
- Linear and constant total flow throughout full plug travel.

Dimensions in inches (millimeters)

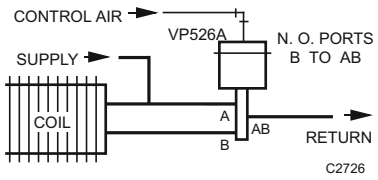


VALVE SIZE	COPPER TUBING (O.D.)	IN. (MM)							
		A	B	C	D	E	F	G	H
3/8	1/2	3-1/16 (78)	7/8 (22)	13/16 (20)	1-1/2 (38)	3/8 (10)	1-1/2 (38)	3 (76)	5-3/4 (146)
1/2	5/8	3-3/8 (85)	1-3/16 (30)	7/8 (22)	1-3/4 (44)	7/16 (11)	1-11/16 (43)	3-7/16 (87)	6-1/4 (159)

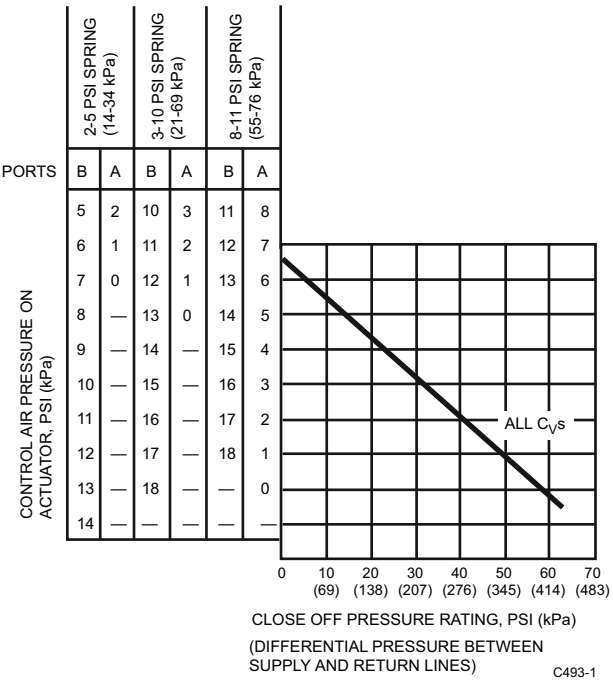
1 ALLOW 1-1/2 IN. (38 MM) MINIMUM CLEARANCE FOR REMOVING ACTUATOR. ALLOW 2-1/2 IN. (63 MM) TO FACILITATE STRAIGHT ON TUBING. IF CLEARANCE IS LESS THAN 2-1/2 IN. (63 MM), USE AN ELBOW.

M18807A

VP526 Typical Piping Diagram



Close-off Ratings for the VP526



Valve Type: Unitary
Body Pattern: Three-way Mixing
Body Pressure: 250 psi (1724 kPa)
Air Connections: Push on for 1/4 in. O.D. plastic tubing
Valve Action: Proportional Normally Open Ports B to AB
Controlled Medium: Water
Type of End Connection: 45 deg. SAE flare
Operating Humidity Range (% RH): 5 to 95% RH
Temperature Range: 35 F to 250 F (2 C to 121 C)
Maximum Safe Actuator Diaphragm Temperature: 230 F (110 C)
Maximum Diaphragm Pressure: 29 psi (200 kPa)

Valves

Accessories:

14003648-001 Vandalism Resistant Assembly, Cover assembly with 1/8 in NPT air Connection and push-in retainer to replace standard Cover

Replacement Parts:

14003102-001 Replacement top assembly

14003297-001 Valve repack kit for VP526A, VP527A, or VP531A valves with 3/16 inch stem

315917 Diaphragm

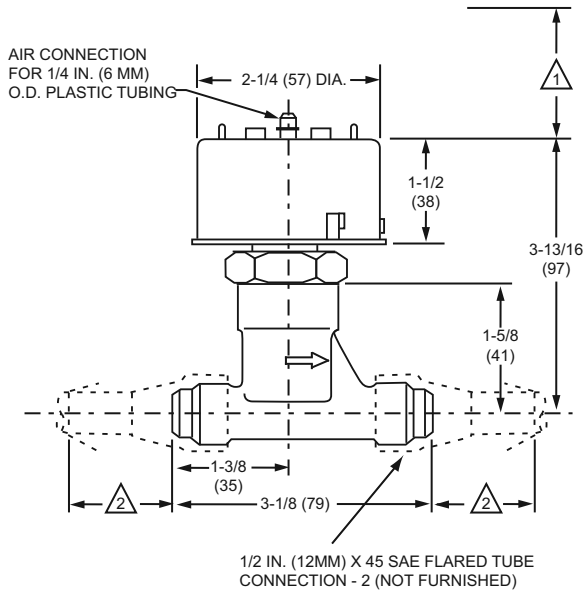
	End Connection Size		Capacity		Close-off Ratings at Branchline Pressure for Port A	Close-off Ratings at Branchline Pressure for Port B	Spring Range	
Product Number	(inch)	(mm)	(Cv)	(Kv)			(psi)	(kPa)
VP526A1001	O.D.: 5/8 in.; Nominal: 1/2 in.	O.D.: 15.9 mm; Nominal: 12.7 mm	1.6 Cv	1.38 Kv	14 psid at 0 psi	50 psid at 17 psi	3 psi to 10 psi	21 kPa to 69 kPa
VP526A1019	O.D.: 5/8 in.; Nominal: 1/2 in.	O.D.: 15.9 mm; Nominal: 12.7 mm	2.5 Cv	2.16 Kv	14 psid at 0 psi	50 psid at 17 psi	3 psi to 10 psi	21 kPa to 69 kPa
VP526A1027	O.D.: 5/8 in.; Nominal: 1/2 in.	O.D.: 15.9 mm; Nominal: 12.7 mm	1.6 Cv	1.38 Kv	5 psid at 0 psi	50 psid at 12 psi	2 psi to 5 psi	14 kPa to 34 kPa
VP526A1035	O.D.: 5/8 in.; Nominal: 1/2 in.	O.D.: 15.9 mm; Nominal: 12.7 mm	2.5 Cv	2.16 Kv	5 psid at 0 psi	50 psid at 12 psi	2 psi to 5 psi	14 kPa to 34 kPa
VP526A1043	O.D.: 5/8 in.; Nominal: 1/2 in.	O.D.: 15.9 mm; Nominal: 12.7 mm	1.6 Cv	1.38 Kv	58 psid at 0 psi	50 psid at 18 psi	8 psi to 11 psi	55 kPa to 76 kPa
VP526A1050	O.D.: 5/8 in.; Nominal: 1/2 in.	O.D.: 15.9 mm; Nominal: 12.7 mm	2.5 Cv	2.16 Kv	58 psid at 0 psi	50 psid at 18 psi	8 psi to 11 psi	55 kPa to 76 kPa
VP526A1068	O.D.: 1/2 in.; Nominal: 3/8 in.	O.D.: 12.7 mm; Nominal: 9.5 mm	1.0 Cv	0.86 Kv	14 psid at 0 psi	50 psid at 17 psi	3 psi to 10 psi	21 kPa to 69 kPa
VP526A1076	O.D.: 1/2 in.; Nominal: 3/8 in.	O.D.: 12.7 mm; Nominal: 9.5 mm	1.6 Cv	1.38 Kv	14 psid at 0 psi	50 psid at 17 psi	3 psi to 10 psi	21 kPa to 69 kPa
VP526A1084	O.D.: 1/2 in.; Nominal: 3/8 in.	O.D.: 12.7 mm; Nominal: 9.5 mm	1.0 Cv	0.86 Kv	5 psid at 0 psi	50 psid at 12 psi	2 psi to 5 psi	14 kPa to 34 kPa
VP526A1092	O.D.: 1/2 in.; Nominal: 3/8 in.	O.D.: 12.7 mm; Nominal: 9.5 mm	1.6 Cv	1.38 Kv	5 psid at 0 psi	50 psid at 12 psi	2 psi to 5 psi	14 kPa to 34 kPa
VP526A1100	O.D.: 1/2 in.; Nominal: 3/8 in.	O.D.: 12.7 mm; Nominal: 9.5 mm	1.0 Cv	0.86 Kv	58 psid at 0 psi	50 psid at 18 psi	8 psi to 11 psi	55 kPa to 76 kPa
VP526A1118	O.D.: 1/2 in.; Nominal: 3/8 in.	O.D.: 12.7 mm; Nominal: 9.5 mm	1.6 Cv	1.38 Kv	58 psid at 0 psi	50 psid at 18 psi	8 psi to 11 psi	55 kPa to 76 kPa

VP527 Pneumatic Water Valve

Normally open, single-seated, high pressure valve provides proportional control of hot and/or cold water in unit air conditioners and fan coil units. Replacement devices are available for Johnson, Powers, Robertshaw, Barber-Colman, and older Honeywell devices.

- Small size permits installation where space is limited.
- Forged brass, straight-through body with end connections threaded for 45 degrees SAE flare fitting nuts.
- Spring-loaded, self-adjusting, Buna-N “V”-ring packing is replaceable without shutting system down.
- High-temperature rolling diaphragm actuator (aluminum cover) and high-temperature plastic diaphragm retaining cup with integral air connection for 1/4 in. (6 mm) O.D. plastic tubing.
- Integral seat and brass plug with removable composition disc provides equal percentage flow.
- Stainless steel stem, 3/16 in. (5 mm) diameter.

Dimensions in inches (millimeters)



1 ALLOW 1-1/2 IN. (38 MM) MINIMUM CLEARANCE TO SERVICE VALVE, 2-1/2 IN. (63 MM) CLEARANCE TO CONNECT TUBING STRAIGHT TO CONNECTOR. IF CLEARANCE IS LESS THAN 2-1/2 IN. (63 MM), USE AN ELBOW CONNECTOR.

2 ALLOW 1-3/8 IN. (35 MM) MINIMUM CLEARANCE TO REMOVE VALVE.

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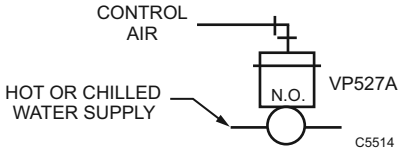
VP527 Typical Piping Diagram



Valve Type: Unitary
Body Pattern: Two-way
Body Pressure: 250 psi (1724 kPa)
Air Connections: Push on for 1/4 in. O.D. plastic tubing
Valve Action: Proportional Normally Open
Controlled Medium: Water
Type of End Connection: 45 deg. SAE flare
Operating Humidity Range (% RH): 5 to 95% RH
Temperature Range: 35 F to 250 F (2 C to 121 C)
Maximum Safe Actuator Diaphragm Temperature: 230 F (110 C)
Maximum Diaphragm Pressure: 30 psi (205 kPa)

Accessories:

14003648-001 Vandalism Resistant Assembly, Cover assembly with 1/8 in NPT air Connection and push-in retainer to replace standard Cover

14004932-001 Pneumatic Valve Adapter (M6410/M7410 linkage and a green main spring to allow to retrofit an electric actuator)

Replacement Parts:

14003102-001 Replacement top assembly

14003297-001 Valve repack kit for VP526A, VP527A, or VP531A valves with 3/16 inch stem

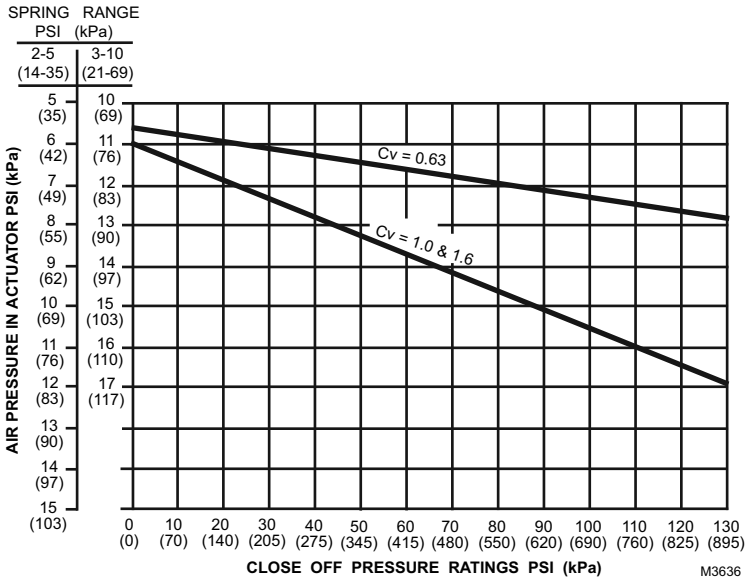
14003475-001 Valve Rebuild Kit for 1/2 in. valve with 0.4 or 0.63 Cv

14003476-001 Valve Rebuild Kit for 1/2 in. valve with 1 or 1.6 Cv

315917 Diaphragm

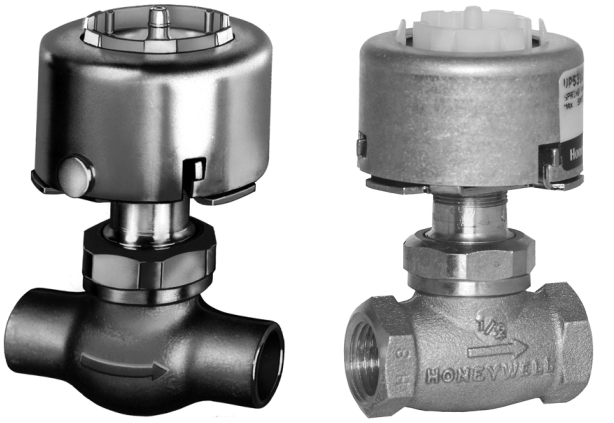
Valves

Close-off Ratings vs. Control Air Pressure



Product Number	End Connection Size (inch)	End Connection Size (mm)	Capacity (Cv)	Capacity (Kv)	Close-off Ratings at Branchline Pressure	Spring Range (psi)	Spring Range (kPa)
VP527A1018	O.D.: 1/2 in.; Nominal: 3/8 in.	O.D.: 12.7 mm; Nominal: 9.5 mm	0.63 Cv	0.54 Kv	130 psid at 13 psi	3 psi to 10 psi	21 kPa to 69 kPa
VP527A1026	O.D.: 1/2 in.; Nominal: 3/8 in.	O.D.: 12.7 mm; Nominal: 9.5 mm	1.0 Cv	0.86 Kv	45 psid at 13 psi	3 psi to 10 psi	21 kPa to 69 kPa
VP527A1034	O.D.: 1/2 in.; Nominal: 3/8 in.	O.D.: 12.7 mm; Nominal: 9.5 mm	1.6 Cv	1.38 Kv	45 psid at 13 psi	3 psi to 10 psi	21 kPa to 69 kPa
VP527A1059	O.D.: 1/2 in.; Nominal: 3/8 in.	O.D.: 12.7 mm; Nominal: 9.5 mm	0.63 Cv	0.54 Kv	130 psid at 8 psi	2 psi to 5 psi	14 kPa to 34 kPa
VP527A1067	O.D.: 1/2 in.; Nominal: 3/8 in.	O.D.: 12.7 mm; Nominal: 9.5 mm	1.0 Cv	0.86 Kv	45 psid at 8 psi	2 psi to 5 psi	14 kPa to 34 kPa
VP527A1075	O.D.: 1/2 in.; Nominal: 3/8 in.	O.D.: 12.7 mm; Nominal: 9.5 mm	1.6 Cv	1.38 Kv	45 psid at 8 psi	2 psi to 5 psi	14 kPa to 34 kPa

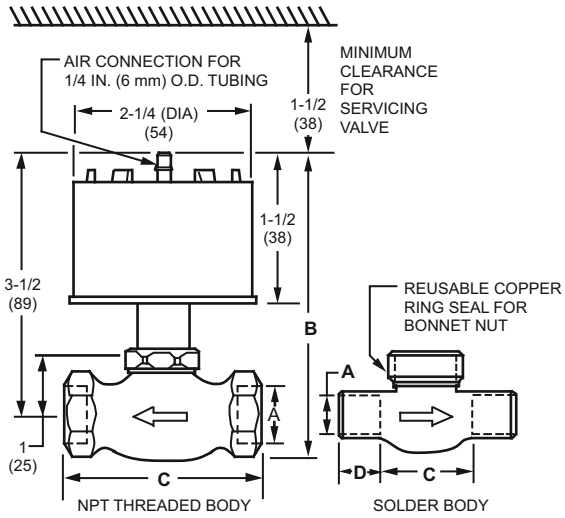
VP531C Pneumatic Terminal Unit Valve



Normally-open, single-seated valve provides proportional control of steam or hot or cold water in terminal units. Replacement devices are available for Johnson, Powers, Robertshaw, Barber-Colman, and older Honeywell devices.

- Available in several capacities and spring ranges for various application requirements.
- Easily replaceable actuator assembly for convenience of service.
- Compact size for use inside most unit enclosures.

Dimensions in inches (millimeters)



BODY SIZE	A	B	C	D
1/2 IN. NPT (1.6 OR 2.3 CV)	1/2 IN. PIPE	4-1/8 IN. (104 MM)	2-9/32 IN. (58 MM)	–
3/4 IN. NPT (2.6 OR 3.3 CV)	3/4 IN. PIPE	4-3/16 IN. (106 MM)	2-7/16 IN. (61 MM)	–
1/2 IN. SOLDER (1.6 CV)	5/8 IN. (16 MM) O.D. COPPER TUBING	4-1/8 IN. (104 MM)	1-5/8 IN. (41 MM)	1/2 IN. (13 MM)
3/4 IN. SOLDER (2.6 OR 3.3 CV)	7/8 IN. (22 MM) O.D. COPPER TUBING	4-3/16 IN. (106 MM)	1-1/2 IN. (38 MM)	3/4 IN. (19 MM)

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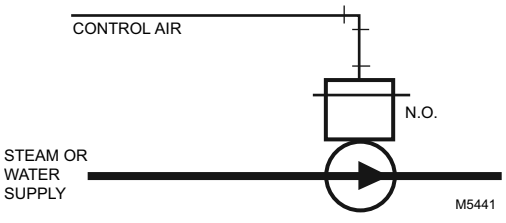
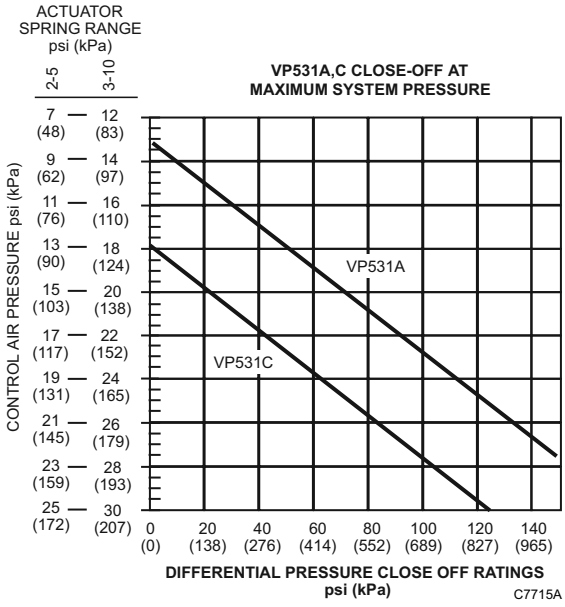
VP531C Typical Piping Diagram



Close-off Ratings for the VP531C



Valve Type: Unitary
Body Pattern: Two-way
Body Pressure: 150 psi (1034 kPa)
Air Connections: Push on for 1/4 in. O.D. plastic tubing
Valve Action: Proportional Normally Open
Controlled Medium: Water; Steam
Operating Humidity Range (% RH): 5 to 95% RH
Temperature Range: 40 F to 240 F (140 F max difference, alternating hot and cold water service)
(4 C to 116 C (78 K max difference, alternating hot and cold water service))
Maximum Safe Actuator Diaphragm Temperature: 230 F (110 C)
Maximum Diaphragm Pressure: 30 psi (205 kPa)

Accessories:

14003648-001 Vandalism Resistant Assembly, Cover assembly with 1/8 in NPT air Connection and push-in retainer to replace standard Cover

14004932-001 Pneumatic Valve Adapter (M6410/M7410 linkage and a green main spring to allow to retrofit an electric actuator)

Valves

Replacement Parts:

14002560-010 Repair stem assembly, 1.6 Cv VP531C or to Upgrade, 1.6 Cv VP531A

14002560-011 Repair stem assembly for 2.6 Cv VP531C or to Upgrade 2.6 Cv VP531A

14002560-012 Repair stem assembly for 3.3 Cv VP531C or to Upgrade 3.3 Cv VP531A

14003102-001 Replacement top assembly

14003297-002 Teflon packing kit for VP531C or VP531A upgrade valves

14004898-001 Repair Top & Insert for NPT and Solder body, 1.6 Cv VP531C or to upgrade NPT and solder body, 1.6 Cv VP531A

14004898-002 Repair Top & Insert for NPT and Solder body, 2.3 and 2.6 Cv VP531C or to upgrade NPT and solder body, 2.3 and 2.6 Cv VP531A

14004898-003 Repair Top & Insert for NPT and Solder body, 3.3 Cv VP531C or to upgrade NPT and solder body, 3.3 Cv VP531A

315913/0041 Orange Spring, 3 to 10 psi for VP525, VP526, VP527, VP531

316027/0042 Green Spring, 2 to 5 psi

316026 Yellow Spring, 8-11 psi

Product Number	End Connection Size		Type of End Connec-tion	Capacity		Close-off Ratings at Branchline Pressure	Spring Range		Comments	Includes
	(inch)	(mm)		(Cv)	(Kv)		(psi)	(kPa)		
VP531C1000	1/2 in.	12.7 mm	NPT	1.6 Cv	1.38 Kv	70 psid at 20 psi (with 2 to 5 psi spring)	2 psi to 5 psi	14 kPa to 34 kPa	Replacement for VP531A1004 and VP531A1012	3-10 psi spring is packed in box
VP531C1018	3/4 in.	19.1 mm	NPT	2.6 Cv	2.24 Kv	70 psid at 20 psi (with 2 to 5 psi spring)	2 psi to 5 psi	14 kPa to 34 kPa	Replacement for VP531A1046 and VP531A1053	3-10 psi spring is packed in box
VP531C1026	3/4 in.	19.1 mm	NPT	3.3 Cv	2.85 Kv	70 psid at 20 psi (with 2 to 5 psi spring)	2 psi to 5 psi	14 kPa to 34 kPa	Replacement for VP531A1061 and VP531A1079	3-10 psi spring is packed in box
VP531C1034	O.D.: 5/8 in.; Nominal: 1/2 in.	O.D.: 15.9 mm; Nominal: 12.7 mm	Solder	1.6 Cv	1.38 Kv	70 psid at 20 psi (with 2 to 5 psi spring)	2 psi to 5 psi	14 kPa to 34 kPa	Replacement for VP531A1087 and VP531A1095	3-10 psi spring is packed in box
VP531C1042	O.D.: 7/8 in.; Nominal: 3/4 in.	O.D.: 22.2 mm; Nominal: 19.1 mm	Solder	2.6 Cv	2.24 Kv	70 psid at 20 psi (with 2 to 5 psi spring)	2 psi to 5 psi	14 kPa to 34 kPa	Replacement for VP531A1103 and VP531A1111	3-10 psi spring is packed in box
VP531C1059	O.D.: 7/8 in.; Nominal: 3/4 in.	O.D.: 22.2 mm; Nominal: 19.1 mm	Solder	3.3 Cv	2.85 Kv	70 psid at 20 psi (with 2 to 5 psi spring)	2 psi to 5 psi	14 kPa to 34 kPa	Replacement for VP531A1129 and VP531A1137	3-10 psi spring is packed in box
VP531C1067	1/2 in.	12.7 mm	NPT	2.3 Cv	1.99 Kv	70 psid at 20 psi (with 2 to 5 psi spring)	2 psi to 5 psi	14 kPa to 34 kPa	Replacement for VP531A1020 and VP531A1038	3-10 psi spring is packed in box

Pneumatic Valve Accessories

Product Number	Description	Used With
14002864-001	Valve rebuild kit for 1/2 to 3/4 in valves with Cv of 4 or less	VP512
14003102-001	Replacement top assembly	VP526; VP525; VP527; VP531
14003115-001	Valve rebuild kit for 1/2 in. valves with 2 Cv or less. Not for Solder Bodies.	VP525A
14003116-001	Valve rebuild kit for 3/4 in. valves with 2 Cv or less valves. Not for Solder Bodies.	VP525A
14003117-001	Valve rebuild kit for 3/4 in. valves with 3 Cv. Not for Solder Bodies.	VP525A
14003118-001	Valve rebuild kit for 3/4 in. valves with 5 Cv. Not for solder bodies.	VP525A
14003119-001	Valve rebuild kit for 1/2 in. valves with 3 Cv. Not for solder bodies.	VP525A
14003310-003	Stem assembly for valves with 1.6 Cv	VP531A
14003311-003	Stem assembly for valves with 2.3 or 2.6 Cv	VP531A
14003312-003	Stem assembly for valves with 3.3 Cv	VP531A
14003313-001	Base	VP526A; VP527A; VP525A,C; VP531A,C
14003315-001	Gland	VP526A; VP527A; VP525A,C; VP531A,C
14003373-001	Rep Bonnet Assembly	VP513A
14003381-001	Brass Hex Bonnet, 1 3/8 diameter	VP526A; VP527A
14003648-001	Vandalism Resistant Assembly, Cover assembly with 1/8 in NPT air Connection and push-in retainer to replace standard Cover	VP526A; VP527A; VP525A,C; VP531A,C
14003873-001	Red Spring, 2 to 5 psi	VP526A
14004553-003	Stem and Plug Assembly for valves with 2.0 Cv	VP525A
14004554-003	Stem and Plug Assembly for valves with 3.0 Cv	VP525A
14004555-003	Stem and Plug Assembly for valves with 5.0 Cv	VP525A
14004932-001	Pneumatic Valve Adapter (M6410/M7410 linkage and a green main spring to allow to retrofit an electric actuator)	VP525; VP527; VP531
312817AA	Actuator Assembly, 3 to 8 psi, 21 to 55 kPa, and 1/2 in. stroke.	VP513; VP517; VP512
312817AB	Actuator Assembly, 6 to 11 psi, 41 to 76 kPa and 1/2 in. stroke.	VP513; VP517; VP512
312817S	Actuator for VP522A1039, VP522A1047, VP522A1237	VP522A1039; VP522A1047; VP522A1237
312817T	Actuator assembly, 3 to 10 psi, 21 to 69 kPa, and 1/2 in. stroke.	VP517A; VP513A
312817U	Actuator Assembly, 3 to 7 psi, 21 to 48 kPa, and 1/2 in. stroke.	VP517A; VP513A
312817V	Actuator Assembly, 8 to 12 psi, 55 to 83 kPa, and 1/2 in. stroke.	VP513
312817W	Actuator for VP522B1003	VP522B1003
312817Y	Actuator assembly for VP522B1011 andVP522B1029	VP522B1011; VP522B1029
313241A	Disc holder for VP513A	VP513A
313824A	Rebuild kit, include Stem and Disc holder, button with screw, packing and instruction, VP522A1005	VP522A1005
314459A	Rebuild kit, include Stem and Disc holder, button with screw, packing and instruction, VP522A1039	VP522A1039
314459B	Rebuild kit, includes stem and disc holder, Button with screw, packing and instructions, VP522A1047	VP522A1047
315407A	Rebuild kit, include Stem and Disc holder, button with screw, packing and instruction for the VP522B1003	VP522B1003
315408A	Rebuild kit, include Stem and Disc holder, button with screw, packing and instruction	VP522B1011; VP522B1029
315972	Stainless steel plug with 3/8 inch diameter and 1.0 Cv for VP513B1012	VP513B1012
316027/0042	Green Spring, 2 to 5 psi	VP525; VP527; VP531
316324A	Disc holder assemble for VP527A1026 and VP527A1067	VP527A1026; VP527A1067
CCT3833	Valve Seat Removal Wrench for 5/8 in. OD (1/2 in. nominal) and 7/8 in. OD (3/4 in.nominal) VP513B; VP517A; VP522A, B; VP526 Valves	VP517A; VP513B; VP526; VP522A, B
CCT3843	Valve Seat Removal Wrench for 1/2 in. OD (3/8 in. nominal) VP522; VP526 Valves	VP526; VP522

Valves

Pneumatic Valve Replacement Parts

Product Number	Description	Used With
14000639-001	Washer	VP526
14001046-004	Fastener	VP526A; VP527A; VP525A,C; VP531A,C
14001101-001	Valve Position Indicator	VP525
14002560-002	Stem and Disk Assembly	VP527A1018; VP527A1059
14002560-004	Stem and Disk Assembly	VP527A1034; VP527A1075
14002560-006	Stem and Disk Holder Assembly. For 0.63 Cv VP525 Valve	VP525
14002560-007	Repair stem assembly for 1/2 inch, 2.0 Cv VP525C or to Upgrade, 2.0 Cv VP525A	VP525A; VP525C
14002560-008	Repair stem assembly for 1/2 and 3/4 inch, 3.0 Cv VP525C or to Upgrade 1/2 and 3/4 inch, 3.0 Cv VP525A	VP525A; VP525C
14002560-009	Repair stem assembly for 3/4 inch, 5.0 Cv VP525C or to Upgrade, 5.0 Cv VP525A	VP525A; VP525C
14002560-010	Repair stem assembly, 1.6 Cv VP531C or to Upgrade, 1.6 Cv VP531A	VP531A; VP531C
14002560-011	Repair stem assembly for 2.6 Cv VP531C or to Upgrade 2.6 Cv VP531A	VP531A; VP531C
14002560-012	Repair stem assembly for 3.3 Cv VP531C or to Upgrade 3.3 Cv VP531A	VP531A; VP531C
14002560-013	Repair stem assembly for 1/2 inch, 0.63 Cv VP525C or to Upgrade, 0.63 Cv VP525A	VP525A; VP525C
14002863-001	Valve rebuild kit for 3/4 to 1 1/4 in valves with Cv of 6.3 or 10	VP512
14003297-001	Valve repack kit for VP526A, VP527A, or VP531A valves with 3/16 inch stem	VP526A; VP527A; VP531A
14003297-002	Teflon packing kit for VP531C or VP531A upgrade valves	VP531A; VP531C
14003299-001	Repair Top & Insert for 5/8 in. OD, 1.6 Cv VP525A solder body	VP525A
14003300-001	Repair Top & Insert for 7/8 in. OD, 2.5 Cv VP525A solder body	VP525A
14003308-001	Valve Bonnet	VP531A; VP531C
14003314-001	1 1/4 inch hex stainless steel Bonnet nut, Finish zinc plate with Dichromate treatment.	VP531A; VP531C
14003352-001	Seal washer, 1 1/64 outside diameter X 7/8 inside diameter	VP531A; VP531C
14003382-001	Brass Hex Bonnet 1-1/2 in. diameter	VP526A; VP525C
14003475-001	Valve Rebuild Kit for 1/2 in. valve with 0.4 or 0.63 Cv	VP527A
14003476-001	Valve Rebuild Kit for 1/2 in. valve with 1 or 1.6 Cv	VP527A
14004845-001	Green Packing Spring	VP525A; VP525C; VP531C
14004897-001	Repair Top & Insert for 1/2 inch NPT, 0.63 Cv VP525C or to upgrade 1/2 NPT, 0.63 Cv VP525A	VP525A; VP525C
14004897-002	Repair Top & Insert for 1/2 inch NPT, 2.0 Cv VP525C or to upgrade 1/2 NPT, 2.0 Cv VP525A	VP525A; VP525C
14004897-003	Repair Top & Insert for 3/4 inch NPT, 3.0 Cv VP525C or to upgrade 3/4 NPT, 3.0 Cv VP525A	VP525A; VP525C
14004897-004	Repair Top & Insert for 3/4 inch NPT, 5.0 Cv VP525C or to upgrade 3/4 NPT, 5.0 Cv VP525A	VP525A; VP525C
14004898-001	Repair Top & Insert for NPT and Solder body, 1.6 Cv VP531C or to upgrade NPT and solder body, 1.6 Cv VP531A	VP531A; VP531C
14004898-002	Repair Top & Insert for NPT and Solder body, 2.3 and 2.6 Cv VP531C or to upgrade NPT and solder body, 2.3 and 2.6 Cv VP531A	VP531A; VP531C
14004898-003	Repair Top & Insert for NPT and Solder body, 3.3 Cv VP531C or to upgrade NPT and solder body, 3.3 Cv VP531A	VP531A; VP531C
310135	Packing Spring, 1 Required	VP513A,B; VP522A,B
310137	Spacer for VP513 or VP517 Valves	VP513A,B; VP522A,B
310143	Black Packing, 3 required	VP513A,B; VP522A,B
310208	White Packing	VP525C; VP531C
312826	O-Ring	—
313051	1/2 inch valve Union Nut for VP525	VP501; VP500; VP525A,C
313052	3/4 inch valve Union Nut for VP525	VP501; VP500; VP525A,C
313102	Disc for VP513A Valves	VP513A
313744A	Actuator Replacement Assembly for the VP519 Valve	VP519C
314482	Stainless Steel Stem for 1/4 inch VP517A Valves	VP522A; VP517A
314526	Orange Spring with Blue stripe, 3 to 10 psi, 1/2 in. stroke	VP517A; VP513A; 312817T

Product Number	Description	Used With
315800A	O-Ring for VP513B, VP525, VP527 or VP531 Valves	VP513B; VP525; VP527; VP531
315911/0021	Cup with keyhole for VP525, VP526, VP527, VP531	VP526A; VP527A; VP525A,C; VP531A,C
315913/0041	Orange Spring, 3 to 10 psi for VP525, VP526, VP527, VP531	VP526A; VP527A; VP525A,C; VP531A,C
315917	Diaphragm	VP526A; VP527A; VP525A,C; VP531A,C
315937	Disc Holder	VP513B
315939	Spring	VP513B
316026	Yellow Spring, 8-11 psi	VP526A
316207	Stem for VP526A	VP526A
316208	Valve Seat	VP526A
316209	Plug 1.0 Cv	VP526A
316210	Plug for VP526	VP526A1118, VP526A1076, VP526A1092
316322	Plug	VP527A1026; VP527A1067
316336	Disc	VP527A1026; VP527A1067
320047	Retaining Ring	VP526A

Gauges for Pneumatics

Product Number	Description
14004904-001	2-1/2 in. diameter, panel mount Pneumatic Receiver gauge (-40 to 160 F), +/- 2% accuracy. Replaces 14506495-001(gauge) + 14505846-001
14004904-002	2-1/2 in. diameter, panel mount Pneumatic Receiver gauge (0 to 200 F), +/- 2% accuracy. Replaces 4506495-001(gauge) + 14505846-002
14004904-003	2-1/2 in. diameter, panel mount Pneumatic Receiver gauge (40 to 240 F), +/- 2% accuracy, Replaces 14506495-001(gauge) + 14505846-003
14004904-004	2-1/2 in. diameter, panel mount Pneumatic Receiver gauge (3 to 15 psi), +/- 2% accuracy, Replaces 14506495-001(gauge) + 14505846-022
14004904-005	2-1/2 in. diameter, panel mount Pneumatic Receiver gauge (0 to 20 psi), +/- 2% accuracy, Replaces 14506495-001(gauge) + 14505846-023
14004904-006	2-1/2 in. diameter, panel mount Pneumatic Receiver gauge (25 to 125 F), +/- 2% accuracy, Replaces 14506495-001(gauge) + 14505846-004
14004904-007	2-1/2 in. diameter, panel mount Pneumatic Receiver gauge (50 to 100 F), +/- 2% accuracy, Replaces 14506495-001(gauge) + 14505846-005,
14004904-008	2-1/2 in. diameter, Pneumatic Receiver gauge (-20 to 80 F), +/- 2% accuracy
14004904-009	2-1/2 in. diameter, Pneumatic Receiver gauge (0 to 2 in. wc), +/- 2% accuracy
14004904-010	2-1/2 in. diameter, Pneumatic Receiver gauge (15 to 85% RH), +/- 2% accuracy
14004904-011	2-1/2 in. diameter, Pneumatic Receiver gauge (15 to 75% RH), +/- 2% accuracy
14004904-012	2-1/2 in. diameter, Pneumatic Receiver gauge (15 to 95% RH), +/- 2% accuracy
14004904-101	2-1/2 in. diameter, Pneumatic Receiver gauge (-40 to 160 F), +/- 1% accuracy. Replaces 14506495-101(gauge) + 14505846-001
14004904-102	2-1/2 in. diameter, Pneumatic Receiver gauge (0 to 200 F), +/- 1% accuracy. Replaces 14506495-101(gauge) + 14505846-002
14004904-103	2-1/2 in. diameter, Pneumatic Receiver gauge (40 to 240 F), +/- 1% accuracy. Replaces 14506495-101(gauge) + 14505846-003
14004904-104	2-1/2 in. diameter, Pneumatic Receiver gauge (3 to 15 psi), +/- 1% accuracy. Replaces 14506495-101(gauge) + 14505846-022
14004904-105	2-1/2 in. diameter, Pneumatic Receiver gauge (0 to 20 psi), +/- 1% accuracy. Replaces 14506495-101(gauge) + 14505846-023
14004904-106	2-1/2 in. diameter, Pneumatic Receiver gauge (25 to 125 F), +/- 1% accuracy. Replaces 14506495-101(gauge) + 14505846-004
14004904-107	2-1/2 in. diameter, Pneumatic Receiver gauge (50 to 100 F), +/- 1% accuracy. Replaces 14506495-101(gauge) + 14505846-005
14004905-001	3-1/2 in. diameter, Pneumatic Receiver gauge (-40 to 160 F), +/- 2% accuracy
14004905-002	3-1/2 in. diameter, Pneumatic Receiver gauge (0 to 200 F), +/- 2% accuracy. Replaces 14506496-001(gauge) + 14505846-102
14004905-003	3-1/2 in. diameter, Pneumatic Receiver gauge (40 to 240 F), +/- 2% accuracy. Replaces 14506496-001(gauge) + 14505846-103
14004905-004	3-1/2 in. diameter, Pneumatic Receiver gauge (3 to 15 psi), +/- 2% accuracy. Replaces 14506496-001(gauge) + 14505846-122
14004905-005	3-1/2 in. diameter, Pneumatic Receiver gauge (0 to 20 psi), +/- 2% accuracy. Replaces 14506496-001(gauge) + 14505846-123
14004905-006	3-1/2 in. diameter, Pneumatic Receiver gauge (25 to 125 F), +/- 2% accuracy. Replaces 14506496-001(gauge) + 14505846-104
14004905-007	3-1/2 in. diameter, Pneumatic Receiver gauge (50 to 100 F), +/- 2% accuracy. Replaces 14506496-001(gauge) + 14505846-105
14004905-008	3-1/2 in. diameter, Pneumatic Receiver gauge (-20 to 80 F), +/- 2% accuracy
14004905-009	3-1/2 in. diameter, Pneumatic Receiver gauge (0 to 2 in. wc), +/- 2% accuracy
14004905-010	3-1/2 in. diameter, Pneumatic Receiver gauge (15 to 85% RH), +/- 2% accuracy
14004905-011	3-1/2 in. diameter, Pneumatic Receiver gauge (15 to 75% RH), +/- 2% accuracy
14004905-012	3-1/2 in. diameter Pneumatic Receiver gauge (15 to 95% RH), +/- 2% accuracy
14004905-101	3-1/2 in. diameter, Pneumatic Receiver gauge (-40 to 160 F), +/- 1% accuracy. Replaces 14506496-101(gauge) + 14505846-101
14004905-102	3-1/2 in. diameter, Pneumatic Receiver gauge (0 to 200 F), +/- 1% accuracy. Replaces 14506496-101(gauge) + 14505846-102
14004905-103	3-1/2 in. diameter, Pneumatic Receiver gauge (40 to 240 F), +/- 1% accuracy. Replaces 14506496-101(gauge) + 14505846-103
14004905-104	3-1/2 in. diameter, Pneumatic Receiver gauge (3 to 15 psi), +/- 1% accuracy. Replaces 14506496-101(gauge) + 14505846-122
14004905-105	3-1/2 in. diameter, Pneumatic Receiver gauge (0 to 20 psi), +/- 1% accuracy. Replaces 14506496-101(gauge) + 14505846-123
14004905-106	3-1/2 in. diameter, Pneumatic Receiver gauge (25 to 125 F), +/- 1% accuracy. Replaces 14506496-101(gauge) + 14505846-104
14004905-107	3-1/2 in. diameter, Pneumatic Receiver gauge (50 to 100 F), +/- 1% accuracy. Replaces 14506496-101(gauge) + 14505846-105
305616	1-1/2 in. diameter, 1/8 NPT center stem back mount Receiver gauge (0 to 2 in. wc scale) with +/- 2% accuracy

Gauges and Accessories

Product Number	Description
305617	1-1/2 in. diameter, 1/8 NPT center stem back mount Receiver gauge (1.0 to 3.0 in. wc scale) with +/- 2% accuracy
305911	Gauge, 2 in., 0-160PSI, 1/8 in. NPT
305912	Gauge, 0-100PSI, 2 in., 1/8 in. NPT
305914	2 in. diameter, 1/8 NPT center stem back mount Pressure Indicating gauge (0 to 30 psi scale) with +/- 3% accuracy
305917	2 in. diameter, 1/4 NPT center stem back mount Pressure Indicating gauge (0 to 160 psi scale) with +/- 3% accuracy
305923	1-1/2 in. diameter, 1/8 NPT stem on bottom mount Pressure Indicating gauge (0 to 30 psi scale) with +/- 4% accuracy
305925	Gauge, 0-30 PSI, 2 in., 1/8 in. NPT
305929	1-1/2 in. diameter, 1/8 NPT center back stem mount Receiver gauge (-40 to +160 F scale) with +/- 2% accuracy
305930	1-1/2 in. diameter, 1/8 NPT center back stem mount Receiver gauge (0 to 200 F scale) with +/- 2% accuracy
305931	1-1/2 in. diameter, 1/8 NPT center back stem mount Receiver gauge (40 to 240 F scale) with +/- 2% accuracy
305935	3-1/2 in. diameter, surface mounted 1/8 NPT stem on bottom Receiver gauge (-40 to +160 F scale) with +/- 2% accuracy
305965	1-1/2 in. diameter, 1/8 NPT center stem back mount Pressure Indicating gauge (0 to 30 psi scale) with +/- 4% accuracy
305986	Receiver Gauge. -20 to 80 F scale 1-1/2 in. diameter,1/2 NPT connection
305989	Gauge, Dew Point, 5-25C, 1.5 in., 1/8 in. NPT
804190C	3-1/2 in. diameter, panel-mounted Pneumatic Pressure Indicating Gauge (0 to 60 psi), 1/8 in. NPT connection, +/-3% accuracy
804191B	2-1/2 in. diameter, panel-mounted Pneumatic Pressure Indicating Gauge (0 to 30 psi), 1/4 in. barbed connection, +/-3% accuracy
804191C	2-1/2 in. diameter, panel-mounted Pneumatic Pressure Indicating Gauge (0 to 60 psi), 1/8 in. NPT connection, +/-3% accuracy
804191E	2-1/2 in. diameter, panel-mounted Pneumatic Pressure Indicating Gauge (0 to 160 psi), 1/8 in. NPT connection, +/-3% accuracy

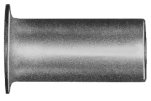
Pneumatic Accessories

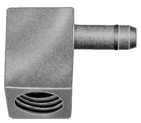
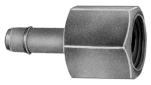
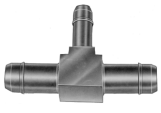
Product Number	Description	Used With
14002913-002	External Restriction Assembly. 0.007 in. Restriction, Red, Inlet 1/4 in; Outlet 1/4 in. and 1/4 in.	LP907; RP9517
14002913-003	External Restriction Assembly. 0.007 in. Restriction, Red, Inlet 1/4 in; Outlet 1/4 in. and 5/32 in.	LP907
14002913-004	External Restriction Assembly. 0.005 in. Restriction, Blue Inlet 1/4 in; Outlet 5/32 in. and 5/32 in.	—
14002913-005	External Restriction Assembly. 0.007 in. Restriction, Blue Inlet 1/4 in; Outlet 5/32 in. and 5/32 in.	—
14002913-007	External Restriction Assembly. 0.013 in. Restriction, Gray and Red, Inlet 1/4 in; Outlet 1/4 in. and 1/4 in.	—
14002914-001	Internal Restriction Assembly, 0.005 in. Restriction, Blue	RP975; SP970
14002914-002	Internal Restriction Assembly, 0.013 in. Restriction, Gray	—
14002914-004	Internal Restriction Assembly, 0.008 in. Restriction, Red	—
14003078-004	Three position switch, same as SP470A1018 without the scaleplate	SP470A1018
14003428-001	Amber tint filter bowl 4 1/64 inch long x 2 59/64 inch diameter including Bushing (313003)	WP251A
14003519-001	0-30 psi Gauge Kit with Fittings for Copper or Poly Tubing	—
14003567-001	Cap-barb with linear of low density polyethylene	14002913
14004239-001	Total air flow pick-up Tube assembly	PP904A
14004441-003	Bag assembly, with Spring [silver] (14001992-001) window [vertical. Logo] (14004405-001), window [horizontal. Logo] (14004405-002), window [vertical. 60-90] (14004405-005),1 window [horizontal. 60-90] (14004405-014)	—
14004441-015	Bag assembly with window [vertical. Logo], window [horizontal. Logo], window [vertical. 60-90], window [horizontal 60-90], Cover insert, setpoint, and window [vertical. 60-90]	—
14004559-001	Connector bag assembly, with connector assembly and connector assembly	Pneumatic Fittings
14004596-004	1 1/4 in. Bonnet for V5011/V5013	V5011; V5013
14004695-002	Pneumatic indicator - 1 7/8 in. +/- 1/16 in. X 5/8 in. +/- 1/32 in. Red =energized color, black de-energized color	—
14501547-001	ISD Central relay panel	—

Product Number	Description	Used With
14501600-001	Resistor Assembly PPK, End of Line Resistor, 1.91K Ohms Single Zone Fire Alarm Panels	—
14501600-002	Resistor Assembly PPK, End of Line Resistor, 1.91K Ohms Single Zone Fire Alarm Panels	—
14501600-003	Resistor Assembly PPK, End of Line Resistor, 1.91K Ohms Single Zone Fire Alarm Panels	—
14501600-008	Resistor Assembly PPK, End of Line Resistor, 1.91K Ohms Single Zone Fire Alarm Panels	—
14502286-003	Plate for SC 806	SC806
14502412-005	Lightning Suppressor for Lighting Products	—
14502412-006	Lightning Suppressor for Lighting Products	—
14502412-009	Lightning Suppressor for Lighting Products	—
14502412-010	Lightning Suppressor for Lighting Products	—
14502412-011	Lightning Suppressor for Lighting Products	—
14502412-012	Lightning Suppressor for Lighting Products	—
14502412-014	Lightning Suppressor for Lighting Products	—
14505159-001	Tamper Switch for Cabinet	—
14505393-001	Isolation Transformer, 24V / 50-60 Hz	—
14505928-001	Lock & Key for Cabinet	—
14506587-004	Base for TC804, TC805 Smoke Detector	—
14506635-001	Rough-in Ring, for Half-sized (18 in. x 18 in.) Standard Cabinet (19 in. X 24 in. X 9 in.).	—
14506635-002	Rough-in Ring for Full-sized (36 in. x 36 in.) Standard Cabinet (38 in. X 24 in. X 9 in.).	—
14506636-001	Door with Lock for Half-sized (18 in. x 18 in.) Standard Cabinet.	—
14506636-002	Door with Lock for Full-sized (36 in. x 36 in.) Standard Cabinet.	—
15753205-001	Nameplate, Material: 005 aluminum foil with foam relief liner .020 thick vendor - 3M #Y9394, Letters to be matte aluminum finish. Letters no to be embossed. Background to be Red.	Pneumatic Universal Cabinet
15753207-004	Back Coverplate for Half-sized (18 in. x 18 in.) Standard Cabinet.	—
20133	Dial	—
301572A/0767	Thermostat Key	—
310418A	Pneumatic External Adjustable Restrictor	—
310543	Seat, Valve, Removable, V5005	—
311680	Plug, Orifice, Rubber, TP, LP Thermostats	—
314963	Spring	—
315559E	Pneumatic “Tee” Restrictor	—
316134B	PP901A & B Diaphragm Repair Kit	PP901A,B
316203A	Pressure Regulator Valve Assembly, PP901A & PP901B, PP902A,B.	—
802550	Toggle Switch	—

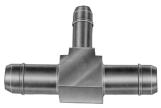
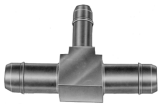
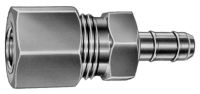
Product Number	Description	
AK3052W1C	Pneumatic Tubing, Polyethylene Flame Retardant Plastic (5/32 in. O.D. x 0.030 in. wall thickness), Carton qty = 3000 ft	
AK3053W1C	Pneumatic Tubing, Polyethylene Flame Retardant Plastic (1/4 in. O.D. x 0.040 in. wall thickness), Black with Colored Markings, without Fittings, Carton qty = 1500 ft	
AK3056C	Pneumatic Tubing, Polyethylene Flame Retardant Plastic (3/8 in. O.D. x 0.062 in. wall thickness), Black with 1 through 2 White Markings, without Fittings, Carton qty = 1000 ft	
AK3061C	Pneumatic Tubing, Polyethylene Flame Retardant Plastic (1/2 in. O.D. x 0.062 in. wall thickness), Black with 1 through 2 White Markings, without Fittings, Carton qty = 500 ft	
AK3071A	3/8 in. White Stripes	
AK3071B	3/8 in. Red Stripes	
AK3071D	3/8 in. Yellow Stripes	
AK3071G	3/8 in. Violet Stripes	

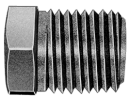
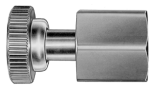
Gauges and Accessories

Product Number	Description	
AK3240C	Polyethylene Pneumatic Twin Tubing, includes two 5/32 in. O.D. x 0.030 in. Wall Thickness Tubings, Black with Joining Web without Fittings, Carton qty = 1000 ft	
AK3241C	Polyethylene Pneumatic Twin Tubing, includes two 1/4 in. O.D. x 0.040 in. Wall Thickness Tubings, Flame Retardant, Black with Joining Web without Fittings, Carton qty = 5000 ft	
AK3470B	Condensate Trap, 1/2 in., for 1 h.p. or larger compressors	
AK3470C	Condensate Trap, 3/8 in., for 3/4 h.p. or smaller compressors	
AK3485D	Installation Material	
AK3486	Coalescing In-line Pneumatic Filter Kit includes Two Filters with integral barbed fitting for individual devices	
AK3980	Fittings	
AK3997	Free Standing Mounting Kit for one General Purpose Cabinet	
ARR262	Miniature Pressure Regulator (0-125 psi Range), no gauge	
ARR262-S31	Miniature Pressure Regulator (0-125 psi Range), includes 0-160 psi gauge	
ARR262-S32	Miniature Pressure Regulator (0-60 psi Range), includes 0-60 psi gauge	
ARR262-S34	Arrow PRV 0-60	
ARR262I	Miniature Pressure Regulator (0-20 psi Range), no gauge	
ARR262L	Arrow PRV No Gag	
ARRBK1611	Arrow PRV	
CCT1421	1/4 in. Brass Compression Union	
CCT1435T	Pneumatic Fitting - 1/4 in. x 1/8 in. NPT Brass Compression Adapter to NPT,	
CCT1529	Pneumatic Fitting - 1/4 in. Brass Compression Tee,	
CCT1531	Pneumatic Fitting - 3/8 in. Brass Compression Tee,	
CCT1532	Pneumatic Fitting - 1/2 in. Brass Compression Tee,	
CCT1571	Pneumatic Fitting - 1/4 in. Plastic Ferrule (white) for use with plastic tubing and standard compression fittings,	
CCT1572	Pneumatic Fitting - 3/8 in. Plastic Ferrule (white) for use with plastic tubing and standard compression fittings,	
CCT1573	Pneumatic Fitting - 1/2 in. Plastic Ferrule (white) for use with plastic tubing and standard compression fittings,	
CCT1575	Pneumatic Fitting - 1/4 in. Brass Insert for Plastic Tubing,	
CCT1576	Pneumatic Fitting - 3/8 in. Brass Insert for Plastic Tubing,	
CCT1577	Pneumatic Fitting - 1/2 in. Brass Insert for Plastic Tubing,	

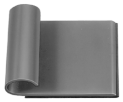
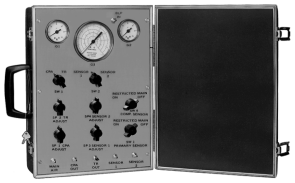
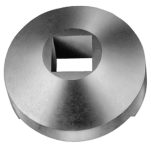
Product Number	Description	
CCT1589B	Pneumatic Fitting - 1/4 in.x1/8 in. FPT 90 Barbed Female Street Ells,	
CCT1590BT	Pneumatic Fitting - 1/4 in. Barbed x 1/8 in. NPT Male Adapter, Taped,	
CCT1594B	Pneumatic Fitting - 1/4 in. Barbed x 1/8 in. FPT Female Adapter,	
CCT1595BT	Pneumatic Fitting - 1/4 in. barbed x 1/8 in. NPT 90 Barbed Male Street Ells,	
CCT1598B	Pneumatic Fitting - 3/8 in. barbed x 3/8 in. barbed 90 Elbow	
CCT1599BT	Pneumatic Fitting - combination 5/32 in. and 1/4 in. Barbed x 1/8 in. NPT Male Adapter,	
CCT1602	Pneumatic Fitting - In-line gauge Tee (5/32 in. barbed x 5/32 in. barbed x 1/8 in. FPT),	
CCT1606B	Pneumatic Fitting - 5/32 in. barbed x 1/4 in. barbed (brass) plastic tubing coupling, reducing,	
CCT1607B	Pneumatic Fitting - 1/4 in. barbed x 1/4 in. barbed (brass) plastic tubing coupling,	
CCT1608B	Pneumatic Fitting - 3/8 in. barbed x 3/8 in. barbed (brass) plastic tubing coupling,	
CCT1610B	Pneumatic Fitting - 3/8 in. barbed x 1/4 in. barbed (brass) plastic tubing coupling,	
CCT1611B	Pneumatic Fitting - 1/2 in. barbed x 3/8 in. barbed (brass) plastic tubing coupling,	
CCT1612B	Pneumatic Fitting - 1/4 in. barbed x 1/4 in. barbed x 1/4 in. barbed (brass) Straight Tee,	
CCT1613B	Pneumatic Fitting - 3/8 in. barbed x 3/8 in. barbed x 3/8 in. barbed (brass) Straight Tee,	
CCT1614B	Pneumatic Fitting - 1/4 in. barbed x 1/4 in. barbed x 1/8 in. FPT In-line gauge Tee,	
CCT1615B	Pneumatic Fitting - 3/8 in. barbed x 3/8 in. barbed x 1/4 in. barbed Reducing Tee,	
CCT1616B	Pneumatic Fitting - 1/2 in. barbed x 1/2 in. barbed x 1/4 in. barbed Reducing Tee,	

Gauges and Accessories

Product Number	Description	
CCT1617B	Pneumatic Fitting - 1/2 in. barbed x 1/2 in. barbed (brass) plastic tubing coupling,	
CCT1618B	Pneumatic Fitting - 1/2 in. barbed x 1/2 in. barbed x 3/8 in. barbed Reducing Tee,	
CCT1619B	Pneumatic Fitting - Bulkhead Barb, 1/4 in. barbed x 1/4 in. Compression Nuts (for panels 5/16 in. thick),	
CCT1620B	Pneumatic Fitting - 1/2 in. barbed x 1/2 in. barbed x 1/2 in. barbed (brass) Straight Tee,	
CCT1622	Pneumatic Fitting - 1/4 in. barbed x 1/4 in. barbed x 1/8 in. FPT In-line gauge Tee with mounting tabs,	
CCT1623	Pneumatic Fitting - 1/4 in. Spring Clamp for Pneumatic Tubing,	
CCT1628B	Pneumatic Fitting - 5/32 in. barbed x 5/32 in. barbed (brass) plastic tubing coupling,	
CCT1629B	Pneumatic Fitting - 1/2 in. barbed x 1/4 in. barbed (brass) plastic tubing coupling,	
CCT1630B	Pneumatic Fitting - 1/4 in. barbed x 1/4 in. barbed x 5/32 in. barbed Reducing Tee,	
CCT1631B	Pneumatic Fitting - 3/8 in. barbed x 3/8 in. barbed x 5/32 in. barbed Reducing Tee,	
CCT1633BT	Pneumatic Fitting - 1/4 in. Barbed x 1/4 in. NPT Male Adapter,	
CCT1635B	Pneumatic Fitting - 1/4 in. barbed x 1/4 in. Compression Adapter,	
CCT1637B	Pneumatic Fitting - 5/32 in. barbed x 5/32 in. barbed x 5/32 in. barbed (brass) Straight Tee,	
CCT1640	Pneumatic Fitting - 1/4 in. Tubing Plug,	

Product Number	Description	
CCT1641	Pneumatic Fitting - 5/32 in. barbed x 5/32 in. Brass barbed 90 Elbow,	
CCT1642	Pneumatic Fitting - 1/4 in. barbed x 1/4 in. barbed 90 Elbow,	
CCT1643	Pneumatic Fitting - 1/4 in. barbed x 5/32 in. barbed 90 Elbow	
CCT1650	90 degree brass elbow	
CCT1692T	Pneumatic Fitting - 1/4 in. NPT x 1/8 in. FPT (brass) Pipe Bushing Taped,	
CCT1694T	Pneumatic Fitting - 3/8 in. NPT x 1/4 in. FPT Brass Reducing Pipe Bushing, Taped,	
CCT1696T	Pneumatic Fitting - 1/2 in. NPT x 1/4 in. FPT Brass Reducing Pipe Bushing, Taped,	
CCT1801	Pneumatic Fitting - Rubber Cap for 1/4 in. O.D. Pneumatic Tubing,	
CCT1802	Pneumatic Fitting - Rubber Grommet for 1/4 in. hole used to install capillary in duct	
CCT1807A	Plastic Cap for 3/8 in. Tubing.	
CCT1809	Pneumatic Fitting - Plastic Cap for 1/2 in. O.D. Pneumatic Tubing,	
CCT1815	Pneumatic Fitting - Aluminum Barb Plug for 5/32 in. x 5/32 in. O.D. Pneumatic Tubing (no air passage),	
CCT1820	Plastic Bushing for 1/2 in. EMP or K.O.	
CCT2083T	Pneumatic Fitting - Tank Valve with CCT2084 Cap, 1/8 in. NPT,	
CCT2085	Pneumatic Fitting - Gauge Adapter fits any standard 1/8 in. NPT gauge,	
CCT2090A	Air Check Diode Valve 1/4 in. O.D. Brass, 1.2 SCFM.	
CCT2091	Pneumatic Fitting - Air Check Diode Valve FPT for 1/4 in. O.D. Pneumatic Tubing (4.4 scfm)	
CCT2092	Pneumatic Fitting - Air Check Diode Valve FPT for 3/8 in. O.D. Pneumatic Tubing (7.5 scfm)	
CCT2093	Pneumatic Fitting - Air Check Diode Valve FPT for 1/2 in. O.D. Pneumatic Tubing (12.7 scfm)	
CCT2127B	Pneumatic Fittings - 1/4 in. barbed x 1/4 in. barbed Pneumatic Needle Valve,	

Gauges and Accessories

Product Number	Description	
CCT2564	Pneumatic Fittings - Plated Single Straps for 1/4 in. O.D. Copper Tubing,	
CCT2565	Pneumatic Fittings - Plated Single Straps for 3/8 in. O.D. Copper Tubing,	
CCT2566	Pneumatic Fittings - Plated Single Straps for 1/2 in. O.D. Copper Tubing,	
CCT2626	Pneumatic Fittings - Copper Gang Straps (6 in. wide) for 1/4 in. or 3/8 in. O.D. Copper Tubing,	
CCT2627	Pneumatic Fittings - Copper Gang Straps (36 in. wide) for 1/4 in. or 3/8 in. O.D. Copper Tubing,	
CCT2628	Pneumatic Fittings - Zinc-plated Steel Universal Gang Straps (24 in. wide) for 1/8 in. through 3/4 in. O.D. Copper Tubing,	
CCT2630	Pneumatic Fittings - Aluminum Universal Gang Straps (24 in. wide) for 1/8 in. through 3/4 in. O.D. Copper Tubing,	
CCT2760	Pneumatic Fittings - Adhesive Straps (1 in. wide) for 1/4 in. O.D. Tubing,	
CCT2762	Pneumatic Fittings - Adhesive Straps (1 in. wide) for 3/8 in. O.D. Tubing,	
CCT720B	Tubing Bender for 1/4 in. O.D. Pneumatic Tubing	
CCT722B	Tubing Bender for 3/8 in. O.D. Pneumatic Tubing	
CCT814	Slide Rule for Calculating Pneumatic Valve and Main Air Sizing	
CCT816A	Calibration Kit	
CCT816B	Sensor Calibration Kit; Obsolete Test Kit, use DSP3356 to replace	
CCT817C	Replacement gauge for the DSP3356 Pneumatic Control Calibration Kit	
CCT819	Proportional Band and Authority Setting Adjustment Tool for all RP920's	
CCT852	Pressure Bulb Assembly	
CCT853	Pneumatic Tubing for Test Equipment, 11/32 in. O.D. x 5/32 in. Latex Tubing (10 ft lengths)	
CCT947	Valve Seat Removal Wrench, 2 1/8 in., for V5011 and V5013 (2 in. Valves)	
CCT948	Valve Seat Removal Wrench, 2 5/8 in. for V5011 and V5013 (2-1/2 in. Valves)	
CCT949	Valve Seat Removal Wrench, 3 1/8 in. for V5011 and V5013 (3 in. Valves)	
CCT950	Plastic Tube Holder	

Product Number	Description	
CCT951	Plastic Tube Fitting Push,.	
CCT970	Thermometer Calibration Tool for Pneumatic Thermostats (TP970, TP971, TP972, TP973, TP9600 series). NOTE: The thermometer on thermostats made after 1988 may also be adjusted using a 1/8 in. allen wrench.	
DSP3356	Calibration Training Kit	
HKN03708008	Separator Drain. Assembly with 16 oz. Metal Bowl (for HKN8015)	
HKN03708304	Separator Drain. Assembly with 16 oz. Metal Bowl (for HKN8005, HKN8010, & HKN8210)	
HKN05417007	Drain Snap-Trap #05.4170-07	
HKN07132	Filter Cartridge for HKN13023 Oil Removal Filter	
HKN07313	Replacement Filter Cartridge for 310 - Hankison International Part No.0731-3	
HKN07341	Filter Sleeve Kit (for HKN8005, HKN8010 & HKN8210)	
HKN07342	Filter Sleeve Kit (for HKN8015, HKN8025 & HKN8035)	
HKN07444101	Separator/Drain. Cartridge (for HKN8005, HKN8010 & HKN8210)	
HKN17012	Bypass Valve Kit, 15 scfm	
HKN44604363	Filter Element, 40 microns with gaskets (for HKN8010, HKN8210, HKN8015, HKN8025 & HKN8210)	
HKN44604364	Filter Element, 40 microns with gaskets (for HKN8045, HKN8055, HKN8070 & HKN80100)	
HKN59301891	High Temperature Sensor, thermo-disc (for HKN8005, HKN8010, HKN8015, HKN8025 & HKN8210)	
HKN61052391	Fan Motor (for HKN8010, HKN8210, HKN8015, HKN8025 & HKN8035, 115VAC/1phase/ 60Hertz Models only)	
HKN63504548	Dual Light Assembly (for HKN8010, HKN8210, HKN8015, HKN8025 & HKN8035, 115VAC/1phase/60Hertz Models only)	
HKN8015	Compressed Air Dryer, (includes refrigerated air dryer, manual bypass valve, coalescing filter, regulator, operating status light and gauges. 15 scfm @ 80 PSI, 115VAC/1phase/ 60Hertz	
HKNRDMK1	Maintenance Kit, Hankison Part No.RDMK1	

Gauges and Accessories

Product Number	Description	
MJK100	Pneumatic Fittings Kit - Includes an assortment of fittings most often required for replacement or repair of pneumatic devices.	
MQP800	Pneumatic Calibration Kit with two 0-30 psi gauges	
P246A1009	Static Pressure Regulator	

Pneumatic Controls Engineering Guide

Table of Contents

INTRODUCTION

This section provides basic information on pneumatic control systems and components commonly used to control equipment in commercial heating and air conditioning applications. The information in this section is of a general nature in order to explain the fundamentals of pneumatic control. Some terms and references may vary between manufacturers (e.g., switch port numbers).

Pneumatic control systems use compressed air to operate actuators, sensors, relays, and other control equipment. Pneumatic controls differ from other control systems in several ways with some distinct advantages:

- Pneumatic equipment is inherently proportional but can provide two-position control when required.
- Many control sequences and combinations are possible with relatively simple equipment.
- Pneumatic equipment is suitable where explosion hazards exist.
- The installed cost of pneumatic controls and materials may be lower, especially where codes require that low-voltage electrical wiring for similar electric controls be run in conduit.
- Quality, properly installed pneumatic equipment is reliable. However, if a pneumatic control system requires troubleshooting or service, most building-maintenance people have the necessary mechanical knowledge.

DEFINITIONS

Actuator: A mechanical device that operates a final control element (e.g., valve, damper).

Authority (Reset Authority or Compensation Authority): A setting that indicates the relative effect a compensation sensor input has on the main setpoint (expressed in percent).

Branchline: The air line from a controller to the controlled device.

Branchline pressure (BLP): A varying air pressure signal from a controller to an actuator carried by the branchline. Can go from atmospheric to full main line pressure.

Compensation changeover: The point at which the compensation effect is reversed in action and changes from summer to winter or vice versa. The percent of compensation effect (authority) may also be changed at the same time.

Compensation control: A process of automatically adjusting the control point of a given controller to compensate for changes in a second measured variable such as outdoor air temperature. For example, the hot deck control point is reset upward as the outdoor air temperature decreases. Also know as “reset control”.

Compensation sensor: The system element which senses a variable other than the controlled variable and resets the main sensor control point. The amount of this effect is established by the authority setting.

Control point: The actual value of the controlled variable (setpoint plus or minus offset).

Controlled variable: The quantity or condition that is measured and controlled (e.g., temperature, relative humidity, pressure).

Controller: A device that senses the controlled variable or receives an input signal from a remote sensing element, compares the signal with the setpoint, and outputs a control signal (branchline pressure) to an actuator.

Differential: A term that applies to two-position devices. The range through which the controlled variable must pass in order to move the final control element from one to the other of its two possible positions. The difference between cut-in and cut-out temperatures, pressures, etc.

Direct acting (DA): A direct-acting thermostat or controller increases the branchline pressure on an increase in the measured variable and decreases the branchline pressure on a decrease in the variable. A direct-acting actuator extends the shaft on an increase in branchline pressure and retracts the shaft on a decrease in pressure.

Discharge air: Conditioned air that has passed through a coil. Also, air discharged from a supply duct outlet into a space. See Supply air.

Final control element: A device such as a valve or damper that acts to change the value of the manipulated variable. Positioned by an actuator.

Main line: The air line from the air supply system to controllers and other devices. Usually plastic or copper tubing.

Manipulated variable: Media or energy controlled to achieve a desired controlled variable condition.

Measuring element: Same as sensing element.

Mixed air: Typically a mixture of outdoor air and return air from the space.

Modulating: Varying or adjusting by small increments. Also called “proportional”.

Offset: A sustained deviation between the actual system control point and its controller setpoint under stable operating conditions. Usually applies to proportional (modulating) control.

Proportional band: As applied to pneumatic control systems, the change in the controlled variable required to change the controller output pressure from 3 to 13 psi. Usually expressed as a percentage of sensor span.

Reset changeover: The point at which the compensation effect is reversed in action and changes from summer to winter or vice versa. The percent of compensation effect (authority) may also be changed at the same time.

Reset control: A process of automatically adjusting the control point of a given controller to compensate for changes in a second measured variable such as outdoor air temperature.

Abbreviations

For example, the hot deck control point is reset upward as the outdoor air temperature decreases. Also know as “compensation control.”

Restrictor: A device in an air line that limits the flow of air.

Return air: Air entering an air handling system from the occupied space.

Reverse acting (RA): A reverse-acting thermostat or controller decreases the branchline pressure on an increase in the measured variable and increases the branchline pressure on a decrease in the variable. A reverse-acting valve actuator retracts the shaft on an increase in branchline pressure and extends the shaft on a decrease in pressure.

Sensing element: A device that detects and measures the controlled variable (e.g., temperature, humidity).

Sensor: A device placed in a medium to be measured or controlled that has a change in output signal related to a change in the sensed medium.

Sensor Span: The variation in the sensed media that causes the sensor output to vary between 3 and 15 psi.

Setpoint: The value on the controller scale at which the controller is set (e.g., the desired room temperature set on a thermostat). The desired control point.

Supply air: Air leaving an air handling system.

Thermostat: A device that responds to changes in temperature and outputs a control signal (branchline pressure). Usually mounted on a wall in the controlled space.

Throttling range: Related to proportional band, and expressed in values of the controlled variable (e.g., degrees, percent relative humidity, pounds per square inch) rather than in percent.

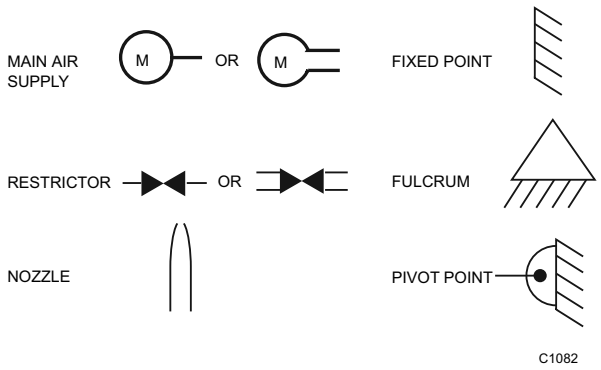
ABBREVIATIONS

The following port abbreviations are used in drawings of relays and controllers:

- **B** — Branch
- **C** — Common
- **E** — Exhaust
- **M** — Main
- **O** — Normally connected*
- **X** — Normally disconnected*
- **P** — Pilot (P1 and P2 for dual-pilot relays)
- **S** — Sensor (S1 and S2 for dual-input controllers)
- **N.C.** — Normally closed
- **N.O.** — Normally open

* The normally connected and common ports are connected on a fall in pilot pressure below the relay setpoint, and the normally disconnected port is blocked. On a rise in pilot pressure above the relay setpoint, the normally disconnected and common ports are connected and the normally connected port is blocked. Refer to Figure 37 in RELAYS AND SWITCHES.

SYMBOLS



BASIC PNEUMATIC CONTROL SYSTEM

General

A pneumatic control system is made up of the following elements:

— Compressed air supply system
— Main line distribution system
— Branchlines
— Sensors
— Controllers
— Actuators
— Final control elements (e.g., valves, dampers)

A basic pneumatic control system consists of an air supply, a controller such as a thermostat, and an actuator positioning a valve or damper (Fig. 1).

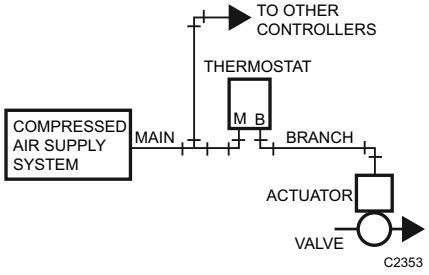


Fig. 1. Basic Pneumatic Control System.

The controller receives air from the main line and regulates its output pressure (branchline pressure) as a function of the temperature, pressure, humidity, or other variable. The branchline pressure from the controller can vary from zero to full mainline pressure. The regulated branchline pressure energizes the actuator, which then assumes a position proportional to the branchline pressure applied. The actuator usually goes through its full stroke as the branchline pressure changes from 3 psi to 13 psi. Other pressure ranges are available.

In a typical control system, the final control element (a valve or a damper) is selected first because it must produce the desired control results. For example, a system designed to control the flow of water through a coil requires a control valve. The type of valve, however, depends on whether the water is intended for

heating or cooling, the water pressure, and the control and flow characteristics required. An actuator is then selected to operate the final control element. A controller and relays complete the system. When all control systems for a building are designed, the air supply system can be sized and designed.

Air Supply and Operation

The main line air supply is provided by an electrically driven compressor pumping air into a storage tank at high pressure (Fig. 2). A pressure switch turns the compressor on and off to maintain the storage tank pressure between fixed limits. The tank stores the air until it is needed by control equipment. The air dryer removes moisture from the air, and the filter removes oil and other impurities. The pressure reducing valve (PRV) typically reduces the pressure to 18 to 22 psi. For two-pressure (day/night) systems and for systems designed to change from direct to reverse acting (heating/cooling), the PRV switches between two pressures, such as 13 and 18 psi. The maximum safe air pressure for most pneumatic controls is 25 psi.

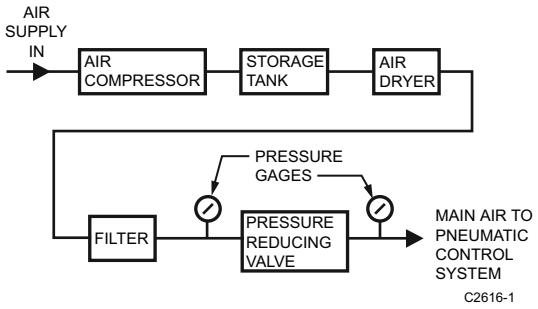


Fig. 2. Compressed Air Supply System.

From the PRV, the air flows through the main line to the controller (in Figure 1, a thermostat) and to other controllers or relays in other parts of the system. The controller positions the actuator. The controller receives air from the main line at a constant pressure and modulates that pressure to provide branchline air at a pressure that varies according to changes in the controlled variable, as measured by the sensing element. The controller signal (branchline pressure) is transmitted via the branchline to the controlled device (in Figure 1, a valve actuator). The actuator drives the final control element (valve) to a position proportional to the pressure supplied by the controller.

When the proportional controller changes the air pressure to the actuator, the actuator moves in a direction and distance proportional to the direction and magnitude of the change at the sensing element.

Restrictor

The restrictor is a basic component of a pneumatic control system and is used in all controllers. A restrictor is usually a disc with a small hole inserted into an air line to restrict the amount of airflow. The size of the restrictor varies with the application, but can have a hole as small as 0.003 inches.

Nozzle-Flapper Assembly

The nozzle-flapper assembly (Fig. 3) is the basic mechanism for controlling air pressure to the branchline. Air supplied to the nozzle escapes between the nozzle opening and the flapper. At a given air supply pressure, the amount of air escaping is determined by how tightly the flapper is held against the nozzle by a sensing element, such as a bimetal. Thus, controlling the tension on the spring also controls the amount of air escaping. Very little air can escape when the flapper is held tightly against the nozzle.

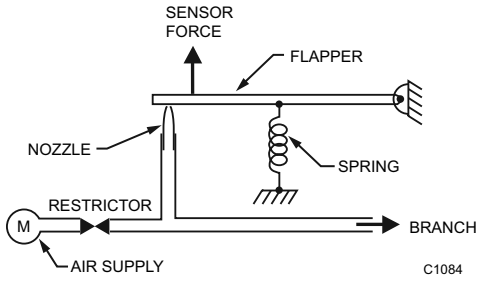


Fig. 3. Nozzle-Flapper Assembly with Restrictor.

To create a branchline pressure, a restrictor (Fig. 3) is required. The restrictor and nozzle are sized so that the nozzle can exhaust more air than can be supplied through the restrictor when the flapper is off the nozzle. In that situation, the branchline pressure is near zero. As the spring tension increases to hold the flapper tighter against the nozzle, reducing the air escaping, the branchline pressure increases proportionally. When the spring tension prevents all airflow from the nozzle, the branchline pressure becomes the same as the mainline pressure (assuming no air is flowing in the branchline). This type of control is called a “bleed” control because air “bleeds” continuously from the nozzle.

With this basic mechanism, all that is necessary to create a controller is to add a sensing element to move the flapper as the measured variable (e.g., temperature, humidity, pressure) changes. Sensing elements are discussed later.

Pilot Bleed System

The pilot bleed system is a means of increasing air capacity as well as reducing system air consumption. The restrictor and nozzle are smaller in a pilot bleed system than in a nozzle flapper system because in a pilot bleed system they supply air only to a capacity amplifier that produces the branchline pressure (Fig. 4). The capacity amplifier is a pilot bleed component that maintains the branchline pressure in proportion to the pilot pressure but provides greater airflow capacity.

Basic Pneumatic Control System

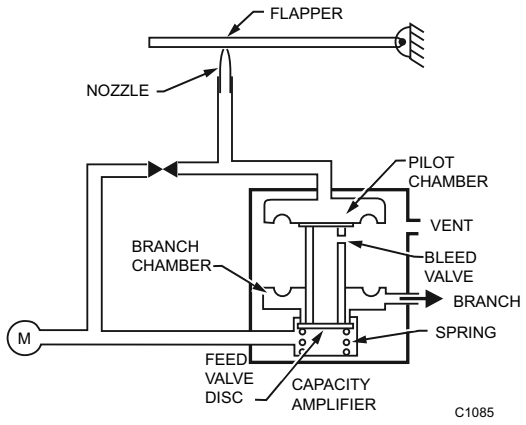


Fig. 4. Pilot Bleed System with Amplifier Relay.

The pilot pressure from the nozzle enters the pilot chamber of the capacity amplifier. In the state shown in Figure 4, no air enters or leaves the branch chamber. If the pilot pressure from the nozzle is greater than the spring force, the pilot chamber diaphragm is forced down, which opens the feed valve and allows main air into the branch chamber. When the pilot pressure decreases, the pilot chamber diaphragm rises, closing the feed valve. If the pilot chamber diaphragm rises enough, it lifts the bleed valve off the feed valve disc, allowing air to escape from the branch chamber through the vent, thus decreasing the branchline pressure. Main air is used only when branchline pressure must be increased and to supply the very small amount exhausted through the nozzle.

Signal Amplifier

In addition to the capacity amplifier, pneumatic systems also use a signal amplifier. Generally, modern amplifiers use diaphragms for control logic instead of levers, bellows, and linkages.

A signal amplifier increases the level of the input signal and provides increased flow. This amplifier is used primarily in sensor-controller systems where a small signal change from a sensor must be amplified to provide a proportional branchline pressure. The signal amplifier must be very sensitive and accurate, because the input signal from the sensor may change as little as 0.06 psi per degree Fahrenheit.

Another use for a signal amplifier is to multiply a signal by two to four times so a signal from one controller can operate several actuators in sequence.

Feed and Bleed System

The “feed and bleed” (sometimes called “non bleed”) system of controlling branchline pressure is more complicated than the nozzle-flapper assembly but theoretically uses less air. The nozzle-flapper system exhausts some air through the nozzle continually, whereas the feed and bleed system exhausts air only when the branchline pressure is being reduced. Since modern nozzle-flapper devices consume little air, feed and bleed systems are no longer popular.

The feed and bleed system consists of a feed valve that supplies main air to the branchline and a bleed valve that exhausts air from the branchline (Fig. 5). Each valve consists of a ball nested on top of a tube. Some pneumatic controllers use pressure balance diaphragm devices in lieu of springs and valves. A spring in the tube continually tries to force the ball up. The lever holds the ball down to form a tight seal at the end of the tube. The feed and bleed valves cannot be open at the same time.

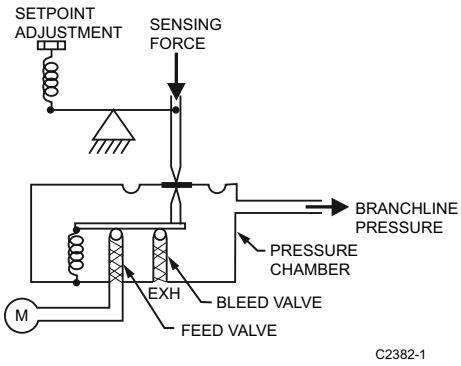


Fig. 5. Feed and Bleed System.

A force applied by the sensing element at the sensor input point is opposed by the setpoint adjustment spring and lever. When the sensing element pushes down on the lever, the lever pivots on the bleed ball and allows the feed ball to rise, which allows main air into the chamber. If the sensing element reduces its force, the other end of the lever rises and pivots on the feed ball, and the bleed ball rises to exhaust air from the system. The sensor can be any sensing element having enough force to operate the system.

Sensing Elements

Bimetal

A bimetal sensing element is often used in a temperature controller to move the flapper. A bimetal consists of two strips of different metals welded together as shown in Figure 6A. As the bimetal is heated, the metal with the higher coefficient of expansion expands more than the other metal, and the bimetal warps toward the lower-coefficient metal (Fig. 6B). As the temperature falls, the bimetal warps in the other direction (Fig. 6C).

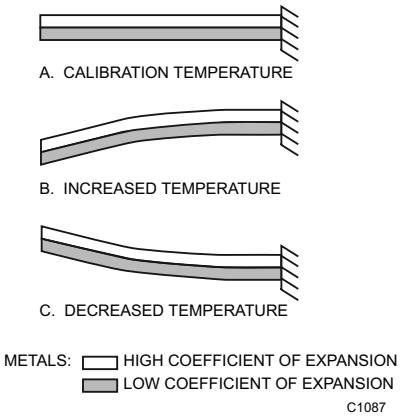


Fig. 6. Bimetal Sensing Element.

A temperature controller consists of a bimetal element linked to a flapper so that a change in temperature changes the position of the flapper. Figure 7 shows a direct-acting thermostat (branchline pressure increases as temperature increases) in which the branchline pressure change is proportional to the temperature change. An adjustment screw on the spring adjusts the temperature at which the controller operates. If the tension is increased, the temperature must be higher for the bimetal to develop the force necessary to oppose the spring, lift the flapper, and reduce the branch pressure.

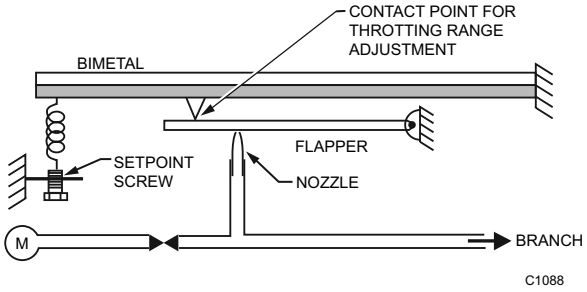


Fig. 7. Temperature Controller with Bimetal Sensing Element.

Rod And Tube

The rod-and-tube sensing element consists of a brass tube and an Invar rod, as shown in Figure 8. The tube expands and contracts in response to temperature changes more than the rod. The construction of the sensor causes the tube to move the rod as the tube responds to temperature changes. One end of the rod connects to the tube and the other end connects to the flapper spring to change the force on the flapper.

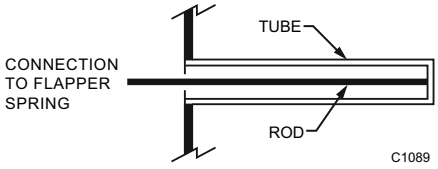


Fig. 8. Rod-and-Tube Insertion Sensor.

On a rise in temperature, the brass tube expands and draws the rod with it. The rod pulls on the flapper spring which pulls the flapper closed to the nozzle. The flapper movement decreases the air-bleed rate, which increases branchline pressure.

Remote Bulb

The remote-bulb sensing element has as measuring element made up of a capillary and bulb filled with a liquid or vapor (Fig. 9). On and increase in temperature at the bulb, the liquid or vapor expands through the capillary tubing into the diaphragm chamber. The expansion causes the diaphragm pad to push the pin toward the lever, which moves the flapper to change the branchline pressure.

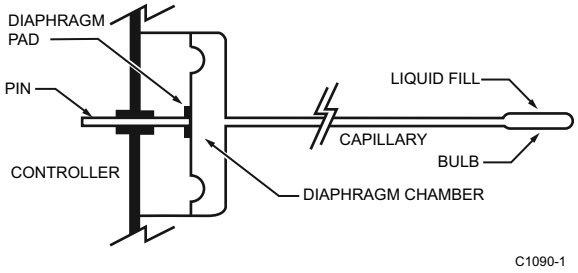


Fig. 9. Remote-Bulb Temperature Sensor.

Remote-bulb temperature sensors are used in bleed-type controllers. Capillary length of up to 2.5 meters are normally used for inserting the bulb in duct, tank, or pipe.

Averaging Element

The averaging-element sensor is similar to the remote-bulb sensor except that it has no bulb and the whole capillary is the measuring element. The long, flexible capillary has a slightly wider bore to accommodate the equivalent liquid fill that is found in a remote-bulb sensor. The averaging-element sensor averages temperatures along its entire length and is typically used to measure temperatures across the cross section of a duct in which two air streams may not mix completely. Averaging element sensors are used to provide an input signal to a controller.

Throttling Range Adjustment

A controller must always have some means to adjust the throttling range (proportional band). In a pneumatic controller, the throttling range is the change at the sensor required to change the branchline pressure 10 psi. The setpoint is usually at the center of the throttling range. For example, if the throttling range of a temperature controller is 4F and the setpoint is 72F, the branchline pressure is 3 psi at 70F, 8 psi at 72F, and 13 psi at 74F for a direct acting controller

In all pneumatic systems except the sensor-controller system, the throttling range is adjusted by changing the effective length of a lever arm. In Figure 7, the throttling range is changed by moving the contact point between the bimetal and the flapper. (For information on adjusting the throttling range in a sensor-controller system, see SENSOR-CONTROLLER SYSTEMS.)

Air Supply Equipment

Relays and Switches

Relays are used in control circuits between controllers and controlled devices to perform a function beyond the capacity of the controllers. Relays typically have diaphragm logic construction (Fig. 10) and are used to amplify, reverse, average, select, and switch controller outputs before being sent to valve and damper actuators.

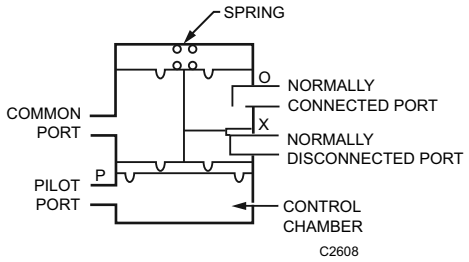


Fig. 10. Typical Switching Relay.

The controlling pressure is connected at the pilot port (P), and pressures to be switched are connected at the normally connected port (O) or the normally disconnected port (X). The operating point of the relay is set by adjusting the spring pressure at the top of the relay.

When the pressure at the pilot port reaches the relay operating point, it pushes up on the diaphragm in the control chamber and connects pressure on the normally disconnected port (X) to the common port as shown. If the pilot pressure falls below the relay setpoint, the diaphragm moves down, blocks the normally disconnected (X) port, and connects the normally connected port (O) to the common port.

AIR SUPPLY EQUIPMENT

General

A pneumatic control system requires a supply of clean, dry, compressed air. The air source must be continuous because many pneumatic sensors, controllers, relays, and other devices bleed air. A typical air supply system includes a compressor, an air dryer, an air filter, a pressure reducing valve, and air tubing to the control system (Fig. 11).

The following paragraphs describe the compressor, filter, pressure reducing valves, and air drying techniques. For information on determining the moisture content of compressed air, refer to the General Engineering Data section.

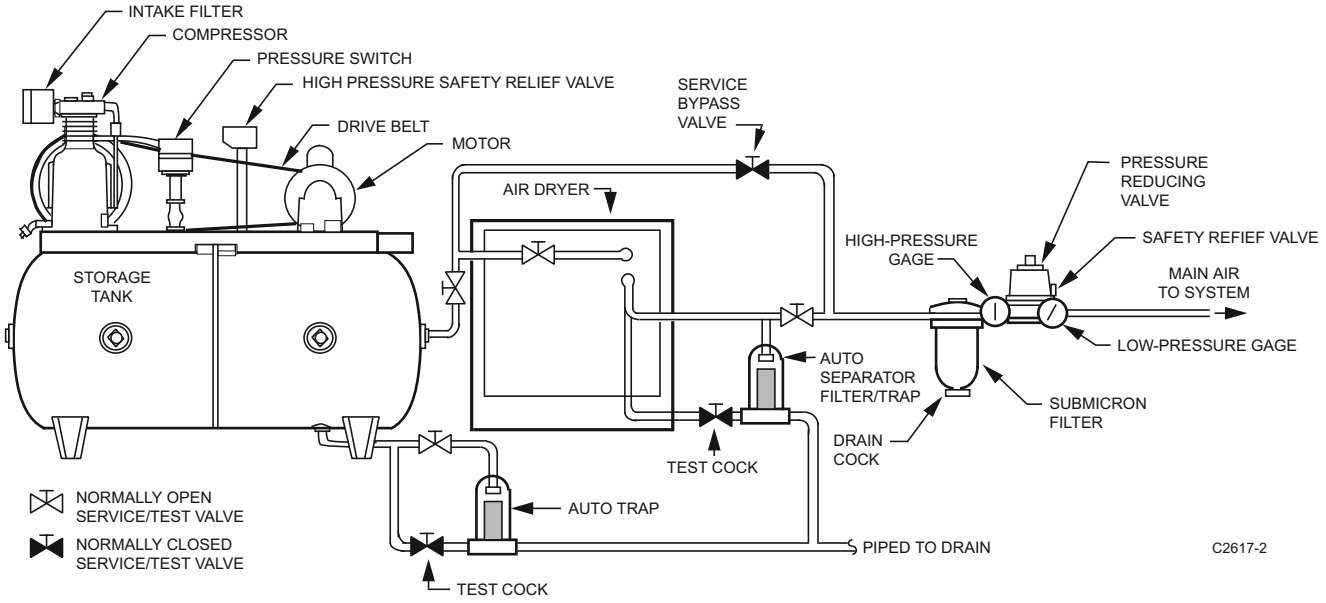


Fig. 11. Typical Air Supply.

Air Compressor

The air compressor provides the power needed to operate all control devices in the system. The compressor maintains pressure in the storage tank well above the maximum required in the control system. When the tank pressure goes below a minimum setting (usually 70 to 90 psi), a pressure switch starts the compressor motor. When the tank pressure reaches a high-limit setting, the pressure switch stops the motor. A standard tank is typically large enough so that the motor and compressor operate no more than 50 percent of the time, with up to twelve motor starts per hour.

Some applications require two compressors or a dual compressor. In a dual compressor, two compressors operate alternately, so wear is spread over both machines, each capable of supplying the average requirements of the system without operating more than half the time. In the event of failure of one compressor, the other assumes the full load.

Contamination in the atmosphere requires a compressor intake filter to remove particles that would damage the compressor pump. The filter is essential on oil-less compressors because a contaminated inlet air can cause excessive wear on piston rings. The intake filter is usually located in the equipment room with the compressor, but it may be located outdoors if clean

outdoor air is available. After the air is compressed, cooling and settling actions in the tank condense some of the excess moisture and allow fallout of the larger oil droplets generated by the compressor pump.

A high pressure safety relief valve which opens on excessively high tank pressures is also required. A hand valve or automatic trap periodically blows off any accumulated moisture, oil residue, or other impurities that collect in the bottom of the tank.

Air Drying Techniques

General

Air should be dry enough to prevent condensation. Condensation causes corrosion that can block orifices and valve mechanisms. In addition, dry air improves the ability of filters to remove oil and dirt.

Moisture in compressed air is removed by increasing pressure, decreasing temperature, or both. When air is compressed and cooled below its saturation point, moisture condenses. Draining the condensate from the storage tank causes some drying of the air supply, but an air dryer is often required.

An air dryer is selected according to the amount of moisture in the air and the lowest temperature to which an air line will be exposed. For a chart showing temperature and moisture content relationships at various air pressures, refer to the General Engineering Data section.

Dry Air Requirement

The coldest ambient temperature to which tubing is exposed is the criterion for required dryness, or dew point. Dew point is the temperature at which moisture starts to condense out of the air.

The coldest winter exposure is normally a function of outdoor air temperature. Summer exposure is normally a function of temperature in cold air ducts or air conditioned space. The typical coldest winter application is an air line and control device (e.g., damper actuator) mounted on a rooftop air handling unit and exposed to outdoor air temperatures (Fig. 12). The second coldest winter exposure is an air line run in a furred ceiling or outside wall.

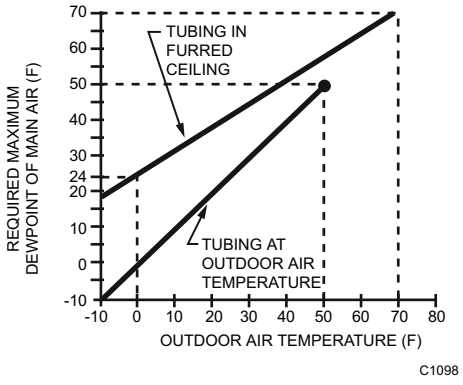


Fig. 12. Winter Dew Point Requirement.

A typical summer minimum dew point application is a cold air plenum. Figure 13 shows a 50F plenum application along with winter requirements for a year-round composite.

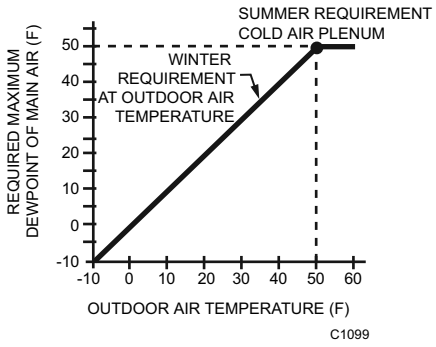


Fig. 13. Twelve-Month Composite Dew Point Requirement.

CONDENSING DRYING

The two methods of condensing drying are high-pressure drying and refrigerant drying.

High-Pressure Drying

High-pressure drying may be used when main air piping is kept away from outside walls and chilling equipment. During compression and cooling to ambient temperatures, air gives up moisture which then collects in the bottom of the storage tank. The higher the tank pressure, the greater the amount of moisture that condenses. Maintaining a high pressure removes the maximum amount of moisture. The compressor should have a higher operating pressure than is required for air supply purposes only. However, higher air pressure requires more energy to run the compressor. The tank must include a manual drain valve or an automatic trap to continually drain off accumulated moisture. With tank pressures of 70 to 90 psi, a dew point of approximately 70F at 20 psi can be obtained.

Refrigerant Drying

Lowering air temperature reduces the ability of air to hold water. The refrigerated dryer (Fig. 14) is the most common means of obtaining dry, compressed air and is available in several capacities. It provides the greatest system reliability and requires minimal maintenance.

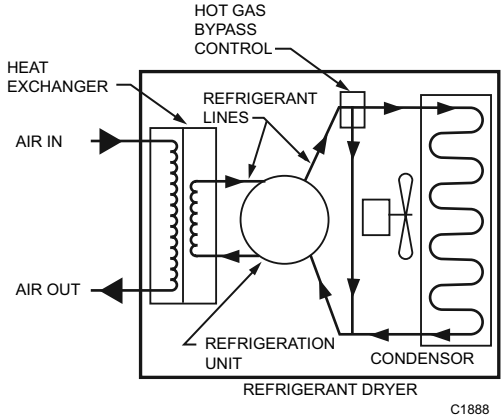


Fig. 14. Typical Refrigerant Dryer Airflow Diagram.

Air Supply Equipment

The refrigerant dryer uses a non cycling operation with a hot gas bypass control on the refrigerant flow to provide a constant dew point of approximately 35F at the tank pressure. The refrigeration circuit is hermetically sealed to prevent loss of refrigerant and lubricant and to protect against dirt.

The heat exchanger reduces the temperature of the compressed air passing through it. A separator/filter condenses both water and oil from the air and ejects the condensate through a drain. A temperature-sensing element controls the operation of the refrigeration system to maintain the temperature in the exchanger.

With a dew point of 35F and an average compressor tank pressure of 80 psi, air is dried to a dew point of 12F at 20 psi. Under severe winter conditions and where piping and devices are exposed to outside temperatures, the 12F dew point may not be low enough.

DESICCANT DRYING

A desiccant is a chemical that removes moisture from air. A desiccant dryer is installed between the compressor and the PRV. Dew points below -100F are possible with a desiccant dryer. The desiccant requires about one-third of the process air to regenerate itself, or it may be heated. To regenerate, desiccant dryers may require a larger compressor to produce the needed airflow to supply the control system and the dryer.

It may be necessary to install a desiccant dryer after the refrigerant dryer in applications where the 12F dew point at 20 psi mainline pressure does not prevent condensation in air lines (e.g., a roof-top unit exposed to severe winters).

The desiccant dryer most applicable to control systems uses the adsorbent principle of operation in which porous materials attract water vapor. The water vapor is condensed and held as a liquid in the pores of the material. The drying action continues until the desiccant is saturated. The desiccant is regenerated by removing the moisture from the pores of the desiccant material. The most common adsorbent desiccant material is silica gel, which adsorbs over 40 percent of its own weight in water and is totally inert. Another type of adsorbent desiccant is the molecular sieve.

A desiccant is regenerated either by heating the desiccant material and removing the resulting water vapor from the desiccant chamber or by flushing the desiccant chamber with air at a lower vapor pressure for heatless regeneration. To provide a continuous supply of dry air, a desiccant dryer has two desiccant chambers (Fig. 15). While one chamber is being regenerated, the other supplies dry air to the system. The cycling is accomplished by two solenoid valves and an electric timer. During one cycle, air passes from the compressor into the left desiccant chamber (A). The air is dried, passes through the check valve (B), and flows out to the PRV in the control system.

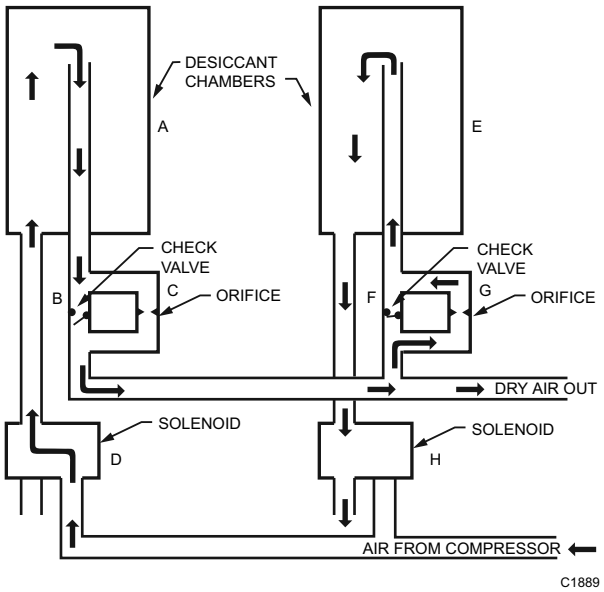


Fig. 15. Typical Heatless Desiccant Dryer Airflow Diagram.

Simultaneously, some of the dried air passes through the orifice (G) to the right desiccant chamber (E). The air is dry and the desiccant chamber is open to the atmosphere, which reduces the chamber pressure to near atmospheric pressure. Reducing the air pressure lowers the vapor pressure of the air below that of the desiccant, which allows the moisture to transfer from the desiccant to the air. The timer controls the cycle, which lasts approximately 30 minutes.

During the cycle, the desiccant in the left chamber (A) becomes saturated, and the desiccant in the right chamber (E) becomes dry. The timer then reverses the flow by switching both of the solenoid valves (D and H). The desiccant in the right chamber (E) then becomes the drying agent connected to the compressor while the desiccant in the left chamber (A) is dried.

The process provides dry air to the control system continually and requires no heat to drive moisture from the desiccant. A fine filter should be used after the desiccant dryer to filter out any desiccant discharged into the air supply.

A heated dryer also has two chambers where one is heat-regenerated while the other dries the compresses air. Periodically, the regenerating and drying action is switched.

Pressure Reducing Valve Station

The pressure reducing valve station is typically furnished with an air filter. The filter, high-pressure gage, high pressure relief valve, pressure reducing valve (PRV), and low-pressure gage are usually located together at one point in the system and may be mounted directly on the compressor. The most important elements are the air filter and the PRV.

Air Filter

The air filter (Fig. 16) removes solid particulate matter and oil aerosols or mist from the control air.

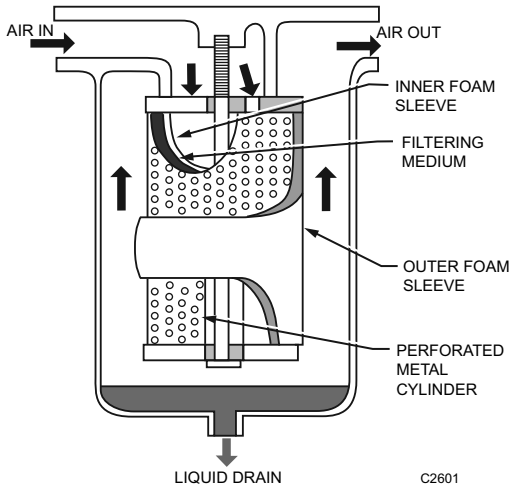


Fig. 16. Typical Air Filter.

Oil contamination in compressed air appears as a gas or an aerosol. Gaseous oil usually remains in a vapor state throughout the system and does not interfere with operation of the controls. Aerosols, however, can coalesce while flowing through the system, and turbulence can cause particles to collect in device filters, orifices, and small passages.

Many filters are available to remove solids from the air. However, only an oil-coalescing filter can remove oil aerosols from control air. An oil coalescing filter uses a bonded fibrous material to combine the small particles of oil mist into larger droplets. The coalesced liquids and solids gravitate to the bottom of the outer surface of the filter material, drop off into a sump, and are automatically discharged or manually drained.

The oil coalescing filter continues to coalesce and drain off accumulated oil until solid particles plug the filter. An increase in pressure drop across the filter (to approximately 10 psi) indicates that the filter element needs replacement. For very dirty air, a 5-micron prefilter filters out large particles and increases the life of the final filter element.

Pressure Reducing Valves

A pressure reducing valve station can have a single-pressure reducing valve or a two-pressure reducing valve, depending on the requirements of the system it is supplying.

SINGLE-PRESSURE REDUCING VALVE

After it passes though the filter, air enters the PRV (Fig. 11). Inlet pressure ranges from 60 to 150 psi, depending on tank pressures maintained by the compressor. Outlet pressure is adjustable from 0 to 25 psi, depending on the control air requirements. The normal setting is 20 psi.

A safety relief valve is built into some PRV assemblies to protect control system devices if the PRV malfunctions. The valve is typically set to relieve downstream pressures above 24 psi.

TWO-PRESSURE REDUCING VALVE

A two-pressure reducing valve is typically set to pass 13 or 18 psi to the control system, as switched by a pilot pressure. The two-pressure reducing valve is the same as the single-pressure reducing valve with the addition of a switchover diaphragm and switchover inlet to accept the switchover pressure signal. Switchover to the higher setting occurs when the inlet admits main air into the switchover chamber. Exhausting the switchover chamber returns the valve to the lower setting.

The switchover signal is typically provided by an E/P relay or a two-position diverting switch. An automatic time clock can operate an E/P relay to switch the main pressure for a day/night control system. A diverting switch is often used to manually switch a heating/cooling system.

In many applications requiring two-pressure reducing valves, a single-pressure reducing valve is also required to supply single-pressure controllers which do not perform well at low pressures. Higher dual pressure systems operating at 20 and 25 psi are sometimes used to eliminate the need and expense of the second PRV.

THERMOSTATS

Thermostats are of four basic types:

— A low-capacity, single-temperature thermostat is the basic nozzle-flapper bleed-type control described earlier. It is a bleed, one-pipe, proportional thermostat that is either direct or reverse acting.

— A high-capacity, single-temperature thermostat is a low capacity thermostat with a capacity amplifier added. It is a pilot-bleed, two-pipe, proportioning thermostat that is either direct or reverse acting.

— A dual-temperature thermostat typically provides occupied/unoccupied control. It is essentially two thermostats in one housing, each having its own bimetal sensing element and setpoint adjustment. A valve unit controlled by mainline pressure switches between the occupied and unoccupied mode. A manual override lever allows an occupant to change the thermostat operation from unoccupied operation to occupied operation.

— A dual-acting (heating/cooling) thermostat is another two-pipe, proportioning thermostat that has two bimetal sensing elements. One element is direct acting for heating control, and the other, reverse acting for cooling control. Switchover is the same as for the dual-temperature thermostat but without manual override.

Other thermostats are available for specific uses. Energy conservation thermostats limit setpoint adjustments to reasonable minimums and maximums. Zero energy band thermostats provide an adjustable deadband between heating and cooling operations.

The thermostat provides a branchline air pressure that is a function of the ambient temperature of the controlled space and the setpoint and throttling range settings. The throttling range setting and the setpoint determine the span and operating range of the thermostat. The nozzle-flapper-bimetal assembly maintains a fixed branchline pressure for each temperature within the throttling range (Fig. 17). The forces within the nozzle-flapper-bimetal assembly always seek a balanced

condition against the nozzle pressure. If the setpoint is changed, the forces in the lever system are unbalanced and the room ambient temperature must change in a direction to cause the bimetal to rebalance the lever system.

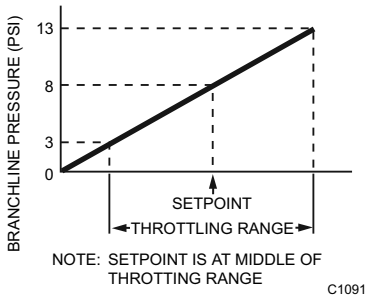


Fig. 17. Relationship between Setpoint, Branchline Pressure, and Throttling Range.

For example, if the setpoint of a direct acting thermostat is increased, the bimetal reduces the force applied to the flapper and raises the flapper off the nozzle. This movement causes the branchline pressure to bleed down and a heating valve to open. Heat enters the space until the temperature at the thermostat increases and the force of the bimetal is again in equilibrium with the opposing force of the pressure at the nozzle. Decreasing the setpoint causes the reverse to occur.

The throttling range adjustment provides the means for changing the effective length of the cantilever bimetal in the lever system. When the throttling range adjustment is positioned directly over the nozzle, the force of the bimetal increases and a narrow throttling range or very high sensitivity results. For example, a change in temperature of 1 degree F could result in a branchline pressure change of 5 psi.

When the throttling range adjustment is moved toward the end of the bimetal and away from the nozzle, the force of the bimetal is reduced. This reduction requires a greater temperature change at the bimetal to throttle the flapper over the nozzle. The result is a wider throttling range or very low sensitivity. For example, a temperature change of 1 degree F could result in a branchline pressure change of only 1 psi.

CONTROLLERS

General

A controller is the same as a thermostat except that it may have a remote sensing element. A controller typically measures and controls temperature, humidity, airflow, or pressure. Controllers can be reverse or direct acting, proportional or two-position, single or two pressure, and bleed, feed and bleed, or pilot bleed.

A two-position controller changes branchline pressure rapidly from minimum to maximum (or from maximum to minimum) in response to changes in the measured condition, thus providing ON/OFF operation of the controlled device.

A proportional controller changes branchline pressure incrementally in response to a change in the measured condition, thus providing modulating operation of the controlled device.

A proportional-integral (PI) controller adds to the proportional controller a component that takes offset into account. The integral component eliminates the control point offset from the setpoint.

Bleed-type controllers can be used in one-pipe or two-pipe configurations. In a one-pipe system (Fig. 18), the main air goes through a restrictor to the controller and actuator in the most expeditious routing. In a two-pipe system (Fig. 19), the main air goes into the controller, through an internal restrictor in the controller, and out of the controller through a branchline to the actuator. All pilot-bleed and feed-and-bleed controllers are two pipe.

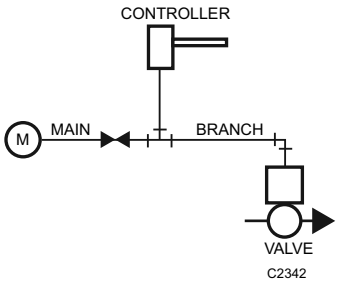


Fig. 18. One-Pipe Controller System.

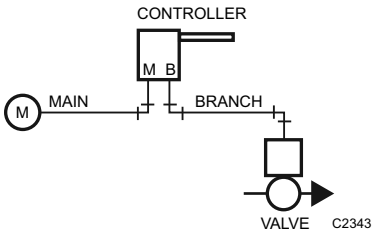


Fig. 19. Two-Pipe Controller System.

Controllers may also be classified as single-pressure or two-pressure controllers. Single-pressure controllers use a constant main air pressure. Two-pressure controllers use a main air pressure that is alternately switched between two pressures, such as 13 and 18 psi. For example, occupied/unoccupied controllers automatically change setpoint from a occupied setting at a mainline pressure of 13 psi to a lowered unoccupied setting at 18 psi. Heating/cooling controllers change from reverse acting at mainline air pressure of 13 psi for cooling to direct acting at 18 psi for heating.

Temperature Controllers

Temperature controllers can be one- or two-pipe. The sensing element is typically bimetal, liquid filled remote bulb, or liquid filled averaging capillary tube. Dimensional change of the element with temperature change results in flapper position change and therefore, pilot and branch pressure change.

Humidity Controllers

Principles that apply to temperature controllers also apply to humidity controllers. The primary difference between temperature and humidity controllers is in the type of sensing element. The sensing element in a humidistat is usually a band of moisture-sensitive nylon. The nylon expands and contracts with changes in the relative humidity of the air.

The humidistat can be used in a one-pipe or two-pipe configuration and is available as either a bleed-type humidistat or a two-pipe capacity humidistat using a capacity amplifier. The humidistat may be direct or reverse acting. The high-capacity humidistat has a capacity amplifier.

Pressure Controllers

Pressure controllers can be divided into two classes according to the pressure range of the measured variable. High-pressure controllers measure and control high pressures or vacuums measured in pounds per square inch or in inches of mercury (e.g., steam or water pressures in an air conditioning system). Low-pressure controllers measure and control low pressures and vacuums measured in inches of water (e.g., pressure in an air duct).

High- and low-pressure controllers have different size diaphragms. In both types, one side of the diaphragm is connected to the pressure to be controlled, and the other side is connected to a reference pressure. Pressures can be measured in respect to atmospheric pressure or another pressure source. The low-pressure controller is available in both bleed-type and pilot-bleed designs.

Figure 20 shows a schematic of a bleed-type, low-pressure controller. The direct-acting pressure sensor measures static pressure from a pressure pickup located in a duct. A reference pressure, from a pickup located outside the duct, is applied to the other side of the diaphragm.

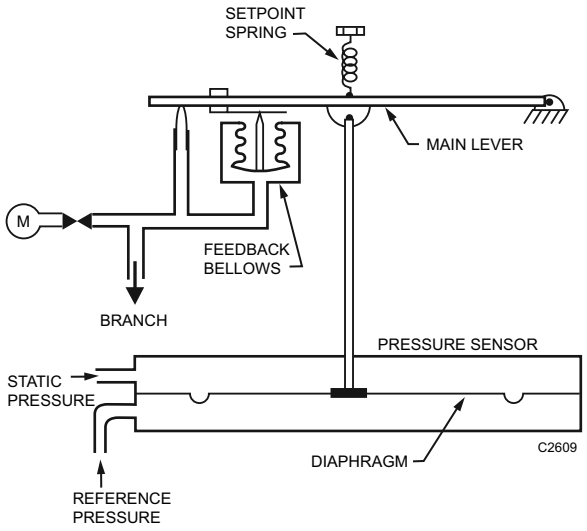


Fig. 20. Bleed-Type Static Pressure Controller.

On an increase in static pressure, the increased force on the diaphragm exceeds the force of the setpoint spring, pulling the main lever downward. A setpoint adjustment screw determines the tension of the setpoint spring. As the main lever is pulled downward, it moves closer to the nozzle, restricts the airflow through the nozzle, and increases the pressure in the branch. The action continues until the pressure on the feedback bellows balances the static pressure on the diaphragm.

On a decrease in static pressure, or if the static pressure sensor is piped for reverse action (high- and low-pressure pickups reversed), the diaphragm moves upward to move the main lever away from the nozzle and reduce the pressure in the branch.

For differential pressure sensing, the two pressure pickup lines connect to opposite sides of the pressure sensor diaphragm.

SENSOR-CONTROLLER SYSTEMS

A sensor-controller system is made up of a pneumatic controller, remote pneumatic sensors, and a final control element. The controller provides proportional or proportional integral control of temperature, humidity, dew point, or pressure in HVAC systems. Sensors do not have a setpoint adjustment and provide a linear 3 to 15 psi signal to the controller over a fixed sensor range. The controller compares the sensor input signal with the setpoint signal. The difference is the pilot input to a signal amplifier, which provides a branchline pressure to the controlled device. Thus the controller acts as a general purpose pneumatic amplifier.

Pneumatic Controllers

Controllers generally use diaphragm logic, which allows flexible system application, provides more accurate control, and simplifies setup and adjustment for the needs of each system. Controllers may be proportional only or proportional-integral (PI). The integral function is also called “automatic reset”. Proportional and PI controllers are available with single sensor input or dual-sensor input for resetting the primary sensor setpoint from a second sensor. They are also available with integral or remote setpoint adjustment.

The single-input controller consists of a signal amplifier feeding a capacity amplifier. The capacity amplifier is discussed under PILOT BLEED SYSTEM. A dual-input controller has inputs from a primary temperature sensor and a reset temperature sensor. The reset sensor resets controller setpoint. Reset can be negative or positive.

Figure 21 depicts a single-input controller as it would appear in a simple application. Figure 22 depicts a dual-input controller with manual remote setpoint control. In Figures 21 and 22 the sensors are fed restricted main air from the controllers. Where sensors are located extremely remote from the controller, a remote restrictor may be required.

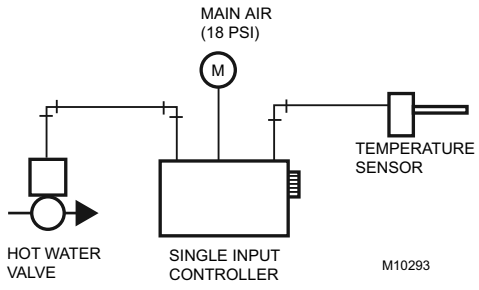


Fig. 21. Single-Input Controller.

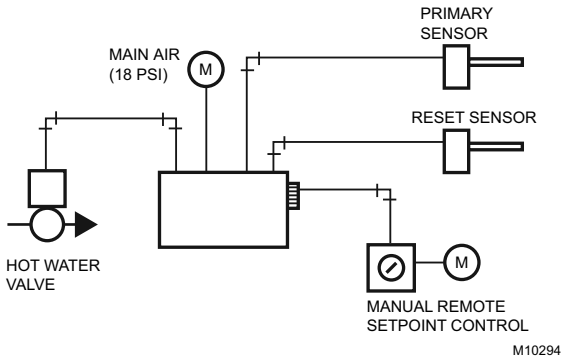


Fig. 22. Dual-Input Controller with Manual Remote Setpoint.

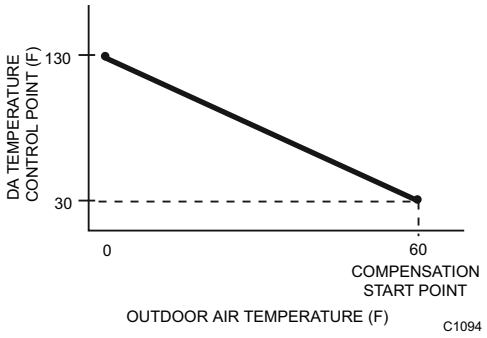


Fig. 23. Typical Reset Schedule for Discharge Air Control.

Proportional-Integral (PI) Controllers

Variations of single-input and dual-input controllers can provide proportional-integral (PI) control. PI controllers are used in critical applications that require closer control than a proportional controller. A PI controller provides close control by eliminating the deviation from setpoint (offset) that occurs in a proportional controller system. PI controllers are similar to the controllers in Figures 21 and 22 and have an additional knob for adjusting the integral reset time.

Controller Adjustments

Controller operation is adjusted in the following ways:
— Adjusting the setpoint
— Changing between direct and reverse control action
— Adjusting the proportional band (throttling range)
— Adjusting the reset authority
— Adjusting the integral control reset time

The setpoint can be manually adjusted with a dial on the controller. Remote setpoint adjustment is available for all controllers. Control action may be direct or reverse, and is field adjustable. The proportional band setting is typically adjustable from 2.5 to 50 percent of the primary sensor span and is usually set for the minimum value that results in stable control. In a sensor with a span of 200 degrees F, for example, the minimum setting of 2.5 percent results in a throttling range of 5 degrees F (0.025 x 200 = 5 degrees F). A change of 5 degrees F is then required at the sensor to proportionally vary the controller branchline pressure from 3 to 13 psi. A maximum setting of 50 percent provides a throttling range of 100 degrees F (0.50 x 200 = 100 degrees F).

Reset authority, also called “reset ratio”, is the ratio of the effect of the reset sensor compared to the primary sensor. Figure 23 shows the effect of authority on a typical reset schedule. The authority can be set from 10 to 300 percent.

The integral control reset time determines how quickly the PI controller responds to a change in the controlled variable. Proportional correction occurs as soon as the controlled variable changes. The integral function is timed with the reset time adjustment. The reset time adjustment is calibrated from 30 seconds to 20 minutes. The proper setting depends on system response time characteristics.

Pneumatic Sensors

Pneumatic sensors typically provide a direct acting 3 to 15 psi pneumatic output signal that is proportional to the measured variable. Any change in the measured variable is reflected as a change in the sensor output. Commonly sensed variables are temperature, humidity, and differential pressure. The sensors use the same sensing elements and principles as the sensors in the controllers described earlier, but do not include setpoint and throttling range adjustments. Their throttling range is the same as their span.

A gage connected to the sensor output can be used to indicate the temperature, humidity, or pressure being sensed. The gage scale is calibrated to the sensor span.

Temperature sensors may be vapor-filled, liquid-filled, averaging capillary, or rod-and-tube. The controller usually provides restricted air to the sensor.

Humidity sensors measure the relative humidity of the air in a room (wall-mounted element) or a duct (insertion element). Nylon is typically used as the sensing element. Humidity sensors include temperature compensation and operate on a force-balance principle similar to a wall thermostat.

The low-pressure sensor measures duct static pressure and differential pressure. When the duct static pressure or the pressure differential increases, branchline pressure increases.

Velocity Sensor-Controller

The velocity sensor-controller combines a highly sensitive air velocity sensor with a pneumatic controller to detect and control airflow regardless of system static pressure. It is used in air terminal units and other air handling systems. Reverse and direct-acting models are available for normally closed and normally open dampers.

The velocity sensor measures actual velocity and does not require the conversion of velocity pressure to velocity. Although the sensor is typically used in duct air velocity applications, it can accurately sense velocities as low as 100 feet per minute. Flow-limiting orifices inserted into the sensor sampling tube can measure velocity ranges up to 3,500 feet per minute.

Figure 24 shows the operation of a velocity sensor. A restrictor supplies compressed air to the emitter tube located in the air stream to be measured. When no air is flowing in the duct, the jet of air from the emitter tube impinges directly on the collector tube and maximum pressure is sensed. Air flowing in the duct blows the air jet downstream and reduces the pressure on the collector tube. As the duct air velocity increases, less and less of the jet enters the collector tube. The collector tube is connected to a pressure amplifier to produce a usable output pressure and provide direct or reverse action.

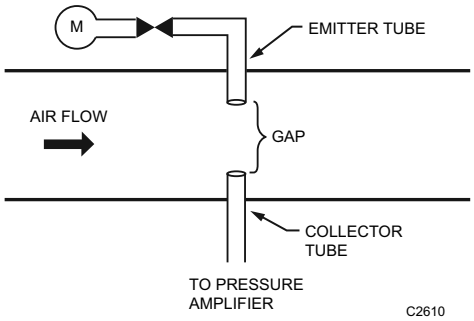


Fig. 24. Velocity Sensor Operation.

A controller connected to the pressure amplifier includes setpoints for maximum and minimum dual air velocity limits. This allows the air volume to be controlled between the limits by a thermostat or another controller.

Two models of the controller are available. One model operates with a one-pipe, bleed-type thermostat, and the other with a two-pipe thermostat. The two-pipe model also allows sequencing for reheat applications.

Figure 25 shows a typical application of a thermostat and velocity controller on a Variable Air Volume (VAV) terminal unit with hot water reheat. The thermostat senses a change in room temperature and resets the velocity setpoint of the velocity controller. The controller repositions the VAV damper to increase or decrease airflow accordingly. If a change in duct static pressure modifies the flow, the controller repositions the actuator to maintain the correct flow. The reheat valve operates only when the thermostat has reset the velocity setpoint down to minimum airflow and the thermostat calls for heating.

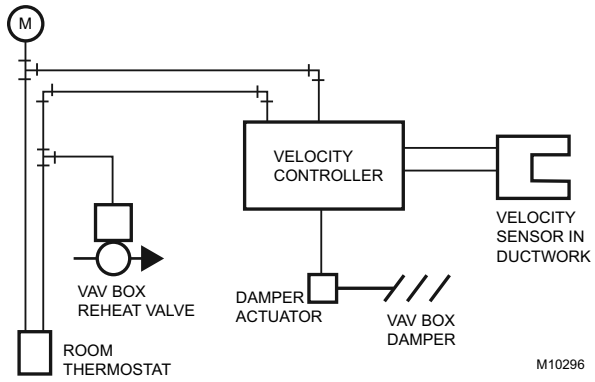


Fig. 25. VAV Box Velocity Controller Control System.

ACTUATORS AND FINAL CONTROL ELEMENTS

A pneumatic actuator and final control element such as a valve (Fig. 26) or damper (Fig. 27) work together to vary the flow of the medium passing through the valve or damper. In the actuator, a diaphragm and return spring move the damper push rod or valve stem in response to changes in branchline pressure.

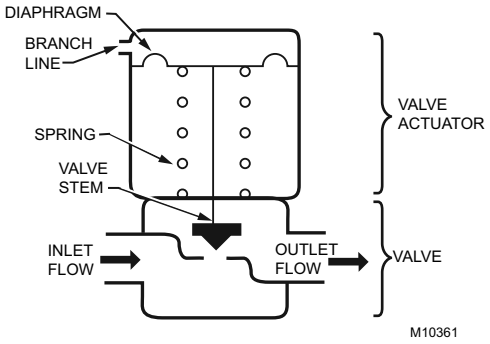


Fig. 26. Pneumatic Actuator and Valve.

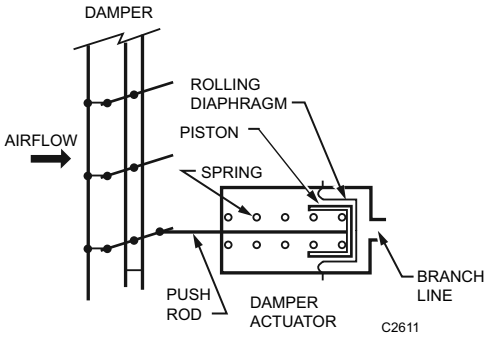


Fig. 27. Pneumatic Actuator and Damper.

Actuators and Final Control Elements

Actuators

General

Pneumatic actuators position damper blades and valve stems. A damper actuator typically mounts on ductwork or on the damper frame and uses a push rod and crank arm to position the damper blades (rotary action). A valve actuator mounts on the valve body and positions the valve stem directly (linear action) for a globe valve or rotary action via linkage for a butterfly valve. Valve actuator strokes typically are between one-quarter and one and one-half inch. Damper actuator strokes range from one to four inches (longer in special applications). In commercial pneumatic actuators, air pressure positions the actuator in one direction and a spring returns it the other direction.

Valve actuators are direct or reverse acting. Damper actuators are direct acting only. A direct-acting actuator extends on an increase in branchline pressure and retracts on a decrease in pressure. A reverse-acting actuator retracts on an increase in branchline pressure and extends on a decrease in pressure.

Pneumatic valve and damper actuator assemblies are termed “normally open” or “normally closed.” The normal position is the one assumed upon zero actuator air pressure. Three-way valves have both normally open (N.O.) and normally closed (N.C.) ports.

SPRING RANGES

Springs used in valve and damper actuators determine the start pressure and pressure change required for full movement of the actuator from open to closed, or from closed to open. Actuators designed for special applications can move through the full range, open to closed or closed to open, on a limited change in pressure from the controller. Such actuators can provide a simple form of sequence control (e.g., operating heating and cooling valves from a single thermostat). Typical spring pressure ranges are 2-7 psi, 8-12 psi, and 3-13 psi.

Control Valves

Single-seated globe valves (Fig. 28) are used where tight close-off is required. The valve body can be either direct acting or reverse acting. A direct-acting valve body allows flow with the stem up, while a reverse-acting valve body shuts off flow with the stem up. The combination of valve body and actuator (called the valve assembly) determines the normal valve stem position.

The position maintained by the valve stem depends on the balance of forces acting on it:
— Force F1 from the air pressure on the diaphragm
— Opposing force F2 from the actuator spring
— Controlled-medium force F3 acting on the valve disc and plug due to the difference between inlet and outlet pressures

An increase in controller branchline pressure increases force F1, (Fig. 28A), moving the diaphragm down and positions the valve stem toward closed until it has moved far enough that the sum of the spring force F2 and the controlled-medium force F3 increases balance the increased force F1 on the diaphragm. Conversely, a decrease in controller branchline air pressure in the diaphragm chamber of a direct-acting actuator decreases force F1, allowing forces F2 and F3 to push the diaphragm upward and move the valve stem toward the open position.

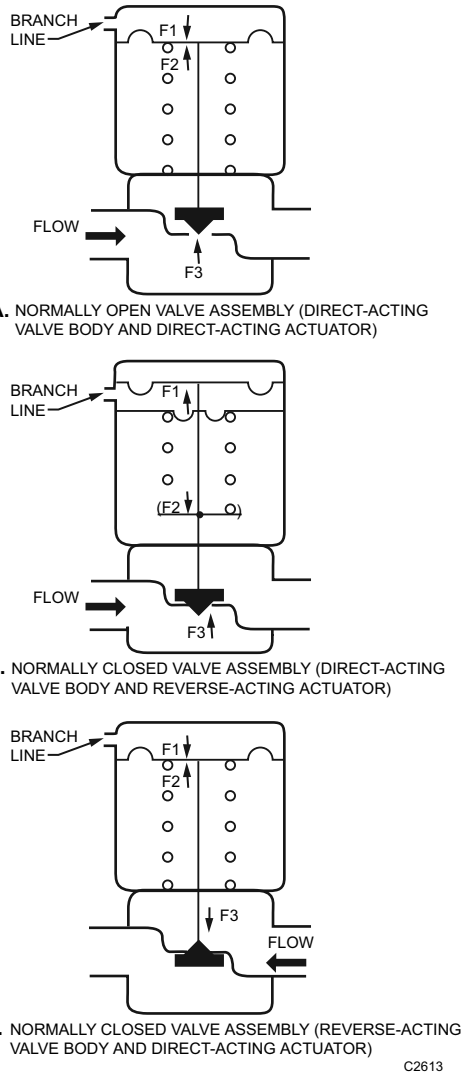


Fig. 28. Single-Seated Valves.

In Figure 28B, branchline pressure is applied on the bottom surface of the diaphragm. An increase in air pressure in the diaphragm chamber increases force F1 causing the actuator diaphragm to move upward and open the valve. Motion continues until the increase in pressure on the diaphragm plus the controlled-medium force F3 is balanced by the increase in spring compression (force F2). On a decrease in air pressure in the diaphragm chamber, the compressed spring moves the diaphragm down toward its normal position and the valve stem toward closed. A normally closed valve assembly usually has a lower close-off rating against the pressure of the controlled medium than a normally open valve because the spring force F2 is the only force available to close the valve.

In Figure 28C, an increase in branchline pressure in the actuator increases force F1 causing the diaphragm to move downward and open the valve. Motion continues until the increase in pressure on the diaphragm (force F1) plus the controlled-medium force F3 is balanced by the increase in spring compression (force F2). On a decrease in air pressure in the diaphragm chamber, the compressed-spring pressure moves the diaphragm up and the valve stem moves toward the closed position.

In a double-seated valve (Fig. 29), the controlled agent flows between the two seats. This placement balances the inlet pressures between the two discs of the plug assembly and reduces the actuator force needed to position the plug assembly. Double-seated valves generally do not provide tight close-off because one disc may seat before the other and prevent the other disc from seating tightly.

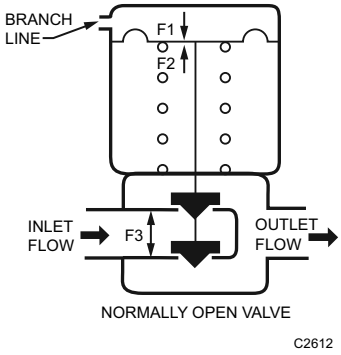


Fig. 29. Double-Seated Valve.

Figure 30 shows three-way globe valve assemblies. The mixing valve has two inlets and a common outlet. The diverting valve has a common inlet and two outlets.

Three-way valves may be piped to be normally open or normally closed to the heating or cooling load. If a three-way valve has linear characteristics and the pressure differentials are equal, constant total flow is maintained through the common inlet or outlet port.

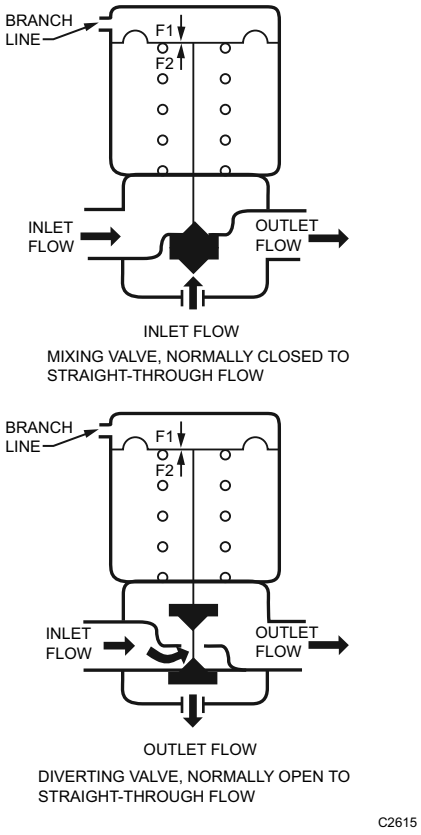


Fig. 30. Three-Way Valve Assemblies.

Relays and Switches

Two- and three-way butterfly valves can be operated by long stroke pneumatic actuators and appropriate linkage (Fig. 31).

One or two low pressure actuators powered directly by branchline pressure can operate butterfly valves up to about 12 inches, depending on the differential close-off rating of the valve. For other applications high pressure pneumatic cylinders can be used to provide the force required by the valve. A pneumatic positioner provides an appropriate high pressure signal to the cylinder based on a 3 to 15 psi input signal.

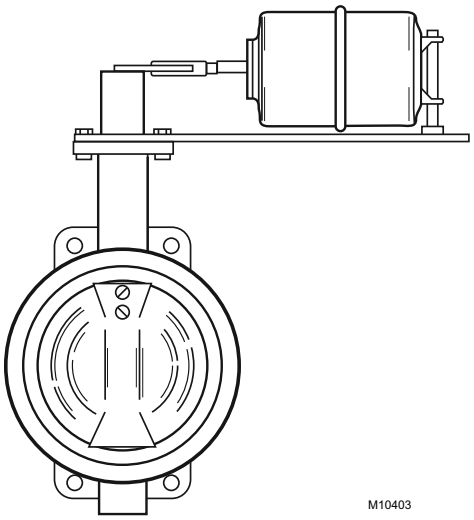


Fig. 31. Butterfly Valve Assembly.

Dampers

Dampers control the flow of air in air-handling systems. The most common type of damper, a multiblade louver damper, can have parallel or opposed blades (Fig. 32).

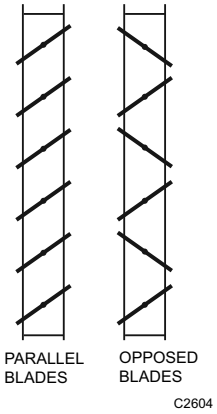


Fig. 32. Parallel- and Opposed-Blade Dampers.

Figure 33 shows normally open and normally closed parallel-blade dampers. A normally open damper returns to the open position with low air pressure in the actuator diaphragm chamber. An increase in branchline pressure forces the rolling diaphragm piston to move against the spring, and a decrease allows the compressed spring to force the piston and diaphragm back to the normal position. As with valve actuators, intermediate positions depend on a balance between the force of the control air pressure on the diaphragm and the opposing force of the actuator spring.

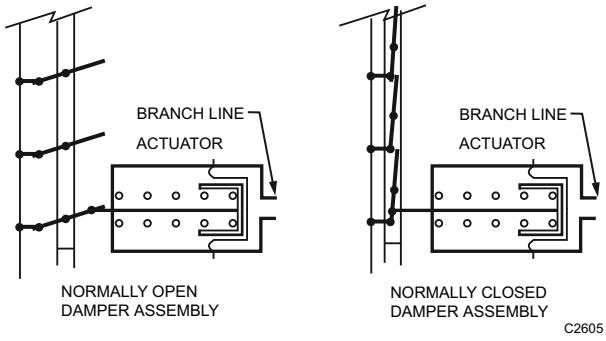


Fig. 33. Normally Open and Normally Closed Dampers.

A normally closed damper returns to the closed position with low air pressure in the actuator diaphragm chamber. The way the damper blades, crank arm, and push rod are oriented during installation determines the normal (open or closed) position of the damper blades.

For a more detailed discussion of dampers, see the DAMPER SELECTION AND SIZING section.

RELAYS AND SWITCHES

In the following illustrations, common (C) and the normally connected port (O) are connected on a fall in pilot pressure (P) below the relay setpoint, and the normally disconnected port (X) is blocked (Fig. 34). On a rise in pilot pressure above the relay setpoint, C and X are connected and O is blocked.

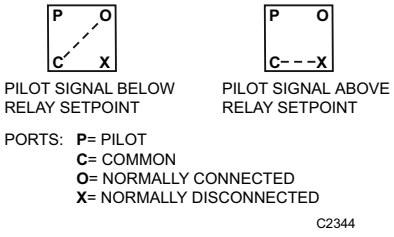


Fig. 34. Relay Port Connections.

Switching Relay

A switching relay requires a two-position pilot signal and is available with either single-pole, double-throw (spdt) or double-pole, double-throw (dpdt) switching action. Pneumatic heating and cooling control systems use relays to switch a valve or damper actuator from one circuit to another or to positively open or close a device. Both spdt and dpdt switching relays are available with a variety of switching pressures.

Figure 35 shows a typical spdt switching relay application for heating/cooling operation in which the thermostat controls the heating/cooling coil valve. Seasonal mainline pressure changes cause the action of the thermostat to be reversed. A discharge low-limit control is switched into the control circuit for heating and out of the circuit for cooling. The switching is done from mainline pressure connected to the pilot port (P).

During the heating cycle, the 18 psi mainline pressure is above the preset switching pressure. The common port (C) connects to the normally disconnected port (X), connecting the low-limit controller to the thermostat branchline to prevent discharge temperatures below the controller setting. The normally connected port (O) is blocked.

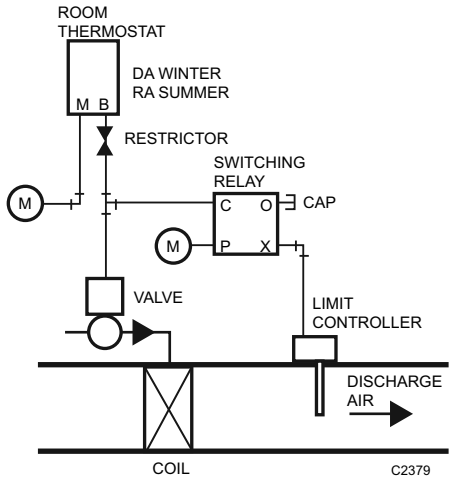


Fig. 35. Typical Switching Relay for Application.

During the cooling cycle, the 13 psi mainline pressure at the pilot port (P) is below the minimum switching pressure of the preset limits. The common port (C) connects to the normally connected port (O), which is capped. The normally disconnected port (X) is closed and removes the low-limit controller from the system.

In a dpdt model, the common, normally connected, and normally disconnected ports are duplicated in the second switch section.

Snap Acting Relay

The snap acting relay is a spdt switch that provides two position switching action from a modulating signal and has an adjustable switching point. The switching differential is less than 1.0 psi. The switching pressure is manually adjustable for 3 to 15 psi operation.

Figure 36 shows a snap acting relay application. Operation is similar to the switching relay. When the branchline pressure from the outdoor air thermostat equals or exceeds the preset switchover pressure, the relay connects the normally disconnected port (X) and blocks the normally connected port (O) to deliver main air to the normally open heating valve and provide positive close off. When the outdoor air thermostat pressure drops below the relay setpoint, the normally disconnected port (X) is blocked and the normally connected port (O) connects to the common port (C) to connect the valve actuator to the room thermostat.

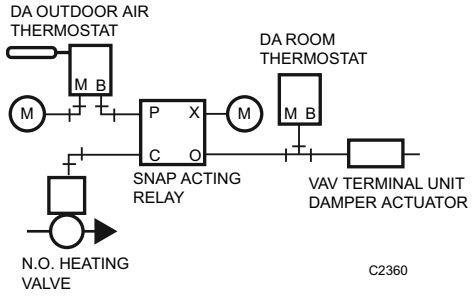


Fig. 36. Typical Application for Snap Acting Relay.

Lockout Relay

The lockout relay is a three-port relay that closes off one pressure signal when a second signal is higher. Figure 37 shows a typical application in which mixed air control becomes disabled when outdoor air temperature is higher than return air temperature. To prevent air from being trapped in the line between the lockout relay and the snap acting relay, a small bleed must be present either in the pilot chamber of the snap acting relay or in the line.

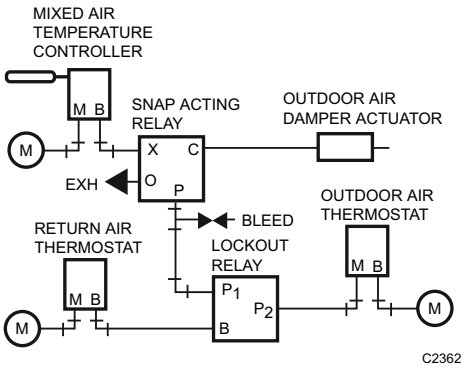


Fig. 37. Lockout Relay in Economizer Cycle.

Relays and Switches

Figure 38 shows the lockout relay used as a repeater. This application provides circuit isolation by repeating the pilot signal with a second air source.

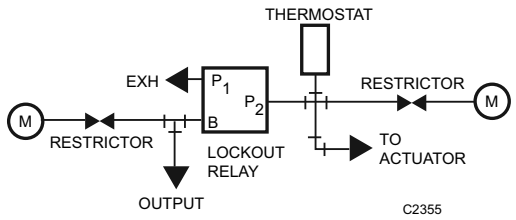


Fig. 38. Lockout Relay as Repeater.

High-Pressure Selector Relay

The high-pressure selector relay is a three-port relay that transmits the higher of two input signals to the output branch. The high sensitivity of the relay allows it to be used in sensor lines with an accuracy of 2 to 3 degrees F.

The application shown in Figure 39 uses pressures from two zones and a high-pressure selector relay to determine control. A separate thermostat controls each zone damper. The thermostat that calls for the most cooling (highest branchline pressure) controls the cooling valve through the high-pressure selector relay.

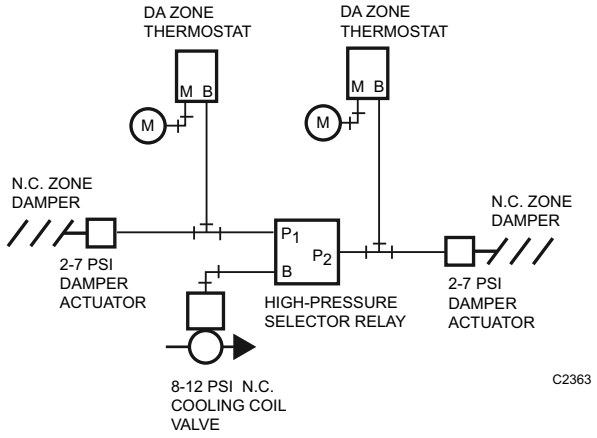


Fig. 39. Typical Application for High-Pressure Selector Relay.

Low-Pressure Selector Relay

The low-pressure selector relay is a three-port relay that selects the lower of two input pressure signals and acts as a repeater for the lower of the two inputs. The relay requires an external restrictor on the input to the branch port. Figure 40 shows a low-pressure selector relay controlling the heating coil valve from the thermostat that calls for the most heat.

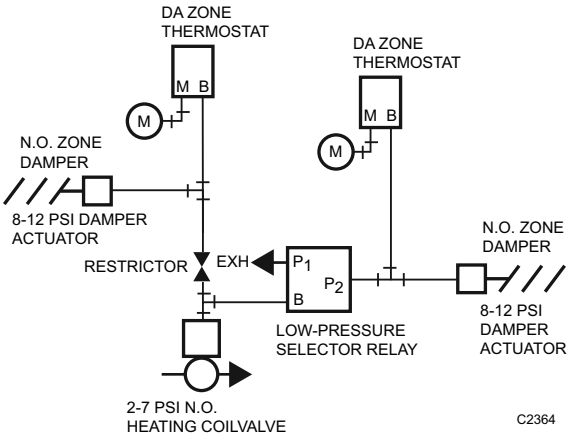


Fig. 40. Typical Application for Low-Pressure Selector Relay.

Load Analyzer Relay

The load analyzer relay is a bleed-type, diaphragm-logic pressure selector. The relay selects the highest and lowest branch pressure from multiple inputs to operate final control elements (Fig. 41). The relay contains multiple diaphragms and control nozzles. Each input pressure connects to two diaphragms.

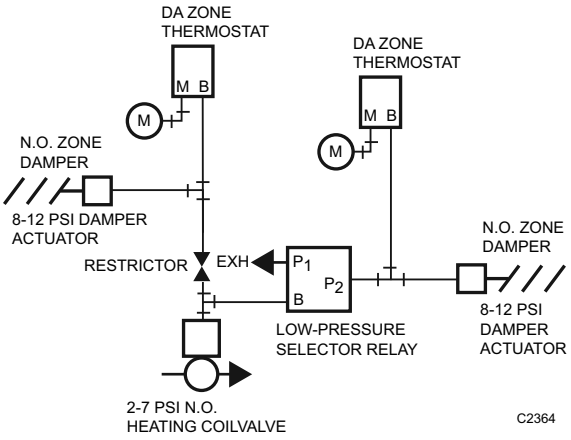


Fig. 41. Load Analyzer Relay in Multizone Air Unit Application.

In Figure 41, the load analyzer relay selects the lowest pressure signal from the thermostat in the coldest zone and transmits that signal to a normally open heating valve. The relay transmits the highest pressure signal from the thermostat in the warmest zone to a normally closed cooling valve.

Capacity Relay

The capacity relay is a direct-acting relay that isolates an input and repeats the input pressure with a higher capacity output. Figure 42 shows a capacity relay enabling a single bleed type thermostat to operate multiple damper actuators quickly by increasing the output capacity of the thermostat.

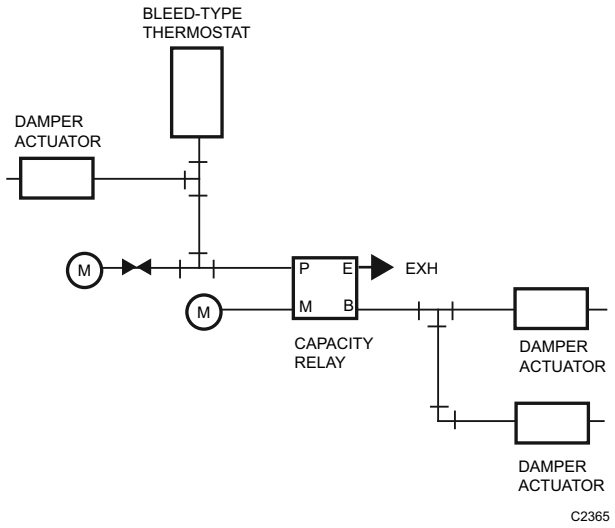


Fig. 42. Typical Capacity Relay Application.

Reversing Relay

The reversing relay is a modulating relay with an output that decreases at a one-to-one ratio as the input signal increases. Figure 43 shows a reversing relay application. A falling temperature at the direct-acting thermostat causes the branchline pressure to decrease. The reversing relay branch pressure increases and opens the normally closed heating valve.

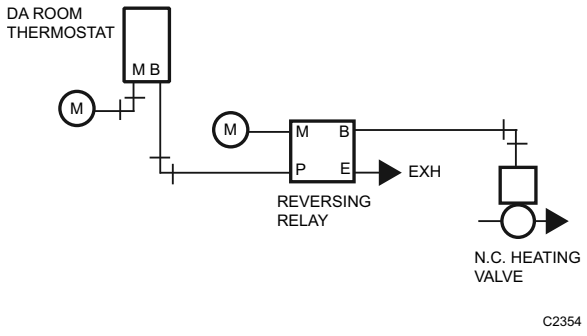


Fig. 43. Reversing Relay Application.

Positive-Positioning Relay

The positive-positioning relay (Fig. 44) mounts directly on a valve or damper actuator. The relay positions the valve or damper precisely according to the branchline pressure from a thermostat or other controller, regardless of the load variations affecting the valve stem or damper shaft. The relay is typically used for large actuators for sequencing, or in applications requiring precise control.

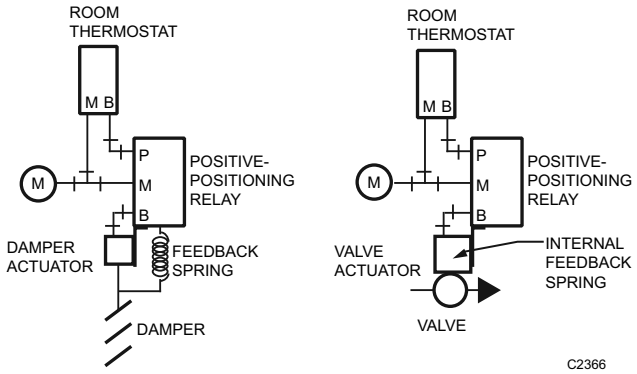


Fig. 44. Positive-Positioning Relay with Damper and Valve Actuators.

When the relay is connected to an actuator, the feedback spring produces a force proportional to the actual valve or damper position. The relay positions the actuator in proportion to the branchline input. If the connected load attempts to unbalance the required valve stem position, the relay either exhausts or applies main pressure to the actuator to correct the condition. If the valve or damper sticks or the load prevents proper positioning, the relay can apply the pressure required (up to full main pressure) or down to zero to correct the condition.

The positive-positioning relay also permits sequenced operation of multiple control valves or dampers from a single thermostat or controller. For example, a normally open heating valve and a normally closed outdoor air damper could be controlled from a single thermostat piloting relays on two actuators. Relays typically have a 3, 5, or 10 psi input pressure span and an adjustable start pressure. As the space temperature rises into the low end of the thermostat throttling range, the heating valve positioner starts to close the valve. Near the midpoint of the throttling range, the heating valve closes completely and the outdoor damper positioner starts to open the damper. At the high end of the throttling range, the damper is completely open.

Averaging Relay

The averaging relay is a direct-acting, three-port relay used in applications that require the average of two input pressures to supply a controller input or to operate a controlled device directly.

Relays and Switches

Figure 45 shows an averaging relay in a typical application with two thermostat signals as inputs. The average of the thermostat signals controls a valve or damper actuator.

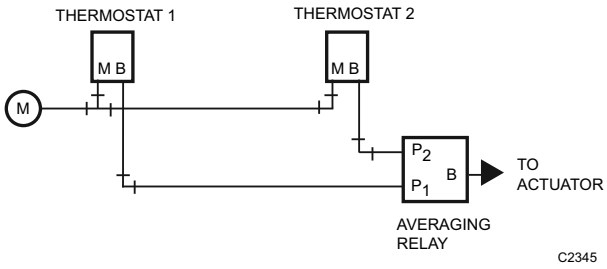


Fig. 45. Averaging Relay Application.

Ratio Relay

The ratio relay is a four-port, non bleed relay that produces a modulating pressure output proportional to the thermostat or controller branchline output. Ratio relays can be used to control two or three pneumatic valves or damper actuators in sequence from a single thermostat. The ratio relay has a fixed input pressure range of either 3 or 5 psi for a 10 psi output range and an adjustable start point. For example, in a ratio relay with a 5 psi range set for a 7 psi start, as the input pressure varies from 7 to 12 psi (start point plus range), the output pressure will vary from 3 to 13 psi.

In Figure 46, three 3 psi span ratio relays are set for 3 to 6, 6 to 9, and 9 to 12 psi inputs, respectively. The thermostat signal through the relays proportions in sequence the three valves or actuators that have identical 3 to 13 psi springs.

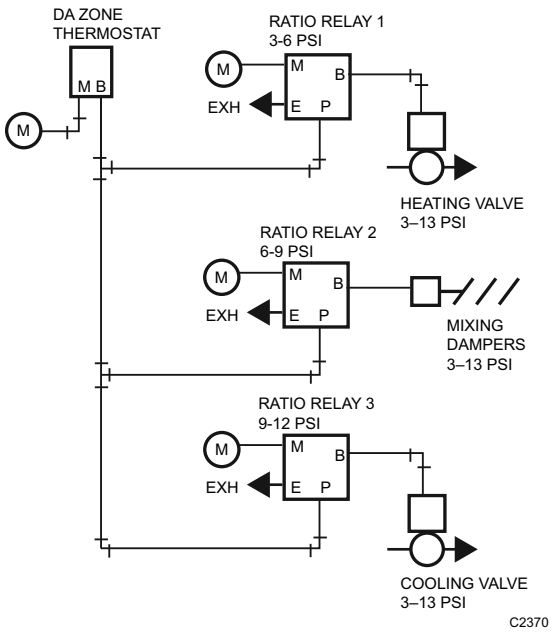


Fig. 46. Ratio Relays in Sequencing Control Application.

Pneumatic Potentiometer

The pneumatic potentiometer is a three-port, adjustable linear restrictor used in control systems to sum two input signal values, average two input pressures, or as an adjustable flow restriction. The potentiometer is a linear, restricted air passage between two input ports. The pressure at the adjustable output port is a value based on the inputs at the two end connections and the location of the wiper between them.

Figure 47 shows a pneumatic potentiometer providing an average of two input signals. The wiper is set at mid-scale for averaging or off-center for a weighted average. It can be used this way to average two air velocity transmitter signals from ducts with different areas by positioning the wiper according to the ratio of the duct areas. This outputs a signal proportional to the airflow.

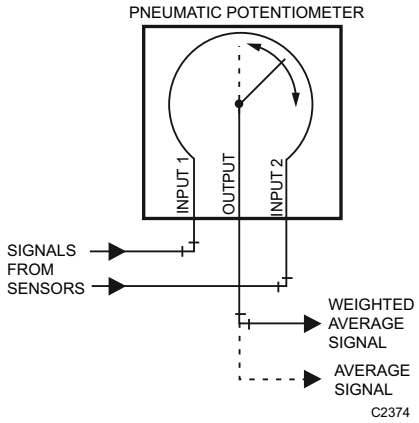


Fig. 47. Pneumatic Potentiometer as Averaging Relay.

Figure 48 shows a pneumatic potentiometer as an adjustable airflow restrictor.

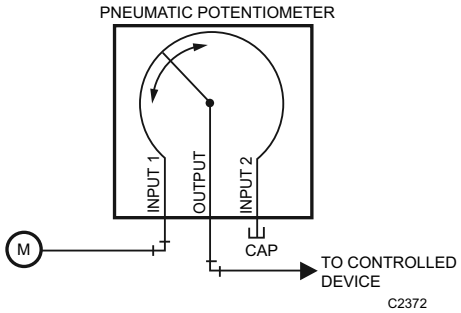


Fig. 48. Pneumatic Potentiometer as Adjustable Airflow Restrictor.

Hesitation Relay

The hesitation relay is used with a pneumatic actuator in unit ventilator applications. The output pressure goes to minimum whenever the input pressure is below the minimum setting. Figure 49 shows a graph of the output of a hesitation relay as controlled by the relay knob settings (piloted from the thermostat).

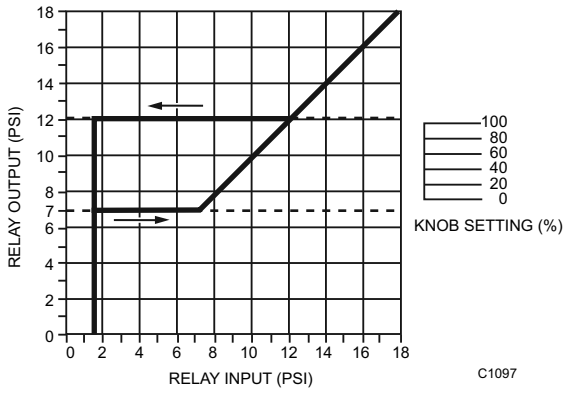


Fig. 49. Hesitation Relay Output Pressure as a Function of Knob Setting.

The hesitation relay has an internal restrictor. Figure 50 shows a typical application of a hesitation relay and a pneumatic damper actuator. When the thermostat branchline pressure reaches 1.5 psi, the relay output goes to its preset minimum pressure. When the branchline pressure of the thermostat reaches the setting of the hesitation relay, the thermostat controls the damper actuator. When the thermostat branchline pressure drops below the hesitation relay setting, the relay holds the damper actuator at the minimum position until the thermostat branchline pressure drops below 1.5 psi. At that point, the hesitation relay output falls to zero.

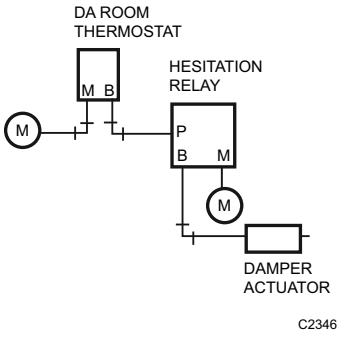


Fig. 50. Typical Hesitation Relay Application.

Electrical Interlocking Relays

Electrical interlocking relays bridge electric and pneumatic circuits. The electric-pneumatic relay uses electric power to actuate an air valve in an associated pneumatic circuit. The pneumatic-electric relay uses control air pressure to make or break an associated electrical circuit.

Electric-Pneumatic Relay

The electric-pneumatic (E/P) relay is a two-position, three-way air valve. Depending on the piping connections to the ports, the relay performs the same functions as a simple diverting relay. A common application for the E/P relay is to exhaust and close an outdoor air damper in a fan system when the fan motor is turned off, as shown in Figure 51.

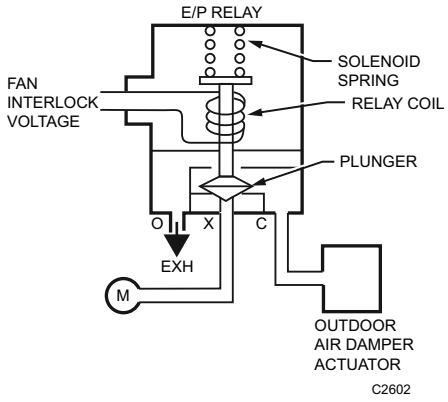


Fig. 51. E/P Relay Application.

When the relay coil is de-energized, the solenoid spring seats the plunger. The normally disconnected port (X) is blocked and the normally connected port (O) connects to the common port (C). The connection exhausts the damper actuator which closes the damper. When the relay coil is energized, the plunger lifts against the tension of the spring and blocks the normally connected port (O). Main air at the normally disconnected port (X) connects to the common port (C) and opens the damper.

Pneumatic-Electric Relay

Figure 52 shows a simplified pneumatic-electric (P/E) relay with a spdt switch. The P/E relay makes the normally closed contact on a fall in pilot pressure below the setpoint, and makes the normally open contact on a rise above a value equal to the setpoint plus the differential. For example, with a setpoint adjustment of 3 psi and a differential of 2 psi, the pump is energized at pilot pressures below 3 psi and turns off at pilot pressures above 5 psi.

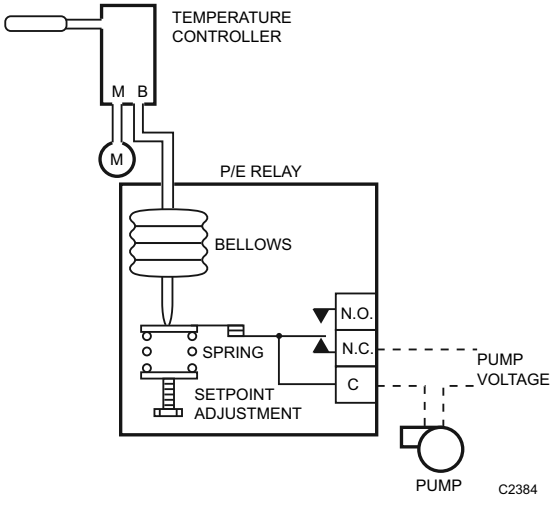


Fig. 52. P/E Relay Application.

Relays and Switches

Electronic-Pneumatic Transducer

The electronic-pneumatic transducer is a proportional relay that varies the branch air pressure linearly 3 to 15 psi in response to changes in an electrical input of 2 to 10 volts or 4 to 20 ma. Electronic-pneumatic transducers are used as the interface between electronic, digital, or computer-based control systems and pneumatic output devices (e.g., actuators).

Figure 53 shows discharge air temperature control of a heating coil using digital control for sensing and control. The output of the transducer positions the valve on a heating coil.

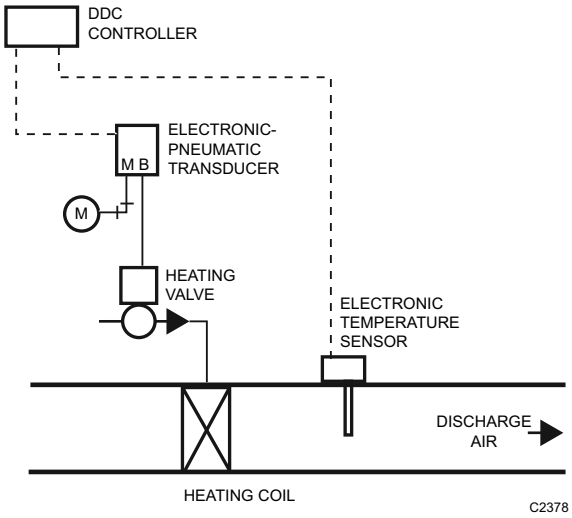


Fig. 53. Typical Electronic-Pneumatic Transducer Application.

A resistance-type temperature sensor in the discharge air duct is the input to the controller, which provides all of the system adjustments and logic requirements for control. The controller output of 2 to 10 volts dc is input to the electronic-pneumatic transducer, which converts the signal to a 3 to 15 psi output to position the heating valve.

Pneumatic Switch

The pneumatic switch is available in two- or three-position models (Fig. 54). Rotating the switch knob causes the ports to align in one of two ways in a two-position switch, and in one of three ways in a three-position switch. The two-position switch is used for circuit interchange. The three-position switch sequentially switches the common port (Port 2) to the other ports and blocks the disconnected ports.

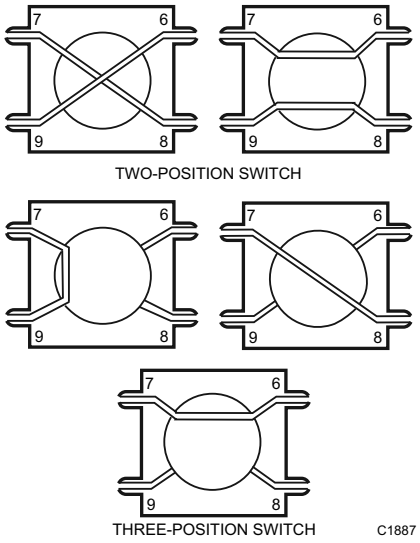


Fig. 54. Pneumatic Switches.

Figure 55 shows a typical application for sequential switching. In the OPEN position, the valve actuator exhausts through Port 4 and the valve opens. In the AUTO position, the actuator connects to the thermostat and the valve is in the automatic mode. In the CLOSED position, the actuator connects to main air and the valve closes.

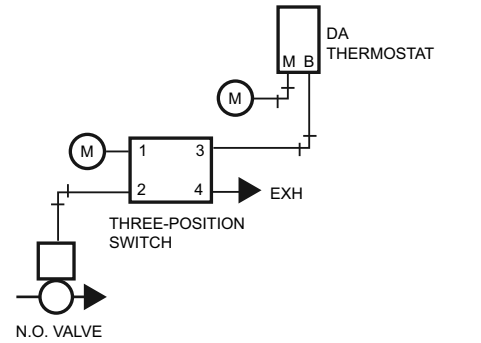


Fig. 55. Typical OPEN/AUTO/CLOSED Application.

Manual Positioning Switch

A manual positioning switch is used to position a remote valve or damper or change the setpoint of a controller. The switch takes input air from a controller and passes a preset, constant, minimum air pressure to the branch regardless of the controller

output (e.g., to provide an adjustable minimum position of an outdoor air damper). Branchline pressure from the controller to other devices connected to the controller is not affected.

Figure 56 shows the switch functioning as a minimum positioning switch. The damper will not close beyond the minimum setting of the positioning switch. As the controller signal increases above the switch setting, the switch positions the damper according to the controller signal.

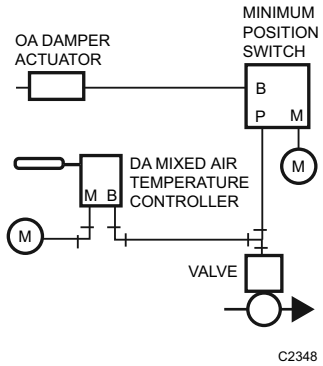


Fig. 56. Typical Three-Port Minimum Position Switch Application.

Manual switches are generally panel mounted with a dial plate or nameplate on the front of the panel which shows the switch position. Gages are sometimes furnished to indicate the main and branch pressures to the switch.

PNEUMATIC CONTROL COMBINATIONS

General

A complete control system requires combinations of several controls. Figure 57 shows a basic control combination of a thermostat and one or more control valves. A normally open control valve assembly is selected when the valve must open if the air supply fails. A normally open control valve requires a direct-acting thermostat in the heating application shown in Figure 56. Cooling applications may use normally closed valves and a direct-acting thermostat. The thermostat in Figure 56 has a 5 degree throttling range (output varies from 3 to 13 psi of the 5 degree range) and the valves have an 8 to 12 psi spring range, then the valve will modulate from open to closed on a 2 degree rise in temperature at the thermostat.

$$\frac{4psi}{10psi} \times 5F° = 2F°$$

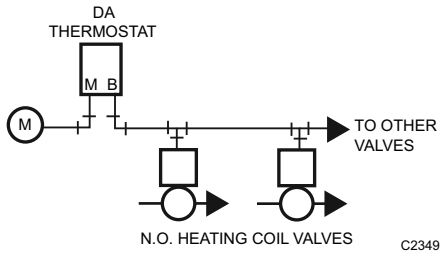


Fig. 57. Thermostat and One or More Normally Open Valves.

A normally open or a normally closed valve may be combined with a direct-acting or a reverse-acting thermostat, depending on the requirements and the conditions in the controlled space. Applications that require several valves controlled in unison (e.g., multiple hot water radiation units in a large open area) have two constraints:

— All valves that perform the same function must be of the same normal position (all normally open or all normally closed).
— The controller must be located where the condition it measures is uniformly affected by changes in position of the multiple valves. If not, the application requires more than one controller.

A direct- or reverse-acting signal to a three-way mixing or diverting valve must be selected carefully. Figure 58 shows that the piping configuration determines the signal required.

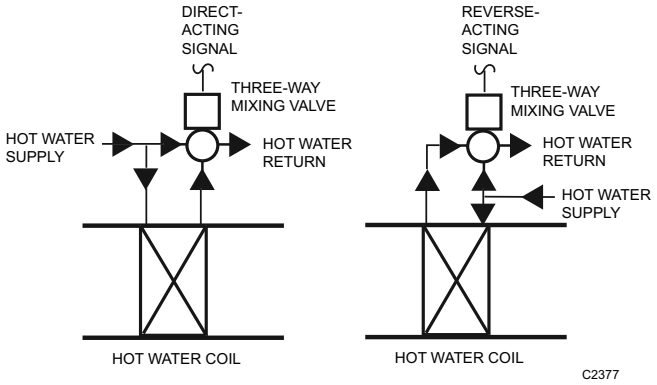


Fig. 58. Three-Way Mixing Valve Piping with Direct Actuators.

Pneumatic Control Combinations

Sequence Control

In pneumatic control systems, one controller can operate several dampers or valves or several groups of dampers or valves. For example, year-round air conditioning systems sometimes require heating in the morning and evening and cooling in the afternoon. Figure 59 shows a system in which a single controller controls a normally open heating valve and normally closed cooling valve. The cooling valve is set for an 8 to 13 psi range and the heating valve, for a 2 to 7 psi range. The controller operates the two valves in sequence to hold the temperature at the desired level continually.

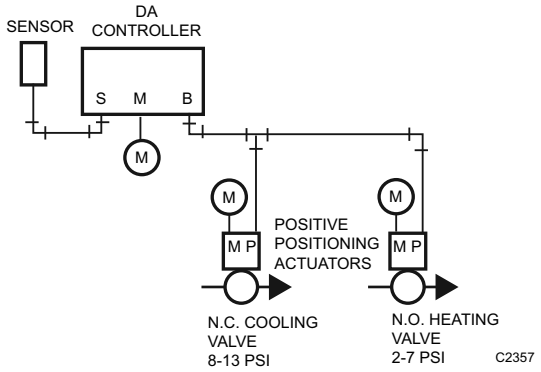


Fig. 59. Pneumatic Sequencing of Two Valves with Positive Positioning Actuators.

When the temperature is so low that the controller calls for full heat, the branchline pressure is less than 3 psi. The normally open heating valve is open and the normally closed cooling valve is closed. As the temperature rises, the branchline pressure increases and the heating valve starts to close. At 7 psi branchline pressure, the heating valve is fully closed. If the temperature continues to rise, the branchline pressure increases until the cooling valve starts to open at 8 psi. The temperature must rise enough to increase the branchline pressure to 13 psi before the cooling valve will be full open. On a drop in temperature, the sequence is reversed.

Valves with positive positioners ensure tight close-off of the heating valve at 7 psi branchline pressure, and delay opening of the cooling valve until 8 psi branchline pressure is reached. Positive positioners prevent overlapping caused by a variation in medium pressure, a binding valve or damper, or a variation in spring tension when using spring ranges for sequencing.

A greater deadband can be set on the positioners to provide a larger span when no energy is consumed. For example, if the positioners are set for 2 to 7 psi on heating and 13 to 18 psi on cooling, no energy is used when the controller branchline pressure is between 7 and 13 psi. The positioners can also be set to overlap (e.g., 4 to 9 and 7 to 12 psi) if required.

Valve and damper actuators without positioners have various spring ranges. To perform the sequencing application in Figure 59 without positioners, select a heating valve actuator that has a 2 to 7 psi spring range and a cooling valve actuator that has an 8 to 13 psi spring range. Although this method lessens precise positioning, it is usually acceptable in systems with lower pressure differentials across the valve or damper and on smaller valves and dampers.

Limit Control

Figure 60 shows a sensor-controller combination for space temperature control with discharge low limit. The discharge low limit controller on a heating system prevents the discharge air temperature from dropping below a desired minimum.

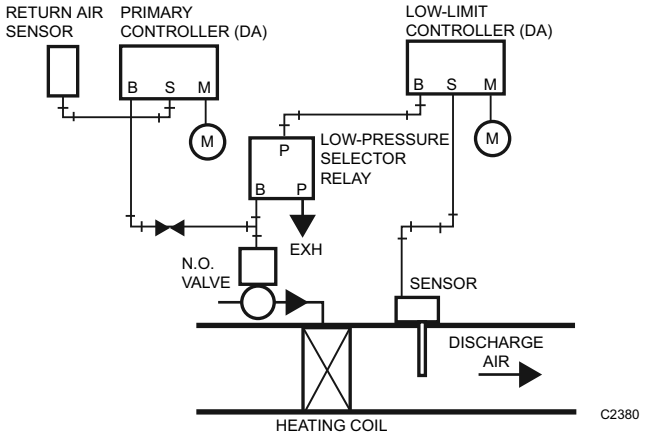


Fig. 60. Low-Limit Control (Heating Application).

Low-limit control applications typically use a direct-acting primary controller and a normally open control valve. The direct-acting, low-limit controller can lower the branchline pressure regardless of the demands of the room controller, thus opening the valve to prevent the discharge air temperature from dropping below the limit controller setpoint. Whenever the low-limit discharge air sensor takes control, however, the return air sensor will not control. When the low-limit discharge air sensor takes control, the space temperature increases and the return air sensor will be unable to control it.

A similar combination can be used for a high-limit heating control system without the selector relay in Figure 61. The limit controller output is piped into the exhaust port of the primary controller, which allows the limit controller to limit the bleed-down of the primary controller branchline.

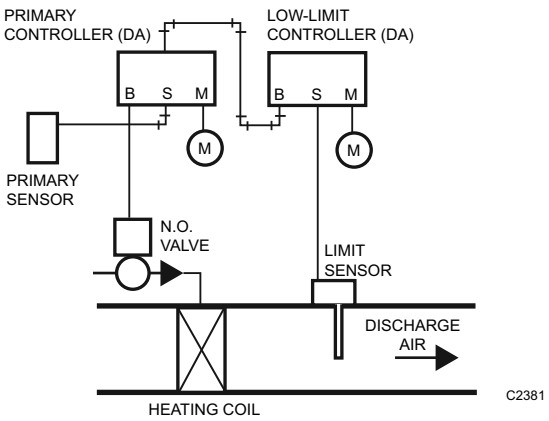


Fig. 61. High-Limit Control (Heating Application).

Bleed-type, low-limit controllers can be used with pilot-bleed thermostats (Fig. 62). A restrictor installed between the thermostat and the low-limit controller, allows the low limit controller to bleed the branchline and open the valve. The restrictor allows the limit controller to bleed air from the valve actuator faster than the thermostat can supply it, thus overriding the thermostat.

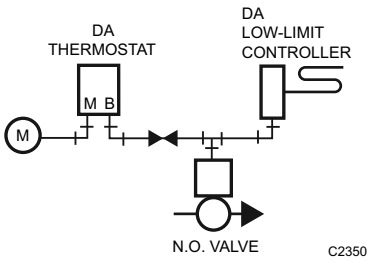


Fig. 62. Bleed-Type, Low-Limit Control System.

Manual Switch Control

Common applications for a diverting switch include on/off/ automatic control for a heating or a cooling valve, open/closed control for a damper, and changeover control for a two-pressure air supply system. Typical applications for a proportional switch include manual positioning, remote control point adjustment, and minimum damper positioning.

Figure 63 shows an application for the two-position manual switch. In Position 1, the switch places the thermostat in control of Valve 1 and opens Valve 2 by bleeding Valve 2 to zero through Port 1. When turned to Position 2, the switch places the thermostat in control of Valve 2 and Valve 1 opens.

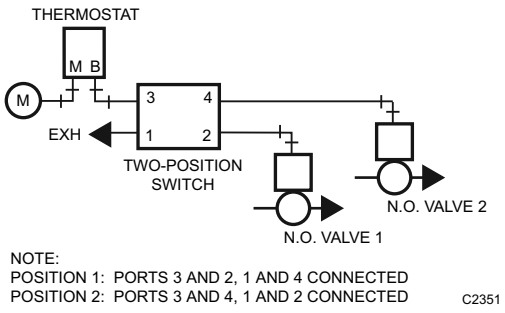


Fig. 63. Application for Two-Position Manual Switch.

Figure 64 shows an application of the three-position switch and a proportioning manual positioning switch.

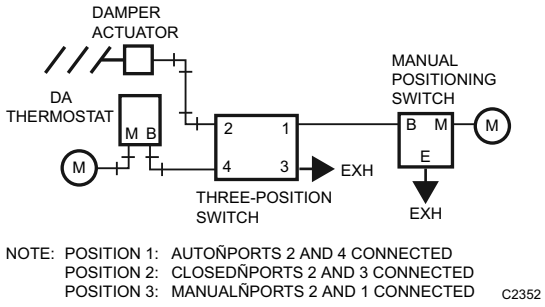


Fig. 64. Application for Three-Position Switch and Manual Positioning Switch.

In Position 1, the three-position switch places the thermostat in control of the damper. Position 2 closes the damper by bleeding air pressure to zero through Port 3. Position 3 allows the manual positioning switch to control the damper.

Changeover Control For Two-Pressure Supply System

Figure 65 shows a manual switch used for changeover from 13 to 18 psi in the mains. Either heating/cooling or day/night control systems can use this arrangement. In Position 1, the switch supplies main pressure to the pilot chamber in the PRV. The PRV then provides 18 psi (night or heating) main air pressure to the control system.

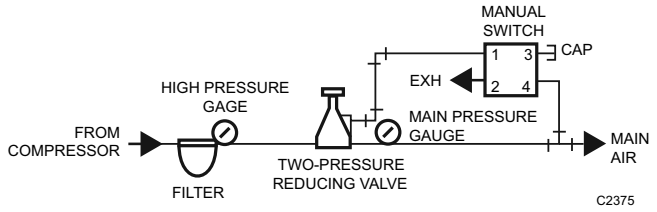


Fig. 65. Two-Pressure Main Supply System with Manual Changeover.

In Position 2, the manual switch exhausts the pilot chamber in the PRV. The PRV then provides 13 psi (day or cooling) to the system.

Figure 66 shows a two-pressure system with automatic changeover commonly used in day/night control. A switch in a seven-day time clock and an E/P relay provide the changeover. When the E/P relay energizes (day cycle), the pilot chamber in the PRV exhausts and controls at 13 psi. When the electric-pneumatic relay de-energizes, the pilot chamber receives full main pressure and the PRV provides 18 psi air.

Pneumatic Control Combinations

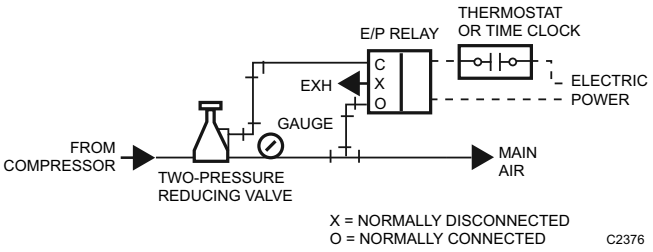


Fig. 66. Two-Pressure Main Supply System with Automatic Changeover.

Compensated Control System

In a typical compensated control system (Fig. 67), a dual-input controller increases or decreases the temperature of the supply water as the outdoor temperature varies. In this application, the dual-input controller resets the water temperature setpoint as a function of the outdoor temperature according to a preset schedule. The system then provides the scheduled water temperature to the convectors, fan-coil units, or other heat exchangers in the system.

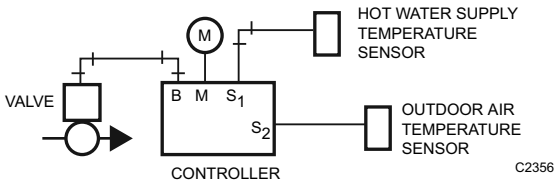


Fig. 67. Compensated Supply Water System Using Dual-Input Controller.

Electric-Pneumatic Relay Control

Figure 68 shows one use of an E/P relay in a pneumatic control circuit. The E/P relay connects to a fan circuit and energizes when the fan is running and de-energizes when the fan turns off, allowing the outdoor air damper to close automatically when the fan turns off. The relay closes off the controller branchline, exhausts the branchline going to the damper actuator, and allows the damper to go to its normal (closed) position. Figure 69 shows an E/P relay application that shuts down an entire control system.

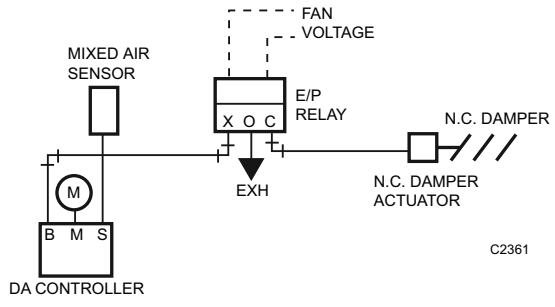


Fig. 68. Simple E/P Relay Combination.

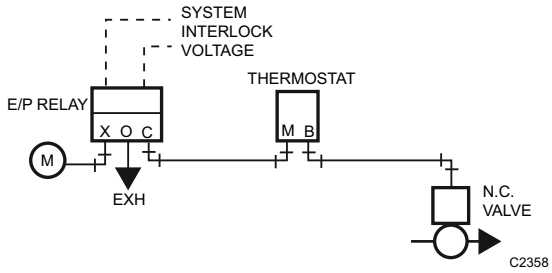


Fig. 69. E/P Relay Combination for System Shutdown.

Pneumatic-Electric Relay Control

A P/E relay provides the interlock when a pneumatic controller actuates electric equipment. The relays can be set for any desired pressure. Figure 70 shows two P/E relays sequenced to start two fans, one at a time, as the fans are needed.

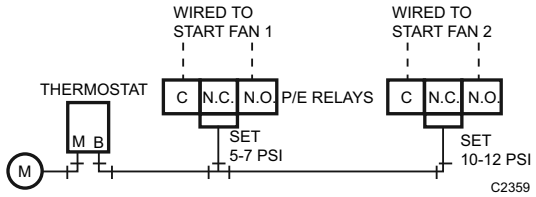


Fig. 70. P/E Relays Controlling Fans in Sequence.

On a rise in temperature, Relay 1 puts Fan 1 in operation as the thermostat branchline pressure reaches 7 psi. Relay 2 starts Fan 2 when the controller branchline pressure reaches 12 psi. On a decrease in branchline pressure, Relay 2 stops Fan 2 at 10 psi branchline pressure, and Relay 1 stops Fan 1 at 5 psi branchline pressure.

Figure 71 shows two spdt P/E relays starting and stopping a two-speed fan to control condenser water temperature.

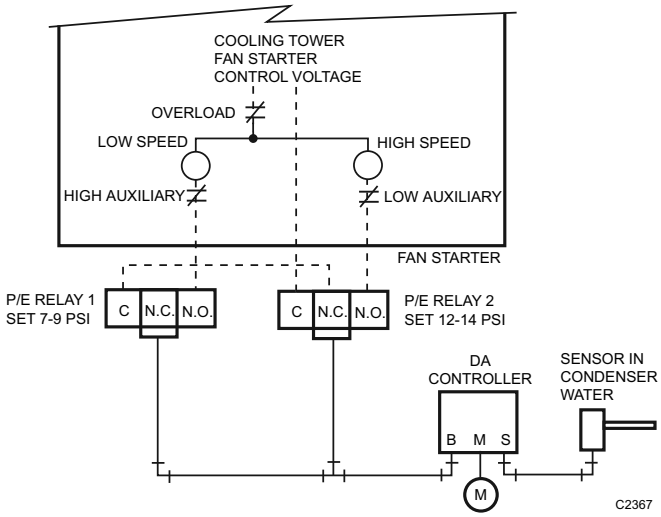


Fig. 71. Two-Speed Fan Operated by P/E Relays.

Voltage is applied to the common contact of Relay 1 from the normally closed contact of Relay 2. When the controller branchline pressure rises to 9 psi, the cooling tower fan is started on low speed by Relay 1 which makes common to normally open. As a further rise in temperature increases the branchline pressure to 14 psi, Relay 2 breaks the normally closed circuit and makes the normally open circuit, removing voltage from Relay 1, shutting down the low speed, and energizing the high speed. On a decrease in temperature, the sequence reverses and the changes occur at 12 and 7 psi respectively.

Pneumatic Recycling Control

E/P and P/E relays can combine to perform a variety of logic functions. On a circuit with multiple electrically operated devices, recycling control can start the devices in sequence to prevent the circuit from being overloaded. If power fails, recycling the system from its starting point prevents the circuit overload that could occur if all electric equipment restarts simultaneously when power resumes.

Figure 72 shows a pneumatic-electric system that recycles equipment when power fails.

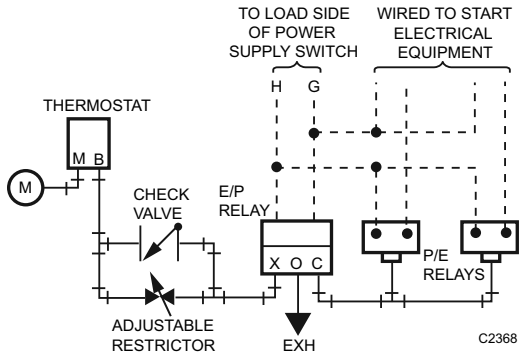


Fig. 72. Recycling System for Power Failure.

When power is applied, the E/P relay operates to close the exhaust and connect the thermostat through an adjustable restrictor to the P/E relays. The electrical equipment starts in sequence determined by the P/E relay settings, the adjustable restrictor, and the branchline pressure from the thermostat. The adjustable restrictor provides a gradual buildup of branchline pressure to the P/E relays for an adjustable delay between startups. On power failure, the E/P relay cuts off the thermostat branchline to the two P/E relays and bleeds them off through its exhaust port, shutting down the electrical equipment. The check valve allows the thermostat to shed the controlled loads as rapidly as needed (without the delay imposed by the restrictor).

PNEUMATIC CENTRALIZATION

Building environmental systems may be pneumatically automated to any degree desired. Figure 73 provides an example of the front of a pneumatic automation panel. This panel contains pneumatic controls and may be local to the controlled HVAC system, or it may be located centrally in a more convenient location.

In this example, the on-off toggle switch starts and stops the fan. The toggle switch may be electric, or pneumatic with a Pneumatic-Electric (P/E) relay.

Two pneumatic “target” gauges are shown for the outside air damper and the supply fan. The ON/OFF Supply Fan Gauge is fed from a fan proof-of-flow relay, and the OPEN/CLOSED Damper Gauge is fed from the damper control line.

The Discharge Air Temperature Indicator is fed from the pneumatic discharge air temperature sensor and the Three-Way Valve Gauge is fed from the valve control line.

When pneumatic automation panels are located local to the HVAC system, they are usually connected with 1/4 inch plastic tubing. When there are many lines at extended lengths, smaller diameter plastic tubing may be preferable to save space and maintain responsiveness. When the panel devices are remote, the air supply should be sourced remotely to avoid pressure losses due to long flow lines. The switching air may be from the automation panel or it may be fed via a remote restrictor and piped in an exhaust configuration.

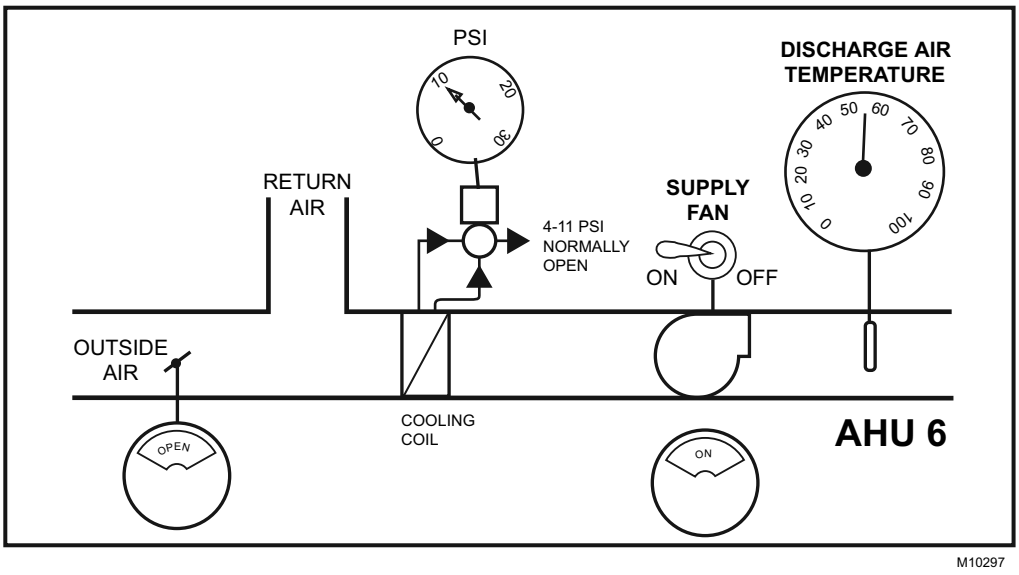


Fig. 73. Pneumatic Centralization

PNEUMATIC CONTROL SYSTEM EXAMPLE

The following is an example of a typical air handling system (Fig. 74) with a pneumatic control system. The control system is presented in the following seven control sequences (Fig. 75 through 79):
— Start-Stop Control Sequence.
— Supply Fan Control Sequence.
— Return Fan Control Sequence.
— Warm-Up/Heating Coil Control Sequence.
— Mixing Damper Control Sequence.
— Discharge Air Temperature Control Sequence.
— Off/Failure Mode Control Sequence.

Controls are based upon the following system information and control requirements:

System Information:
— VAV air handling system.
— Return fan.
— 35,000 cfm.
— 4,000 cfm outside air.
— 3,000 cfm exhaust air.
— Variable speed drives.
— Hot water coil for morning warm-up and to prevent discharge air from getting too cold in winter.
— Chilled water coil.
— Fan powered perimeter VAV boxes with hot water reheat.
— Interior VAV boxes.
— Water-side economizer.
— 8:00 A.M to 5:00 P.M. normal occupancy.
— Some after-hour operation.

Control Requirements:
— Maintain design outside air airflow during all levels of supply fan loading during occupied periods.
— Use normally open two-way valves so system can heat or cool upon compressed air failure by manually running pumps and adjusting water temperatures.
— Provide exhaust/ventilation during after-hour occupied periods.
— Return fan sized for 35,000 cfm.

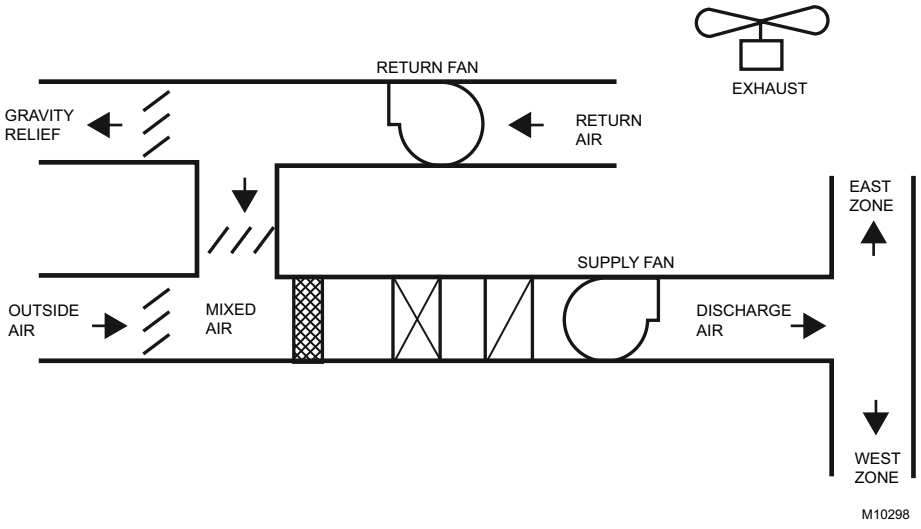


Fig. 74. Typical Air Handling System.

Start-Stop Control Sequence

Fans 1M through 3M (Fig. 75) operate automatically subject to starter-mounted Hand-Off-Automatic Switches.

The Supply Fan 1M is started and controls are energized by Electric-Pneumatic Relay 2EP at 0645 by one of the following:
— An Early Start Time Clock 1TC
— A drop in perimeter space temperature to 65F at Night Thermostat TN
— An after-hour occupant setting the Spring-Wound Interval Timer for 0 to 60 minutes.

The Supply Fan 1M operation is subject to manually reset safety devices including Supply and Return Air Smoke Detectors a heating coil, leaving air, Low Temperature Thermostat; and a supply fan discharge, duct High Static Pressure Cut-Out.

Any time the Supply Fan 1M runs, the Return Fan 2M runs.

Any time the Return Fan 2M runs, the Exhaust Fan 3M and the ventilation controls are energized by the After-Hours Interval Timer or by the Occupancy Schedule Time Clock 2TC set for 0750.

Both Clocks 1TC and 2TC are set to shut the system down at 1700.

Pneumatic Control System Example

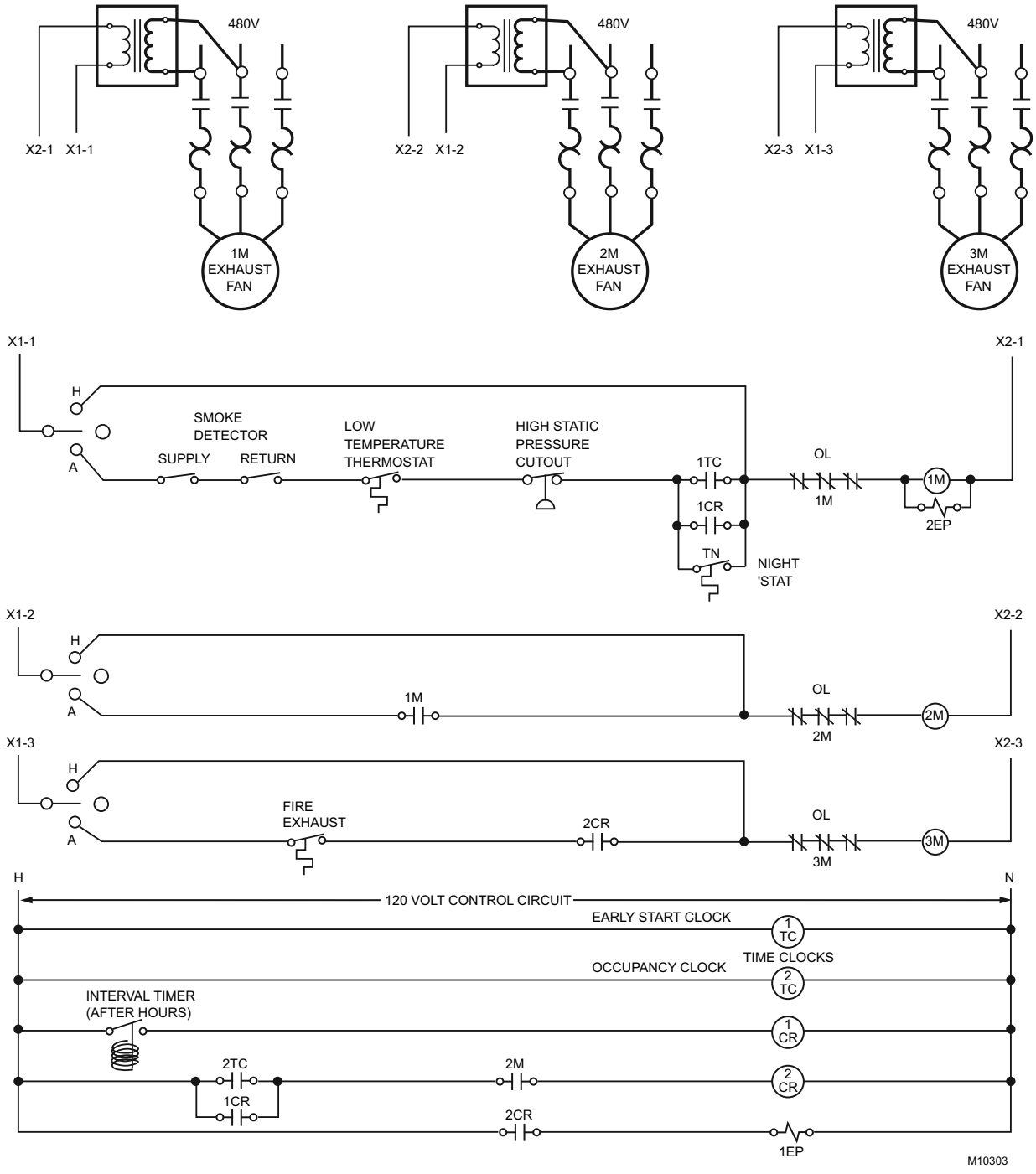


Fig. 75. Start-Stop Control.

Supply Fan Control Sequence

Any time the Supply Fan (Fig. 76) runs, the pressure controller with the greatest demand, Static Pressure Controller PC1 or PC2, operates the Electronic-Pressure Transducer PT. The controller used is determined by High Pressure Selector Relay HSR. Transducer PT controls the Supply Fan Variable Speed Drive (VSD) to maintain duct static pressure. The pick-up probes for Static Pressure Controllers PC1 and PC2 are located at the end of the east and west zone ducts.

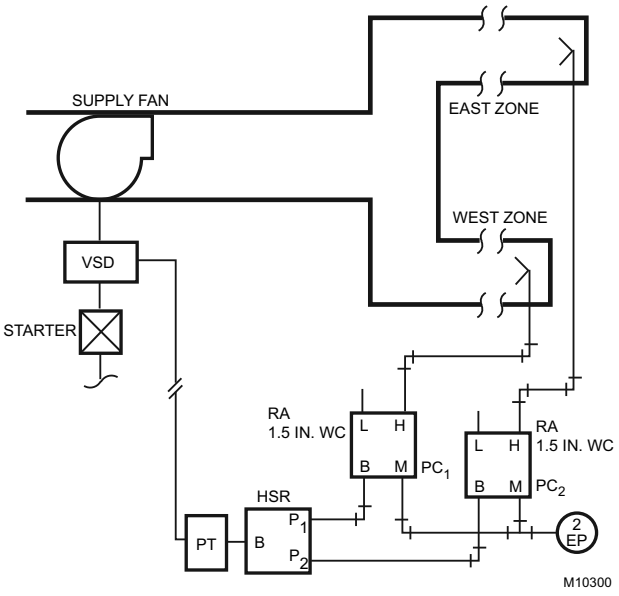


Fig. 76. Supply Fan Load Control.

Return Fan Control Sequence

Static Pressure Controller PC (Fig. 77) controls the return fan variable speed drive to maintain space static pressure. The pick-up probe is located in the space

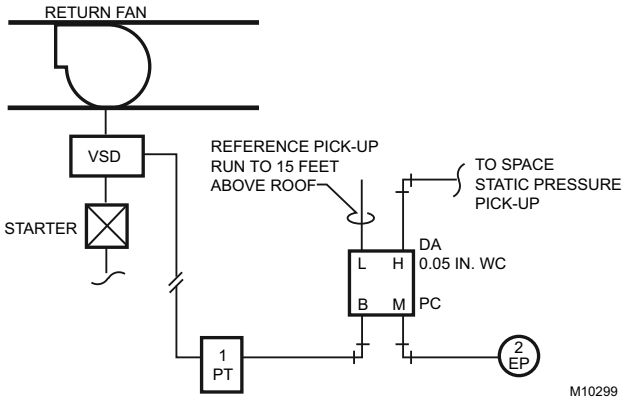


Fig. 77. Return Fan Load Control.

NOTES:

1. Because of varying exhaust between occupied and warm-up modes, space static pressure control of the return fan is selected. Return fan tracking from supply fan airflow is acceptable but is complex if varying exhaust is worked into the control scheme.
2. Exercise care in selecting location of the inside pick-up and in selection of the pressure controller. Location of the reference pick-up above the roof is recommended by ASHRAE.
3. To prevent unnecessary hunting by the return fan at start-up, the supply fan control signal should be slow loading such that the supply fan goes from zero or a minimum to maximum load over three minutes. Shut down should not be restricted.

Pneumatic Control System Example

Warm-Up/Heating Coil Control Sequence

Any time the Supply Fan (Fig. 78) runs and the return air temperature is below 69F, Temperature Controller TC-1 trips Snap-Acting Relay SA-1 to position Switching Relays SR-1 and SR-2 to initialize warm-up control. Relay SA-1 also positions Switching Relay SR-4 to disable cooling controls. Switching Relay SR-2 opens all interior VAV box dampers and starts the hot water pump. Relay SR-1 switches the hot water valve from normal control to warm-up control via Controller TC-2 and modulates the hot water valve to maintain a discharge air temperature setpoint of 90F.

NOTE: Fan powered perimeter VAV boxes are cool in this mode and operate with the fans on and at the minimum airflow (warm air) setpoints. Reheat valves at each box operate as needed. This allows the warm-up cycle to operate the air handling unit (AHU) fans at a reduced and low cost power range.

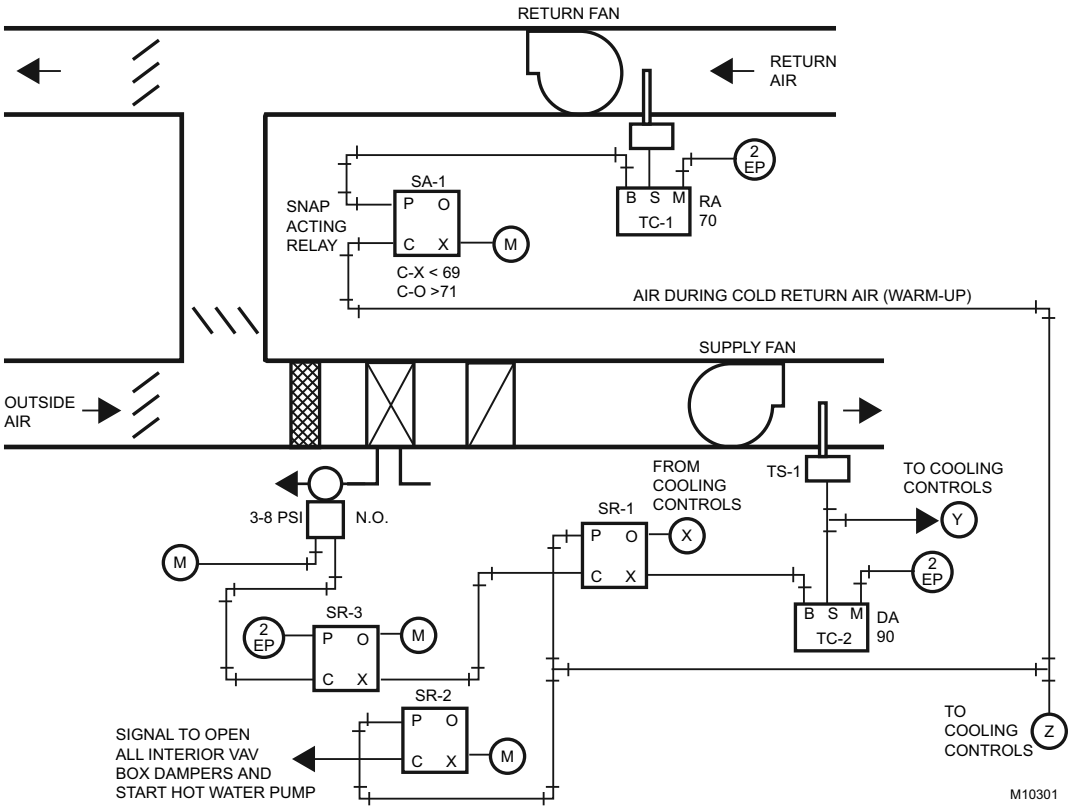


Fig. 78. Heating Coil Control.

Mixing Damper Control Sequence

Any time the AHU (Fig. 79) runs in the occupied mode with Electric-Pneumatic Relay 1EP energized, Outside Air airflow Controller P-F modulates the outside air damper toward open and the return air damper toward closed (or vice versa) in unison to maintain design outside air at 4000 cfm.

NOTE: These dampers can control in sequence also, but unison control positions the damper blades better for mixing which is helpful during freezing periods. If the outside air is provided from an outside air shaft with an outside air fan, an outside air filter is helpful to keep the flow sensing element/pick-up clean and effective. Electric-Pneumatic Relay 1EP starts the outside air system.

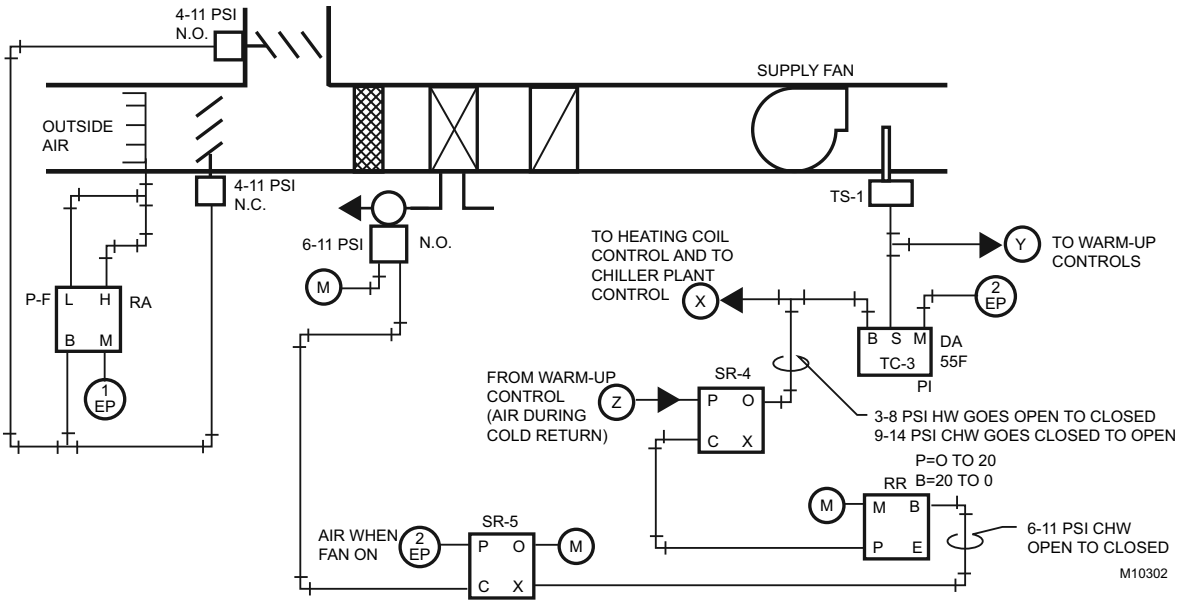


Fig. 79. Mixing Damper and Discharge Air Temperature Control.

Discharge Air Temperature Control Sequence

Any time the AHU (Fig. 79) operates in the non-warm-up mode, Switching Relay SR-4 operates to allow the normal Discharge Air Temperature Controller TC-3 to modulate the hot water valve closed (through Switching Relay SR-1, Fig. 77) and the chilled water valve open in sequence, on a rising cooling load, to maintain the Temperature Controller TC-3 setpoint. Controller TC-3 is a PI (proportional plus integral) controller.

NOTE: In this constant 4000 cfm outside air system, if the return air is 72F and the outside air is -5F, the mixed air temperature will drop below 55F if the AHU airflow drops below 52 percent of the design airflow.

Off/Failure Mode Control Sequence

If compressed air fails, both control valves open, the outside air damper closes, and the return air damper opens.

When the fan is off, Switching Relay SR-3 (Fig. 78) positions to close the hot water valve, Switching Relay SR-5 (Fig. 79) positions to close the chilled water valve, the outside air damper closes, and the return air damper opens.

Pneumatic Product Cross Reference

ITEM NUMBER	MANUFACTURER	REPLACEMENT ITEM		TYPE OF REPLACEMENT	REMARKS
265	POWERS/LANDIS & GYR	**NO REPLACEMENT**		NONE	
782	POWERS/LANDIS & GYR	**RP470A1003**		FUNCTIONAL	
783	POWERS/LANDIS & GYR	**RP970A1008**	OR	FUNCTIONAL	
783	POWERS/LANDIS & GYR	**RP972A1006**		FUNCTIONAL	
2212	ROBERTSHAW	**NO REPLACEMENT**		NONE	
2213	ROBERTSHAW	**NO REPLACEMENT**		NONE	
2214	ROBERTSHAW	**NO REPLACEMENT**		NONE	
2216	ROBERTSHAW	**NO REPLACEMENT**		NONE	
2220	ROBERTSHAW	**TP974A2000**		FUNCTIONAL	
2232	ROBERTSHAW	**HP971A1008**		FUNCTIONAL	
2260	ROBERTSHAW	**LP907A1002**		FUNCTIONAL	
2323	ROBERTSHAW	**PP905B1008**		FUNCTIONAL	
2325	ROBERTSHAW	**PP92B1019**		FUNCTIONAL	
2341	ROBERTSHAW	**RP920A1025**	OR	FUNCTIONAL	
2341	ROBERTSHAW	**RP920B1023**	OR	FUNCTIONAL	
2341	ROBERTSHAW	**RP920C1021**	OR	FUNCTIONAL	
2341	ROBERTSHAW	**RP920D1029**		FUNCTIONAL	
2351	ROBERTSHAW	**RP920C1021**	OR	FUNCTIONAL	
2351	ROBERTSHAW	**RP920D1029**		FUNCTIONAL	
2353	ROBERTSHAW	**RP471A1002**	OR	FUNCTIONAL	
2353	ROBERTSHAW	**RP471A1010**	OR	FUNCTIONAL	
2353	ROBERTSHAW	**RP470A1003**		FUNCTIONAL	
2354	ROBERTSHAW	**RP471A1002**	OR	FUNCTIONAL	
2354	ROBERTSHAW	**RP670A1001**	OR	FUNCTIONAL	
2354	ROBERTSHAW	**RP670A1019**	OR	FUNCTIONAL	
2354	ROBERTSHAW	**RP670B1009**		FUNCTIONAL	
2360	ROBERTSHAW	**RP972A1006**	OR	FUNCTIONAL	
2360	ROBERTSHAW	**RP972A1030**		FUNCTIONAL	
2364	ROBERTSHAW	**P643A1007**	OR	FUNCTIONAL	
2364	ROBERTSHAW	**P658A1013**		FUNCTIONAL	
2368	ROBERTSHAW	**RP418A**	OR	FUNCTIONAL	
2368	ROBERTSHAW	**RP818A**	OR	FUNCTIONAL	
2368	ROBERTSHAW	**RP818B**		FUNCTIONAL	
2372	ROBERTSHAW	**RP470A1003**	OR	FUNCTIONAL	
2372	ROBERTSHAW	**RP970A1008**		FUNCTIONAL	
2373	ROBERTSHAW	**RP913A1008**		FUNCTIONAL	
2390	ROBERTSHAW	**SP970A1005**	OR	FUNCTIONAL	
2390	ROBERTSHAW	**SP970A1013**	OR	FUNCTIONAL	
2390	ROBERTSHAW	**SP970C1001**	OR	FUNCTIONAL	
2390	ROBERTSHAW	**SP970C1004**		FUNCTIONAL	
2392	ROBERTSHAW	**SP470A1000**		FUNCTIONAL	
2393	ROBERTSHAW	**SP470A1018**		FUNCTIONAL	
2472	ROBERTSHAW	**NO REPLACEMENT**		NONE	
2473	ROBERTSHAW	**NO REPLACEMENT**		NONE	
2474	ROBERTSHAW	**NO REPLACEMENT**		NONE	
2561	ROBERTSHAW	**NO REPLACEMENT**		NONE	
2563	ROBERTSHAW	**NO REPLACEMENT**		NONE	
2564	ROBERTSHAW	**NO REPLACEMENT**		NONE	

Pneumatic Product Cross Reference

ITEM NUMBER	MANUFACTURER	REPLACEMENT ITEM		TYPE OF REPLACEMENT	REMARKS
2565	ROBERTSHAW	**NO REPLACEMENT**		NONE	
2566	ROBERTSHAW	**NO REPLACEMENT**		NONE	
2569	ROBERTSHAW	**NO REPLACEMENT**		NONE	
2571	WHITE RODGERS	**VR8300A3500**		FUNCTIONAL	
2580	ROBERTSHAW	**NO REPLACEMENT**		NONE	
2581	ROBERTSHAW	**NO REPLACEMENT**		NONE	
2582	ROBERTSHAW	**NO REPLACEMENT**		NONE	
24799		**NONE**		NONE	
221256		**NONE**		NONE	
221257		**NONE**		NONE	
221257		**NONE**		NONE	
221618		**NO REPLACEMENT**		NONE	
230345	HONEYWELL	**CCT2193**		DIRECT	
310535		**NONE**		NONE	
310540	HONEYWELL	**NO REPLACEMENT**		NONE	
310541		**NO REPLACEMENT**		NONE	
310565		**NONE**		NONE	
310588		**NONE**		NONE	
310670		**NONE**		NONE	
310779		**NONE**		NONE	
311098		**NO REPLACEMENT**		NONE	
311099		**NO REPLACEMENT**		NONE	
311100		**NO REPLACEMENT**		NONE	
311129		**NO REPLACEMENT**		NONE	
311182		**NONE**		NONE	
311188		**NONE**		NONE	
311327		**NO REPLACEMENT**		NONE	
311430		**NO REPLACEMENT**		NONE	
311565		**WILL FIND THE SPRING IN THE ASSEMBLY 14003295-002**			
311631		**NONE**		NONE	
311709	HONEYWELL	**NO REPLACEMENT**		NONE	
311725		**NONE**		NONE	
312179	HONEYWELL	**14002039-001**		DIRECT	
312499		**NO REPLACEMENT**		NONE	
312500		**NO REPLACEMENT**		NONE	
312933		**NONE**		NONE	
313046		**NONE**		NONE	
313047		**NONE**		NONE	
313077		**NONE**		NONE	
313103		**NO REPLACEMENT**		NONE	
313167		**NONE**		NONE	
313175	HONEYWELL	**14004376-001**		DIRECT	
313177	HONEYWELL	**NO REPLACEMENT**		NONE	
313343	HONEYWELL	**314959A**		FUNCTIONAL	
313477		**NO REPLACEMENT**		NONE	
313820		**NO REPLACEMENT**		NONE	
313828		**NONE**		NONE	
313981	HONEYWELL	**NO REPLACEMENT**		NONE	
314082		**NO REPLACEMENT**		NONE	
314439		**314439**		DIRECT	

Pneumatic Product Cross Reference

ITEM NUMBER	MANUFACTURER	REPLACEMENT ITEM		TYPE OF REPLACEMENT	REMARKS
314462		**NO REPLACEMENT**		NONE	
314483		**NONE**		NONE	
314485		**NO REPLACEMENT**		NONE	
314667	HONEYWELL	**NO REPLACEMENT**		NONE	
314706		**NO REPLACEMENT**		NONE	
314810		**NONE**		NONE	
314811		**NONE**		NONE	
314959	HONEYWELL	**314959A**		FUNCTIONAL	
315005		**NONE**		NONE	
315182		**NONE**		NONE	
315245		**NO REPLACEMENT**		NONE	
315285	HONEYWELL	**NO REPLACEMENT**		NONE	
315322		**NONE**		NONE	
315326	HONEYWELL	**NO REPLACEMENT**		NONE	
315333	HONEYWELL	**NO REPLACEMENT**		NONE	
315406		**NONE**		NONE	
315553		**NO REPLACEMENT**		NONE	
315563		**NONE**		NONE	
315835		**NONE**		NONE	
315929		**NONE**		NONE	
316164		**NONE**		NONE	
316210	HONEYWELL	**NO REPLACEMENT**		NONE	
316862	HONEYWELL	**NO REPLACEMENT**		NONE	
2223700	HONEYWELL	**5957600**		DIRECT	
2434600		**NO REPLACEMENT**		NONE	
3161540062	HONEYWELL	**309389J**		FUNCTIONAL	
31050300062	HONEYWELL	**14004623-001**		DIRECT	
31185500034	HONEYWELL	**311855**		DIRECT	
31347800767	HONEYWELL	**14002850-001**		FUNCTIONAL	
31588700605	HONEYWELL	**NO REPLACEMENT**		NONE	
31615400062	HONEYWELL	**309389J**		FUNCTIONAL	
134-1400	POWERS/LANDIS & GYR	**NO REPLACEMENT**		NONE	
134-1401	POWERS/LANDIS & GYR	**NO REPLACEMENT**		NONE	
134-1404	POWERS/LANDIS & GYR	**NO REPLACEMENT**		NONE	
134-1405	POWERS/LANDIS & GYR	**NO REPLACEMENT**		NONE	
134-1406	POWERS/LANDIS & GYR	**NO REPLACEMENT**		NONE	
134-1407	POWERS/LANDIS & GYR	**NO REPLACEMENT**		NONE	
14000028-001		**14002560-010**	OR	FUNCTIONAL	
14000686-002		**14002053-001 PLASTIC BACKPLATE and 14004505-001 RUBBER CONNECTOR**			
14000785-002		**NONE**		NONE	
14000785-007		**NONE**		NONE	
14000785-008		**NONE**		NONE	
14001237-001		**NO REPLACEMENT**		NONE	
14001337-001	HONEYWELL	**315321**	WITH	FUNCTIONAL	
14001337-001	HONEYWELL	**26026B**		FUNCTIONAL	
14001493-002	HONEYWELL	**14004559-001**		FUNCTIONAL	
14001844-001	HONEYWELL	**NO REPLACEMENT**		NONE	
14001976-001		**NONE**		NONE	
14001984-210		**SEE FORM 77-1003 FOR SPECIFICATIONS**			
14001984-500	HONEYWELL	**14004406-910**		DIRECT	

Pneumatic Product Cross Reference

ITEM NUMBER	MANUFACTURER	REPLACEMENT ITEM		TYPE OF REPLACEMENT	REMARKS
14002061-007	HONEYWELL	**14002061-006**		FUNCTIONAL	
14002062-005	HONEYWELL	**NO REPLACEMENT**		NONE	
14002066-001	HONEYWELL	**NO REPLACEMENT**		NONE	
14002095-001		**NONE**		NONE	
14002424-002		**NO REPLACEMENT**		NONE	
14002424-003		**NO REPLACEMENT**		NONE	
14002465-171	HONEYWELL	**14004407-111**		DIRECT	
14002465-174	HONEYWELL	**14004407-121**		DIRECT	
14002467-170	HONEYWELL	**14004407-910**		FUNCTIONAL	
14002625-001		**NONE**		NONE	
14002694-001	HONEYWELL	**14002694-002**		FUNCTIONAL	
14002694-002	HONEYWELL	**NO REPLACEMENT**		NONE	
14002694-003	HONEYWELL	**14002694-007**		DIRECT	
14002694-004	HONEYWELL	**14002694-008**		DIRECT	
14002695-001	HONEYWELL	**14002695-002**		FUNCTIONAL	
14002695-002	HONEYWELL	**NO REPLACEMENT**		NONE	
14002695-003	HONEYWELL	**14002695-007**		DIRECT	
14002695-004	HONEYWELL	**14003109-007**		FUNCTIONAL	
14002697-001	HONEYWELL	**NO REPLACEMENT**		NONE	
14002851-001	HONEYWELL	**14003640-001**		FUNCTIONAL	
14002913-001		**14002913-001**		DIRECT	
14002913-008		**NONE**		NONE	
14003034-263		**NONE**		NONE	
14003109-001	HONEYWELL	**14003109-002**		FUNCTIONAL	
14003109-002	HONEYWELL	**NO REPLACEMENT**		NONE	
14003109-003	HONEYWELL	**14003109-007**		FUNCTIONAL	
14003109-004	HONEYWELL	**14003109-008**		FUNCTIONAL	
14003110-001	HONEYWELL	**14003110-002**		FUNCTIONAL	
14003110-002	HONEYWELL	**NO REPLACEMENT**		NONE	
14003110-003	HONEYWELL	**14003110-007**		DIRECT	
14003110-004	HONEYWELL	**14003110-008**		DIRECT	
14003111-001	HONEYWELL	**14003111-002**		FUNCTIONAL	
14003111-001		**14003111-008**		FUNCTIONAL	
14003111-001		**14003111-008**		FUNCTIONAL	
14003111-002	HONEYWELL	**NO REPLACEMENT**		NONE	
14003111-002		**14003111-008**		FUNCTIONAL	
14003111-002		**14003111-008**		FUNCTIONAL	
14003111-003	HONEYWELL	**14003111-007**		DIRECT	
14003111-003		**14003111-008**		FUNCTIONAL	
14003111-004	HONEYWELL	**14003111-008**		FUNCTIONAL	
14003111-004		**14003111-008**		FUNCTIONAL	
14003111-007		**14003111-008**		FUNCTIONAL	
14003124-001	HONEYWELL	**14003124-002**		DIRECT	
14003203-002		**NONE**		NONE	
14003269-001	HONEYWELL	**14003199-001**		FUNCTIONAL	
14003269-002	HONEYWELL	**14003199-002**		FUNCTIONAL	
14003454-001		**14002053-001**		FUNCTIONAL	
14003571-001	HONEYWELL	**CCT1606B**		FUNCTIONAL	
14003572-001	HONEYWELL	**CCT1599BT**		FUNCTIONAL	
14003696-001		**NONE**		NONE	

Pneumatic Product Cross Reference

ITEM NUMBER	MANUFACTURER	REPLACEMENT ITEM		TYPE OF REPLACEMENT	REMARKS
14003700-002	HONEYWELL	**315321N**		FUNCTIONAL	
14003700-004	HONEYWELL	**315781**	WITH	FUNCTIONAL	
14003700-004	HONEYWELL	**315321**	WITH	FUNCTIONAL	
14003700-004	HONEYWELL	**14003640-001**	WITH	FUNCTIONAL	
14003700-004	HONEYWELL	**26025B**		FUNCTIONAL	
14003820-001	HONEYWELL	**315321**	WITH	FUNCTIONAL	
14003820-001	HONEYWELL	**315781**	WITH	FUNCTIONAL	
14003820-001	HONEYWELL	**26026B**	WITH	FUNCTIONAL	
14003820-001	HONEYWELL	**14003640-001**		FUNCTIONAL	
14003820-005	HONEYWELL	**26026B**	WITH	FUNCTIONAL	
14003820-005	HONEYWELL	**14003640-001**		FUNCTIONAL	
14003820-019		**NONE**		NONE	
14003820-023		**NONE**		NONE	
14003874-001	HONEYWELL	**315781**	WITH	FUNCTIONAL	
14003874-001	HONEYWELL	**315321**	WITH	FUNCTIONAL	
14003874-001	HONEYWELL	**26026D**		FUNCTIONAL	
14003874-002	HONEYWELL	**315781**	WITH	FUNCTIONAL	
14003874-002	HONEYWELL	**315321**	WITH	FUNCTIONAL	
14003874-002	HONEYWELL	**26026D**		FUNCTIONAL	
14003881-001	HONEYWELL	**CCT1642**		FUNCTIONAL	
14003925-002	HONEYWELL	**14004406-910**		DIRECT	
14004013-001	HONEYWELL	**14004210-001**		FUNCTIONAL	
14004014-001	HONEYWELL	**14004210-001**		FUNCTIONAL	
14004017-001	HONEYWELL	**14004213-001**		FUNCTIONAL	
14004080-001	HONEYWELL	**14004138-001**		FUNCTIONAL	
14004212-001	HONEYWELL	**NO REPLACEMENT**		NONE	
14004215-001		**NO REPLACEMENT**		NONE	
14004262-001		**NONE**		NONE	
14004283-003		**NO REPLACEMENT**		NONE	
14004290-002		**NONE**		NONE	
14004316-001		**NO REPLACEMENT**		NONE	
14004350-001	HONEYWELL	**14004241-002**		FUNCTIONAL	
14004367-001		**NO REPLACEMENT**		NONE	
14004368-002	MIRCOSWITCH	**14004062-001**	WITH	FUNCTIONAL	
14004401-002	HONEYWELL	**NO REPLACEMENT**		NONE	
14004402-003		**NONE**		NONE	
14004402-006		**NONE**		NONE	
14004405-111		**NONE**		NONE	
14004406-114		**SEE FORM 77-1003 FOR OPTIONS**		FUNCTIONAL	
14004406-510		**NONE**		NONE	
14004406-711		**NO REPLACEMENT**		NONE	
14004407-400	HONEYWELL	**14004407-910**		FUNCTIONAL	
14004407-902		**NONE**		NONE	
14004407-904		**NONE**		NONE	
14004419-001	MIRCOSWITCH	**14002374-004**	OR	FUNCTIONAL	
14004419-001	MIRCOSWITCH	**14002374-005**		FUNCTIONAL	
14004419-001		**14002374-006**		DIRECT	
14004434-001		**NO REPLACEMENT**		NONE	
14004441-007		**NONE**		NONE	

Pneumatic Product Cross Reference

ITEM NUMBER	MANUFACTURER	REPLACEMENT ITEM		TYPE OF REPLACEMENT	REMARKS
14004459-002		**NONE**		NONE	
14004509-001	HONEYWELL	**14004210-001**		FUNCTIONAL	
14004533-002		**NONE**		NONE	
14004559-001	HONEYWELL	**14004558-001**	OR	FUNCTIONAL	
14004559-001	HONEYWELL	**14004558-002**		FUNCTIONAL	
14004599-004		**NO REPLACEMENT**		NONE	
14004625-002		**NONE**		NONE	
14004625-011		**NO REPLACEMENT**		NONE	
14004630-004		**NO REPLACEMENT**		NONE	
14004665-001		**NONE**		NONE	
14004728-001		**NO REPLACEMENT**		NONE	
14004741-001	HONEYWELL	**NO REPLACEMENT**		NONE	
14004741-003	HONEYWELL	**14004406-910**		DIRECT	
14004743-001	HONEYWELL	**14004788-910**		DIRECT	
14004744-001		**SEE FORM 77-1003 FOR OPTIONS**		FUNCTIONAL	
14004756-004		**14004756-008**		FUNCTIONAL	
14004756-007		**14004756-008**		FUNCTIONAL	
14004757-008		**NONE**		NONE	
14004787-100	HONEYWELL	**14004787-910**		FUNCTIONAL	
14004787-111	HONEYWELL	**14004787-910**		FUNCTIONAL	
14004788-100	HONEYWELL	**14004788-910**		FUNCTIONAL	
14004788-910		**14004406-910**	OR	FUNCTIONAL	
14004788-910		**14004407-910**	OR	FUNCTIONAL	
14004788-910		**14004787-910**	OR	FUNCTIONAL	
14004788-910		**14004878-910**		FUNCTIONAL	
14004789-111		**14004406-910**	OR	FUNCTIONAL	
14004789-111		**14004407-910**	OR	FUNCTIONAL	
14004789-111		**14004787-910**	OR	FUNCTIONAL	
14004789-111		**14004878-910**		FUNCTIONAL	
14004789-910		**14004406-910**	OR	FUNCTIONAL	
14004789-910		**14004407-910**	OR	FUNCTIONAL	
14004789-910		**14004787-910**	OR	FUNCTIONAL	
14004789-910		**14004878-910**		FUNCTIONAL	
14004795-001		**NONE**		NONE	
14004830-001		**SPRING IS PART OF 14004345-001 ASSEMBLY**			
14004853-001		**WASHER IS IN 14002695-006 and 14002695-008 BAG ASSEMBLIES**			
14004878-001	HONEYWELL	**14004878-910**		DIRECT	
14004878-700	HONEYWELL	**NO REPLACEMENT**		NONE	
14004883-001	HONEYWELL	**NO REPLACEMENT**		NONE	
14004883-002	HONEYWELL	**NO REPLACEMENT**		NONE	
14004883-003	HONEYWELL	**NO REPLACEMENT**		NONE	
14004897-005		**NO REPLACEMENT**		NONE	
180-151	POWERS/LANDIS & GYR	**NO REPLACEMENT**		NONE	
186-0013	POWERS/LANDIS & GYR	**HP970A1009**		FUNCTIONAL	
186-0019	POWERS/LANDIS & GYR	**NO REPLACEMENT**		NONE	
192-200	POWERS/LANDIS & GYR	**TP973A2076**		FUNCTIONAL	
192-201	POWERS/LANDIS & GYR	**TP973B2066**		FUNCTIONAL	
192-202	POWERS/LANDIS & GYR	**TP970A2004**	OR	FUNCTIONAL	
192-202	POWERS/LANDIS & GYR	**TP970A2145**		FUNCTIONAL	

Pneumatic Product Cross Reference

ITEM NUMBER	MANUFACTURER	REPLACEMENT ITEM		TYPE OF REPLACEMENT	REMARKS
192-203	POWERS/LANDIS & GYR	**TP970B2002**	OR	FUNCTIONAL	
192-203	POWERS/LANDIS & GYR	**TP970B2027**		FUNCTIONAL	
192-204	POWERS/LANDIS & GYR	**TP971A2086**	OR	FUNCTIONAL	
192-204	POWERS/LANDIS & GYR	**TP971A2102**		FUNCTIONAL	
192-205	POWERS/LANDIS & GYR	**TP971B2043**		FUNCTIONAL	
192-206	POWERS/LANDIS & GYR	**TP971C2025**		FUNCTIONAL	
192-208	POWERS/LANDIS & GYR	**TP972A2168**		FUNCTIONAL	
192-223	POWERS/LANDIS & GYR	**TP970B2010**	OR	FUNCTIONAL	
192-223	POWERS/LANDIS & GYR	**TP970B2150**		FUNCTIONAL	
193-215	POWERS/LANDIS & GYR	**TP979A2005**		FUNCTIONAL	
193-216	POWERS/LANDIS & GYR	**TP979C2001**		FUNCTIONAL	
193-218	POWERS/LANDIS & GYR	**TP979B2003**		FUNCTIONAL	
193-219	POWERS/LANDIS & GYR	**TP972A2085**		FUNCTIONAL	
201-1001	POWERS/LANDIS & GYR	**PP901A1004**		FUNCTIONAL	
201-1002	POWERS/LANDIS & GYR	**PP901B1002**		FUNCTIONAL	
2211-012	ROBERTSHAW	**TP973A2076**		FUNCTIONAL	
2211-013	ROBERTSHAW	**TP970B2150**		FUNCTIONAL	
2211-112	ROBERTSHAW	**TP970A2234**		FUNCTIONAL	
2211-512	ROBERTSHAW	**TP970A2234**		FUNCTIONAL	
2211-513	ROBERTSHAW	**TP970B2150**		FUNCTIONAL	
2212-118	ROBERTSHAW	**TP970A2004**	OR	FUNCTIONAL	
2212-118	ROBERTSHAW	**TP970A2140**	OR	FUNCTIONAL	
2212-118	ROBERTSHAW	**TP970A0005**		FUNCTIONAL	
2212-119	ROBERTSHAW	**TP970B2077**		FUNCTIONAL	
2212-128	ROBERTSHAW	**TP970A2145**		FUNCTIONAL	
2212-129	ROBERTSHAW	**TP970B2077**		FUNCTIONAL	
2212-218	ROBERTSHAW	**TP970A2145**		FUNCTIONAL	
2212-318	ROBERTSHAW	**TP970C2000**		FUNCTIONAL	
2212-319	ROBERTSHAW	**TP970D2008**		FUNCTIONAL	
221237/1698		**NO REPLACEMENT**		NONE	
2212-418	ROBERTSHAW	**TP970A2145**		FUNCTIONAL	
2212-419	ROBERTSHAW	**TP970B2077**		FUNCTIONAL	
2212-518	ROBERTSHAW	**TP970A2234**		FUNCTIONAL	
2212-519	ROBERTSHAW	**TP970B2150**		FUNCTIONAL	
2214-121	ROBERTSHAW	**TP971A2102**		FUNCTIONAL	
2214-122	ROBERTSHAW	**TP971B2001**		FUNCTIONAL	
2214-131	ROBERTSHAW	**TP971A2102**		FUNCTIONAL	
2214-521	ROBERTSHAW	**TP971A2102**		FUNCTIONAL	
221508B		**NO REPLACEMENT**		NONE	
2216-126	ROBERTSHAW	**TP971A2102**		FUNCTIONAL	
2216-136	ROBERTSHAW	**TP971A2102**		FUNCTIONAL	
2216-536	ROBERTSHAW	**TP971A2102**		FUNCTIONAL	
2218-132	ROBERTSHAW	**TP972A2192**		FUNCTIONAL	
2218-133	ROBERTSHAW	**TP972A2200**		FUNCTIONAL	
2218-134	ROBERTSHAW	**TP972A2002**		FUNCTIONAL	
2218-142	ROBERTSHAW	**TP972A2192**		FUNCTIONAL	
2218-301	ROBERTSHAW	**TP972A2077**		FUNCTIONAL	
221846A	HONEYWELL	**NO REPLACEMENT**		NONE	
2218-512	ROBERTSHAW	**TP972A2192**		FUNCTIONAL	
2218-532	ROBERTSHAW	**TP972A2077**		FUNCTIONAL	

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ITEM NUMBER	MANUFACTURER	REPLACEMENT ITEM		TYPE OF REPLACEMENT	REMARKS
221886A		**NO REPLACEMENT**		NONE	
2230-018	ROBERTSHAW	**HP970A1001**	OR	FUNCTIONAL	
2230-018	ROBERTSHAW	**HP970B1007**		FUNCTIONAL	
2252-110	ROBERTSHAW	**LP914A1045**		FUNCTIONAL	
2252-251	ROBERTSHAW	**LP915A1077**		FUNCTIONAL	
2252-501	ROBERTSHAW	**LP915A1044**		FUNCTIONAL	
2252-510	ROBERTSHAW	**LP914A1052**		FUNCTIONAL	
2252-610	ROBERTSHAW	**LP914A1052**		FUNCTIONAL	
2260-550	ROBERTSHAW	**LP907A1002**		FUNCTIONAL	
2260-551	ROBERTSHAW	**LP920A1005**		FUNCTIONAL	
2298-060	ROBERTSHAW	**LP916B1017**		FUNCTIONAL	
2298-061	ROBERTSHAW	**LP916A1016**		FUNCTIONAL	
2298-062	ROBERTSHAW	**LP916C1023**		FUNCTIONAL	
2326-021	ROBERTSHAW	**CP980E1045**		FUNCTIONAL	
2326-022	ROBERTSHAW	**CP980F1068**		FUNCTIONAL	
2341-001	ROBERTSHAW	**RP920A1033**	OR	FUNCTIONAL	
2341-001	ROBERTSHAW	**RP920A1041**	OR	FUNCTIONAL	
2341-001	ROBERTSHAW	**RP920B1056**	OR	FUNCTIONAL	
2341-001	ROBERTSHAW	**RP920C1039**		FUNCTIONAL	
2364-211	ROBERTSHAW	**P643A1007**	OR	FUNCTIONAL	
2364-211	ROBERTSHAW	**P658A1013**		FUNCTIONAL	
2374-410	ROBERTSHAW	**CLEAFS405**		FUNCTIONAL	
2376-501	ROBERTSHAW	**RP973A1005**		FUNCTIONAL	
2378-501	ROBERTSHAW	**RP971A1007**	OR	FUNCTIONAL	
2378-501	ROBERTSHAW	**RP971A1015**		FUNCTIONAL	
241-3	POWERS/LANDIS & GYR	**RP471A1002**	OR	FUNCTIONAL	
241-3	POWERS/LANDIS & GYR	**RP471A1010**		FUNCTIONAL	
243-0020	POWERS/LANDIS & GYR	**RP970A1008**	OR	FUNCTIONAL	
243-0020	POWERS/LANDIS & GYR	**RP970A1016**		FUNCTIONAL	
24400141-007		**NONE**		NONE	
2463-863	ROBERTSHAW	**MP516A1087**		FUNCTIONAL	
2464-861	ROBERTSHAW	**MP516A1087**		FUNCTIONAL	
2466-011	ROBERTSHAW	**MP920B1002**	OR	FUNCTIONAL	
2466-011	ROBERTSHAW	**14004345-001**		FUNCTIONAL	
2466-051	ROBERTSHAW	**MP920B1002**		FUNCTIONAL	
2472-020	ROBERTSHAW	**MP909D1201**		FUNCTIONAL	
2472-030	ROBERTSHAW	**MP909D1227**		FUNCTIONAL	
2472-040	ROBERTSHAW	**MP909D1219**		FUNCTIONAL	
2472-050	ROBERTSHAW	**MP909A1660**		FUNCTIONAL	
2472-110	ROBERTSHAW	**MP909A1041**		FUNCTIONAL	
2472-120	ROBERTSHAW	**MP909D1201**		FUNCTIONAL	
2472-140	ROBERTSHAW	**MP909D1219**		FUNCTIONAL	
2473-010	ROBERTSHAW	**MP909E1018**		FUNCTIONAL	
2473-020	ROBERTSHAW	**MP909E1083**		FUNCTIONAL	
2473-030	ROBERTSHAW	**MP909E1034**		FUNCTIONAL	
2473-110	ROBERTSHAW	**MP909E1018**		FUNCTIONAL	
2473-120	ROBERTSHAW	**MP909E1083**		FUNCTIONAL	
2473-140	ROBERTSHAW	**MP909E1174**		FUNCTIONAL	
2474-160	ROBERTSHAW	**MP909H1331**	OR	FUNCTIONAL	
2474-160	ROBERTSHAW	**MP918A1024**		FUNCTIONAL	

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ITEM NUMBER	MANUFACTURER	REPLACEMENT ITEM		TYPE OF REPLACEMENT	REMARKS
2560-001	ROBERTSHAW	**VP519C1006**		FUNCTIONAL	
2561-002	ROBERTSHAW	**VP527A1067**		FUNCTIONAL	
2561-004	ROBERTSHAW	**VP527A1075**		FUNCTIONAL	
2561-013	ROBERTSHAW	**VP513B1053**		FUNCTIONAL	
2563-002	ROBERTSHAW	**VP526A1118**		FUNCTIONAL	
2563-003	ROBERTSHAW	**VP526A1092**		FUNCTIONAL	
2563-005	ROBERTSHAW	**VP526A1050**		FUNCTIONAL	
2563-006	ROBERTSHAW	**VP526A1035**		FUNCTIONAL	
2564-002	ROBERTSHAW	**VP512A1213**		FUNCTIONAL	
2564-006	ROBERTSHAW	**VP512A1643**		FUNCTIONAL	
2564-010	ROBERTSHAW	**VP512A1684**		FUNCTIONAL	
2564-012	ROBERTSHAW	**VP512A1296**		FUNCTIONAL	
2564-014	ROBERTSHAW	**VP512A1726**		FUNCTIONAL	
2564-018	ROBERTSHAW	**VP512A1767**		FUNCTIONAL	
2565-001	ROBERTSHAW	**VP512A1742**		FUNCTIONAL	
2565-002	ROBERTSHAW	**VP512A1783**		FUNCTIONAL	
2566-002	ROBERTSHAW	**V5013F1004**	WITH	FUNCTIONAL	
2566-002	ROBERTSHAW	**MP953C1000**		FUNCTIONAL	
2566-004	ROBERTSHAW	**V5013F1004**	WITH	FUNCTIONAL	
2566-004	ROBERTSHAW	**MP953C1018**		FUNCTIONAL	
2566-006	ROBERTSHAW	**V5013F1004**	WITH	FUNCTIONAL	
2566-006	ROBERTSHAW	**MP953E1319**		FUNCTIONAL	
2566-008	ROBERTSHAW	**V5013F1020**	WITH	FUNCTIONAL	
2566-008	ROBERTSHAW	**MP953C1000**		FUNCTIONAL	
2566-010	ROBERTSHAW	**V5013F1020**	WITH	FUNCTIONAL	
2566-010	ROBERTSHAW	**MP953C1018**		FUNCTIONAL	
2566-012	ROBERTSHAW	**V5013F1020**	WITH	FUNCTIONAL	
2566-012	ROBERTSHAW	**MP953E1319**		FUNCTIONAL	
2566-014	ROBERTSHAW	**V5013F1038**	WITH	FUNCTIONAL	
2566-014	ROBERTSHAW	**MP953C1000**		FUNCTIONAL	
2566-016	ROBERTSHAW	**V5013F1038**	WITH	FUNCTIONAL	
2566-016	ROBERTSHAW	**MP953C1018**		FUNCTIONAL	
2566-018	ROBERTSHAW	**V5013F1038**	WITH	FUNCTIONAL	
2566-018	ROBERTSHAW	**MP953E1319**		FUNCTIONAL	
2566-020	ROBERTSHAW	**V5013F1046**	WITH	FUNCTIONAL	
2566-020	ROBERTSHAW	**MP953C1000**		FUNCTIONAL	
2566-022	ROBERTSHAW	**V5013F1046**	WITH	FUNCTIONAL	
2566-022	ROBERTSHAW	**MP953C1018**		FUNCTIONAL	
2566-023	ROBERTSHAW	**V5013F1046**	WITH	FUNCTIONAL	
2566-023	ROBERTSHAW	**MP953C1319**		FUNCTIONAL	
2566-025	ROBERTSHAW	**V5013F1053**	WITH	FUNCTIONAL	
2566-025	ROBERTSHAW	**MP953C1000**		FUNCTIONAL	
2566-027	ROBERTSHAW	**V5013F1053**	WITH	FUNCTIONAL	
2566-027	ROBERTSHAW	**MP953C1018**		FUNCTIONAL	
2566-028	ROBERTSHAW	**V5013F1053**	WITH	FUNCTIONAL	
2566-028	ROBERTSHAW	**MP953E1319**		FUNCTIONAL	
2566-030	ROBERTSHAW	**V5013F1061**	WITH	FUNCTIONAL	
2566-030	ROBERTSHAW	**MP953C1000**		FUNCTIONAL	
2566-032	ROBERTSHAW	**V5013F1061**	WITH	FUNCTIONAL	
2566-032	ROBERTSHAW	**MP953C1018**		FUNCTIONAL	

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ITEM NUMBER	MANUFACTURER	REPLACEMENT ITEM		TYPE OF REPLACEMENT	REMARKS
2566-033	ROBERTSHAW	**V5013F1061**	WITH	FUNCTIONAL	
2566-033	ROBERTSHAW	**MP953E1319**		FUNCTIONAL	
2566-102	ROBERTSHAW	**V5013F1004**	WITH	FUNCTIONAL	
2566-102	ROBERTSHAW	**MP958C1000**		FUNCTIONAL	
2566-104	ROBERTSHAW	**V5013F1004**	WITH	FUNCTIONAL	
2566-104	ROBERTSHAW	**MP953C1018**		FUNCTIONAL	
2566-106	ROBERTSHAW	**V5013F1004**	WITH	FUNCTIONAL	
2566-106	ROBERTSHAW	**MP953E1319**		FUNCTIONAL	
2566-108	ROBERTSHAW	**V5013F1004**	WITH	FUNCTIONAL	
2566-108	ROBERTSHAW	**MP953C1000**		FUNCTIONAL	
2566-110	ROBERTSHAW	**V5013F1004**	WITH	FUNCTIONAL	
2566-110	ROBERTSHAW	**MP953C1018**		FUNCTIONAL	
2566-112	ROBERTSHAW	**V5013F1004**	WITH	FUNCTIONAL	
2566-112	ROBERTSHAW	**MP953E1319**		FUNCTIONAL	
256-7	POWERS/LANDIS & GYR	**SP955A1046**		FUNCTIONAL	
2567-001	ROBERTSHAW	**V5011F1006**	WITH	FUNCTIONAL	
2567-001	ROBERTSHAW	**MP953D1172**		FUNCTIONAL	
2567-003	ROBERTSHAW	**V5011F1006**	WITH	FUNCTIONAL	
2567-003	ROBERTSHAW	**MP953D1107**		FUNCTIONAL	
2567-004	ROBERTSHAW	**V5011F1006**	WITH	FUNCTIONAL	
2567-004	ROBERTSHAW	**MP953F1119**		FUNCTIONAL	
2567-005	ROBERTSHAW	**V5011F1022**	WITH	FUNCTIONAL	
2567-005	ROBERTSHAW	**MP953D1172**		FUNCTIONAL	
2567-007	ROBERTSHAW	**V5011F1022**	WITH	FUNCTIONAL	
2567-007	ROBERTSHAW	**MP953D1107**		FUNCTIONAL	
2567-008	ROBERTSHAW	**V5011F1022**	WITH	FUNCTIONAL	
2567-008	ROBERTSHAW	**MP953F1119**		FUNCTIONAL	
2567-009	ROBERTSHAW	**V5011H1022**	WITH	FUNCTIONAL	
2567-009	ROBERTSHAW	**MP953C1000**		FUNCTIONAL	
2567-011	ROBERTSHAW	**V5011H1022**	WITH	FUNCTIONAL	
2567-011	ROBERTSHAW	**MP953C1018**		FUNCTIONAL	
2567-012	ROBERTSHAW	**V5011H1022**	WITH	FUNCTIONAL	
2567-012	ROBERTSHAW	**MP953E1327**		FUNCTIONAL	
2567-013	ROBERTSHAW	**V5011H1022**	WITH	FUNCTIONAL	
2567-013	ROBERTSHAW	**MP953C1000**		FUNCTIONAL	
2567-015	ROBERTSHAW	**V5011H1022**	WITH	FUNCTIONAL	
2567-015	ROBERTSHAW	**MP953C1018**		FUNCTIONAL	
2567-016	ROBERTSHAW	**V5011H1022**	WITH	FUNCTIONAL	
2567-016	ROBERTSHAW	**MP953E1327**		FUNCTIONAL	
2567-017	ROBERTSHAW	**V5011H1028**	WITH	FUNCTIONAL	
2567-017	ROBERTSHAW	**MP953C1000**		FUNCTIONAL	
2567-019	ROBERTSHAW	**V5011H1028**	WITH	FUNCTIONAL	
2567-019	ROBERTSHAW	**MP953C1018**		FUNCTIONAL	
2567-020	ROBERTSHAW	**V5011H1028**	WITH	FUNCTIONAL	
2567-020	ROBERTSHAW	**MP953E1327**		FUNCTIONAL	
2567-021	ROBERTSHAW	**V5011H1036**	WITH	FUNCTIONAL	
2567-021	ROBERTSHAW	**MP953C1000**		FUNCTIONAL	
2567-023	ROBERTSHAW	**V5011H1036**	WITH	FUNCTIONAL	
2567-023	ROBERTSHAW	**MP953C1018**		FUNCTIONAL	

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ITEM NUMBER	MANUFACTURER	REPLACEMENT ITEM		TYPE OF REPLACEMENT	REMARKS
2567-024	ROBERTSHAW	**V5011H1036**	WITH	FUNCTIONAL	
2567-024	ROBERTSHAW	**MP953E1327**		FUNCTIONAL	
2567-025	ROBERTSHAW	**V5011H1044**	WITH	FUNCTIONAL	
2567-025	ROBERTSHAW	**MP953C1000**		FUNCTIONAL	
2567-027	ROBERTSHAW	**V5011H1044**	WITH	FUNCTIONAL	
2567-027	ROBERTSHAW	**MP953C1018**		FUNCTIONAL	
2567-028	ROBERTSHAW	**V5011H1044**	WITH	FUNCTIONAL	
2567-028	ROBERTSHAW	**MP953E1327**		FUNCTIONAL	
2567-029	ROBERTSHAW	**V5011H1089**	WITH	FUNCTIONAL	
2567-029	ROBERTSHAW	**MP953D1172**		FUNCTIONAL	
2567-031	ROBERTSHAW	**V5011H1089**	WITH	FUNCTIONAL	
2567-031	ROBERTSHAW	**MP953D1107**		FUNCTIONAL	
2567-032	ROBERTSHAW	**V5011H1089**	WITH	FUNCTIONAL	
2567-032	ROBERTSHAW	**MP953F1119**		FUNCTIONAL	
2567-033	ROBERTSHAW	**V5011H1097**	WITH	FUNCTIONAL	
2567-033	ROBERTSHAW	**MP953D1172**		FUNCTIONAL	
2567-035	ROBERTSHAW	**V5011H1097**	WITH	FUNCTIONAL	
2567-035	ROBERTSHAW	**MP953D1107**		FUNCTIONAL	
2567-036	ROBERTSHAW	**V5011H1097**	WITH	FUNCTIONAL	
2567-036	ROBERTSHAW	**MP953F1119**		FUNCTIONAL	
2568-003	ROBERTSHAW	**V5011F1014**	WITH	FUNCTIONAL	
2568-003	ROBERTSHAW	**MP953C1018**		FUNCTIONAL	
2568-004	ROBERTSHAW	**V5011F1014**	WITH	FUNCTIONAL	
2568-004	ROBERTSHAW	**MP953C1000**		FUNCTIONAL	
2568-005	ROBERTSHAW	**V5011F1014**	WITH	FUNCTIONAL	
2568-005	ROBERTSHAW	**MP953E1327**		FUNCTIONAL	
2568-008	ROBERTSHAW	**V5011F1022**	WITH	FUNCTIONAL	
2568-008	ROBERTSHAW	**MP953C1018**		FUNCTIONAL	
2568-009	ROBERTSHAW	**V5011F1022**	WITH	FUNCTIONAL	
2568-009	ROBERTSHAW	**MP953C1000**		FUNCTIONAL	
2568-010	ROBERTSHAW	**V5011F1022**	WITH	FUNCTIONAL	
2568-010	ROBERTSHAW	**MP953E1327**		FUNCTIONAL	
2568-013	ROBERTSHAW	**V5011F1030**	WITH	FUNCTIONAL	
2568-013	ROBERTSHAW	**MP953C1018**		FUNCTIONAL	
2568-014	ROBERTSHAW	**V5011F1030**	WITH	FUNCTIONAL	
2568-014	ROBERTSHAW	**MP953C1000**		FUNCTIONAL	
2568-015	ROBERTSHAW	**V5011F1030**	WITH	FUNCTIONAL	
2568-015	ROBERTSHAW	**MP953E1327**		FUNCTIONAL	
2568-018	ROBERTSHAW	**V5011F1055**	WITH	FUNCTIONAL	
2568-018	ROBERTSHAW	**MP953C1018**		FUNCTIONAL	
2568-019	ROBERTSHAW	**V5011F1055**	WITH	FUNCTIONAL	
2568-019	ROBERTSHAW	**MP953C1000**		FUNCTIONAL	
2568-020	ROBERTSHAW	**V5011F1055**	WITH	FUNCTIONAL	
2568-020	ROBERTSHAW	**MP953E1327**		FUNCTIONAL	
2568-023	ROBERTSHAW	**V5011F1063**	WITH	FUNCTIONAL	
2568-023	ROBERTSHAW	**MP953C1018**		FUNCTIONAL	
2568-024	ROBERTSHAW	**V5011F1063**	WITH	FUNCTIONAL	
2568-024	ROBERTSHAW	**MP953C1000**		FUNCTIONAL	
2568-025	ROBERTSHAW	**V5011F1063**	WITH	FUNCTIONAL	
2568-025	ROBERTSHAW	**MP953E1327**		FUNCTIONAL	

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ITEM NUMBER	MANUFACTURER	REPLACEMENT ITEM		TYPE OF REPLACEMENT	REMARKS
2568-028	ROBERTSHAW	**V5011F1071**	WITH	FUNCTIONAL	
2568-028	ROBERTSHAW	**MP953C1018**		FUNCTIONAL	
2568-029	ROBERTSHAW	**V5011F1071**	WITH	FUNCTIONAL	
2568-029	ROBERTSHAW	**MP953C1000**		FUNCTIONAL	
2568-030	ROBERTSHAW	**V5011F1071**	WITH	FUNCTIONAL	
2568-030	ROBERTSHAW	**MP953E1327**		FUNCTIONAL	
2568-033	ROBERTSHAW	**V5011F1089**	WITH	FUNCTIONAL	
2568-033	ROBERTSHAW	**MP953C1018**		FUNCTIONAL	
2568-034	ROBERTSHAW	**V5011F1089**	WITH	FUNCTIONAL	
2568-034	ROBERTSHAW	**MP953C1000**		FUNCTIONAL	
2568-035	ROBERTSHAW	**V5011F1089**	WITH	FUNCTIONAL	
2568-035	ROBERTSHAW	**MP953E1327**		FUNCTIONAL	
2568-038	ROBERTSHAW	**V5011F1097**	WITH	FUNCTIONAL	
2568-038	ROBERTSHAW	**MP953C1018**		FUNCTIONAL	
2568-039	ROBERTSHAW	**V5011F1097**	WITH	FUNCTIONAL	
2568-039	ROBERTSHAW	**MP953C1000**		FUNCTIONAL	
2568-040	ROBERTSHAW	**V5011F1097**	WITH	FUNCTIONAL	
2568-040	ROBERTSHAW	**MP953E1327**		FUNCTIONAL	
256-9	POWERS/LANDIS & GYR	**SP955A1046**		FUNCTIONAL	
2569-001	ROBERTSHAW	**VP522A1005**		FUNCTIONAL	
2569-002	ROBERTSHAW	**VP522B1003**		FUNCTIONAL	
2569-003	ROBERTSHAW	**VP522A1039**		FUNCTIONAL	
2569-004	ROBERTSHAW	**VP522B1011**		FUNCTIONAL	
2569-005	ROBERTSHAW	**VP522A1047**		FUNCTIONAL	
2569-006	ROBERTSHAW	**VP522B1029**		FUNCTIONAL	
2580-002	ROBERTSHAW	**VP525A1416**	OR	FUNCTIONAL	
2580-002	ROBERTSHAW	**VP531A1012**		FUNCTIONAL	
2580-003	ROBERTSHAW	**VP531A1004**	OR	FUNCTIONAL	
2580-003	ROBERTSHAW	**VP525A1416**		FUNCTIONAL	
2580-004	ROBERTSHAW	**VP531A1012**	OR	FUNCTIONAL	
2580-004	ROBERTSHAW	**VP525A1077**		FUNCTIONAL	
2580-005	ROBERTSHAW	**VP525A1119**	OR	FUNCTIONAL	
2580-005	ROBERTSHAW	**VP531A1020**		FUNCTIONAL	
2580-006	ROBERTSHAW	**VP525A1101**	OR	FUNCTIONAL	
2580-006	ROBERTSHAW	**VP531A1038**		FUNCTIONAL	
2580-007	ROBERTSHAW	**VP531A1046**	OR	FUNCTIONAL	
2580-007	ROBERTSHAW	**VP535A1200**		FUNCTIONAL	
2580-008	ROBERTSHAW	**VP525A1192**	OR	FUNCTIONAL	
2580-008	ROBERTSHAW	**VP531A1053**		FUNCTIONAL	
2580-009	ROBERTSHAW	**VP525A1200**		FUNCTIONAL	
2580-010	ROBERTSHAW	**VP525A1192**		FUNCTIONAL	
2581-005	ROBERTSHAW	**VP525A1135**		FUNCTIONAL	
2581-006	ROBERTSHAW	**VP525A1127**		FUNCTIONAL	
2581-008	ROBERTSHAW	**VP525A1168**		FUNCTIONAL	
2581-009	ROBERTSHAW	**VP525A1226**		FUNCTIONAL	
2581-010	ROBERTSHAW	**VP525A1218**		FUNCTIONAL	
2582-002	ROBERTSHAW	**VP527A1059**		FUNCTIONAL	
2582-004	ROBERTSHAW	**VP527A1059**		FUNCTIONAL	
2582-006	ROBERTSHAW	**VP527A1075**		FUNCTIONAL	
2582-008	ROBERTSHAW	**VP527A1067**		FUNCTIONAL	

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ITEM NUMBER	MANUFACTURER	REPLACEMENT ITEM		TYPE OF REPLACEMENT	REMARKS
2583-002	ROBERTSHAW	**VP526A1118**		FUNCTIONAL	
2583-003	ROBERTSHAW	**VP526A1092**		FUNCTIONAL	
269-1066	POWERS/LANDIS & GYR	**PP92B1019**		FUNCTIONAL	
269-1067	POWERS/LANDIS & GYR	**PP92B1035**	OR	FUNCTIONAL	
269-1067	POWERS/LANDIS & GYR	**PP92B1019**		FUNCTIONAL	
310248C		**NONE**		NONE	
310331/0605		**NONE**		NONE	
310502/0767		**NO REPLACEMENT**		NONE	
3107-BY		**AP3422A**		FUNCTIONAL	
3107-BZ		**AP3422A**		FUNCTIONAL	
311093A		**HOLDER IS PART OF 14002694-006 or 14002694-008 MERCHANDISE ASSEMBLY**			
311093B		**HOLDER IS PART OF 14002864-001 MERCHANDISE ASSEMBLY**			
311094A	MIRCOSWITCH	**14002695-006**		FUNCTIONAL	
311094B		**HOLDER IS PART OF 14002863-001 MERCHANDISE ASSEMBLY**			
311936A		**NONE**		NONE	
311993A		**NONE**		NONE	
313220/0062		**NO REPLACEMENT**		NONE	
313824D	HONEYWELL	**NO REPLACEMENT**		NONE	
314249D	HONEYWELL	**309389J**		FUNCTIONAL	
314615/0034		**NONE**		NONE	
31-4854	FEDDERS	**T6031F1010**		FUNCTIONAL	
314959A		**NO REPLACEMENT**		NONE	
315046C		**NO REPLACEMENT**		NONE	
315161A		**NO REPLACEMENT**		NONE	
315178/0062		**NO REPLACEMENT**		NONE	
315321E		**NO REPLACEMENT**		NONE	
315321N		**NONE**		NONE	
315944/0062		**NONE**		NONE	
315993A		**NO REPLACEMENT**		NONE	
316016E		**NONE**		NONE	
316027-00042		**316027/0042**		DIRECT	
316298/0021		**NO REPLACEMENT**		NONE	
316372/0021		**NO REPLACEMENT**		NONE	
316372A		**NONE**		NONE	
31-6617	CARRIER	**T651A1269**		FUNCTIONAL	
316731/0021		**NONE**		NONE	
317086A	HONEYWELL	**NO REPLACEMENT**		NONE	
317086E	HONEYWELL	**NO REPLACEMENT**		NONE	
317086F	HONEYWELL	**NO REPLACEMENT**		NONE	
317086G	HONEYWELL	**NO REPLACEMENT**		NONE	
317086H	HONEYWELL	**NO REPLACEMENT**		NONE	
317086J	HONEYWELL	**NO REPLACEMENT**		NONE	
317086L	HONEYWELL	**NO REPLACEMENT**		NONE	
317086M	HONEYWELL	**NO REPLACEMENT**		NONE	
317086N	HONEYWELL	**NO REPLACEMENT**		NONE	
317086P	HONEYWELL	**NO REPLACEMENT**		NONE	
656-0005	POWERS/LANDIS & GYR	**VP525A1200**		FUNCTIONAL	
657-6290	POWERS/LANDIS & GYR	**NO REPLACEMENT**		NONE	
657-768	POWERS/LANDIS & GYR	**NO REPLACEMENT**		NONE	
657-769	POWERS/LANDIS & GYR	**NO REPLACEMENT**		NONE	

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ITEM NUMBER	MANUFACTURER	REPLACEMENT ITEM		TYPE OF REPLACEMENT	REMARKS
657-7720	POWERS/LANDIS & GYR	**VP512A1767**		FUNCTIONAL	
657-7740	POWERS/LANDIS & GYR	**VP512A1783**		FUNCTIONAL	
657-7890	POWERS/LANDIS & GYR	**NO REPLACEMENT**		NONE	
657-8206	POWERS/LANDIS & GYR	**NO REPLACEMENT**		NONE	
657-8210	POWERS/LANDIS & GYR	**NO REPLACEMENT**		NONE	
657-8216	POWERS/LANDIS & GYR	**NO REPLACEMENT**		NONE	
657-8217	POWERS/LANDIS & GYR	**NO REPLACEMENT**		NONE	
657-8218	POWERS/LANDIS & GYR	**VP512A1726**		FUNCTIONAL	
657-8219	POWERS/LANDIS & GYR	**VP512A1213**	OR	FUNCTIONAL	
657-8219	POWERS/LANDIS & GYR	**VP525A1077**		FUNCTIONAL	
657-8220	POWERS/LANDIS & GYR	**VP525A1127**		FUNCTIONAL	
657-8221	POWERS/LANDIS & GYR	**VP512A1700**	OR	FUNCTIONAL	
657-8221	POWERS/LANDIS & GYR	**VP525A1218**		FUNCTIONAL	
657-8222	POWERS/LANDIS & GYR	**VP512A1742**		FUNCTIONAL	
657-8224	POWERS/LANDIS & GYR	**V5013F1004**		FUNCTIONAL	
657-8225	POWERS/LANDIS & GYR	**V5013F1020**	OR	FUNCTIONAL	
657-8225	POWERS/LANDIS & GYR	**MP953C1018**		FUNCTIONAL	
657-8227	POWERS/LANDIS & GYR	**VP522A1005**		FUNCTIONAL	
657-8228	POWERS/LANDIS & GYR	**VP522A1005**		FUNCTIONAL	
657-8233	POWERS/LANDIS & GYR	**NO REPLACEMENT**		NONE	
658-0002	POWERS/LANDIS & GYR	**VP531A1020**		FUNCTIONAL	
658-0005	POWERS/LANDIS & GYR	**VP531A1188**		FUNCTIONAL	
658-0008	POWERS/LANDIS & GYR	**VP525A1135**		FUNCTIONAL	
658-0010	POWERS/LANDIS & GYR	**VP512A1700**		FUNCTIONAL	
658-0012	POWERS/LANDIS & GYR	**VP512A1742**		FUNCTIONAL	
658-0014	POWERS/LANDIS & GYR	**VP512A1783**		FUNCTIONAL	
658-0018	POWERS/LANDIS & GYR	**VP512A1213**		FUNCTIONAL	
658-0019	POWERS/LANDIS & GYR	**VP512A1643**		FUNCTIONAL	
658-0020	POWERS/LANDIS & GYR	**VP512A1684**		FUNCTIONAL	
658-0021	POWERS/LANDIS & GYR	**VP512A1726**		FUNCTIONAL	
658-0022	POWERS/LANDIS & GYR	**VP512A1767**		FUNCTIONAL	
658-0026	POWERS/LANDIS & GYR	**V5013F1004**	OR	FUNCTIONAL	
658-0026	POWERS/LANDIS & GYR	**MP953C1000**		FUNCTIONAL	
658-0028	POWERS/LANDIS & GYR	**V5013F1020**	OR	FUNCTIONAL	
658-0028	POWERS/LANDIS & GYR	**MP953C1000**		FUNCTIONAL	
658-0050	POWERS/LANDIS & GYR	**VP522A1005**		FUNCTIONAL	
658-0051	POWERS/LANDIS & GYR	**VP522A1039**		FUNCTIONAL	
658-0052	POWERS/LANDIS & GYR	**VP522B1011**		FUNCTIONAL	
782-4	POWERS/LANDIS & GYR	**RP470A1003**		FUNCTIONAL	
908-048	POWERS/LANDIS & GYR	**PP902C1009**		FUNCTIONAL	
908-049	POWERS/LANDIS & GYR	**PP902D1007**		FUNCTIONAL	
A4000	JOHNSON CONTROLS	**PP902D1007**		FUNCTIONAL	
A4000-127	JOHNSON CONTROLS	**PP902C1009**		FUNCTIONAL	
A404A	HONEYWELL	**P658A1013**		FUNCTIONAL	
A421-100	JOHNSON CONTROLS	**AK3470B**	WITH	FUNCTIONAL	
A421-100	JOHNSON CONTROLS	**AK3485D**		FUNCTIONAL	
AK40401	BARBER COLMAN	**RP670A1001**	OR	FUNCTIONAL	
AK40401	BARBER COLMAN	**RP670A1019**	OR	FUNCTIONAL	
AK40401	BARBER COLMAN	**RP670A1027**	OR	FUNCTIONAL	
AK40401	BARBER COLMAN	**RP670A1035**		FUNCTIONAL	

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ITEM NUMBER	MANUFACTURER	REPLACEMENT ITEM		TYPE OF REPLACEMENT	REMARKS
AK40603	BARBER COLMAN	**RP970A1008**	OR	FUNCTIONAL	
AK40603	BARBER COLMAN	**RP970A1016**		FUNCTIONAL	
AK40605	BARBER COLMAN	**SP970A1005**		FUNCTIONAL	
AK40613	BARBER COLMAN	**RP972A1006**	OR	FUNCTIONAL	
AK40613	BARBER COLMAN	**RP972A1030**		FUNCTIONAL	
AK50401	BARBER COLMAN	**RP670A1001**	OR	FUNCTIONAL	
AK50401	BARBER COLMAN	**RP670A1019**	OR	FUNCTIONAL	
AK50401	BARBER COLMAN	**RP670A1027**	OR	FUNCTIONAL	
AK50401	BARBER COLMAN	**RP670A1035**		FUNCTIONAL	
AK50603	BARBER COLMAN	**RP970A1008**	OR	FUNCTIONAL	
AK50603	BARBER COLMAN	**RP970A1016**		FUNCTIONAL	
AK50604	BARBER COLMAN	**SP970A1005**		FUNCTIONAL	
AK50605	BARBER COLMAN	**SP970A1005**		FUNCTIONAL	
AK50607	BARBER COLMAN	**SP970A1005**		FUNCTIONAL	
AK50613	BARBER COLMAN	**RP972A1006**		FUNCTIONAL	
AK50703	BARBER COLMAN	**RP971A1015**		FUNCTIONAL	
AK51306	BARBER COLMAN	**RP973A1005**		FUNCTIONAL	
AK51332	BARBER COLMAN	**RP470A1003**	OR	FUNCTIONAL	
AK51332	BARBER COLMAN	**RP470A1011**		FUNCTIONAL	
AK51342	BARBER COLMAN	**RP970B1001**		FUNCTIONAL	
AK51632	BARBER COLMAN	**RP470A1003**	OR	FUNCTIONAL	
AK51632	BARBER COLMAN	**RP470A1011**		FUNCTIONAL	
AK51642	BARBER COLMAN	**RP470B1001**		FUNCTIONAL	
AK51832	BARBER COLMAN	**RP913A1008**		FUNCTIONAL	
AK51842	BARBER COLMAN	**RP913A1008**		FUNCTIONAL	
AK52032	BARBER COLMAN	**RP913A1008**		FUNCTIONAL	
AK52042	BARBER COLMAN	**RP913A1008**		FUNCTIONAL	
AL100	BARBER COLMAN	**RP818A1004**		FUNCTIONAL	
AL110	BARBER COLMAN	**RP418A1107**		FUNCTIONAL	
AL120	BARBER COLMAN	**RP418A1081**		FUNCTIONAL	
AL125	BARBER COLMAN	**RP418A1099**		FUNCTIONAL	
AL140	BARBER COLMAN	**RP418A1065**		FUNCTIONAL	
AL161-4	BARBER COLMAN	**VP519C1006**		FUNCTIONAL	
AL202	BARBER COLMAN	**RP471A1002**	OR	FUNCTIONAL	
AL202	BARBER COLMAN	**RP471A1010**		FUNCTIONAL	
AL204	BARBER COLMAN	**RP471A1002**	OR	FUNCTIONAL	
AL204	BARBER COLMAN	**RP471A1010**		FUNCTIONAL	
AL2201	BARBER COLMAN	**RP470A1000**		FUNCTIONAL	
AL225	BARBER COLMAN	**SP970A1005**		FUNCTIONAL	
AL230	BARBER COLMAN	**SP970A1005**		FUNCTIONAL	
AL231	BARBER COLMAN	**SP470A1018**		FUNCTIONAL	
AL233	BARBER COLMAN	**SP470A1005**		FUNCTIONAL	
AL2401	BARBER COLMAN	**SP470A1018**		FUNCTIONAL	
AL241	BARBER COLMAN	**SP970A1005**		FUNCTIONAL	
AL242	BARBER COLMAN	**RP972A1006**		FUNCTIONAL	
AL246	BARBER COLMAN	**RP971A1015**		FUNCTIONAL	
AL291	BARBER COLMAN	**SP970A1005**		FUNCTIONAL	
AL292	BARBER COLMAN	**SP970A1005**		FUNCTIONAL	
AL483	BARBER COLMAN	**PP901A1004**		FUNCTIONAL	
AP2	POWERS/LANDIS & GYR	**P658A1013**		FUNCTIONAL	

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ITEM NUMBER	MANUFACTURER	REPLACEMENT ITEM		TYPE OF REPLACEMENT	REMARKS
AP3	POWERS/LANDIS & GYR	**P658A1013**		FUNCTIONAL	
AP910A1700	HONEYWELL	**TP970A2053**		FUNCTIONAL	
AP910A1718	HONEYWELL	**TP970A2053**		FUNCTIONAL	
C101	JOHNSON CONTROLS	**RP471A1002**	OR	FUNCTIONAL	
C101	JOHNSON CONTROLS	**RP471A1010**		FUNCTIONAL	
C104	JOHNSON CONTROLS	**RP973A1002**	OR	FUNCTIONAL	
C104	JOHNSON CONTROLS	**RP973A1013**		FUNCTIONAL	
C108	JOHNSON CONTROLS	**RP970A1008**	OR	FUNCTIONAL	
C108	JOHNSON CONTROLS	**RP970A1016**		FUNCTIONAL	
C120	JOHNSON CONTROLS	**RP470A1003**	OR	FUNCTIONAL	
C120	JOHNSON CONTROLS	**RP470B1001**		FUNCTIONAL	
C122	JOHNSON CONTROLS	**RP470A1003**	OR	FUNCTIONAL	
C122	JOHNSON CONTROLS	**RP470B1001**		FUNCTIONAL	
C202	JOHNSON CONTROLS	**RP971A1015**		FUNCTIONAL	
C204	JOHNSON CONTROLS	**RP973A1005**	OR	FUNCTIONAL	
C204	JOHNSON CONTROLS	**RP973A1013**		FUNCTIONAL	
C2040	JOHNSON CONTROLS	**RP973A1005**	OR	FUNCTIONAL	
C2040	JOHNSON CONTROLS	**RP973A1013**		FUNCTIONAL	
C208	JOHNSON CONTROLS	**RP970A1008**	OR	FUNCTIONAL	
C208	JOHNSON CONTROLS	**RP970B1016**		FUNCTIONAL	
C208-2	JOHNSON CONTROLS	**RP972A1006**	OR	FUNCTIONAL	
C208-2	JOHNSON CONTROLS	**RP972A1030**		FUNCTIONAL	
C220	JOHNSON CONTROLS	**RP913A1008**		FUNCTIONAL	
C2220	JOHNSON CONTROLS	**RP913A1008**		FUNCTIONAL	
C5222-1	JOHNSON CONTROLS	**RP970A1008**		FUNCTIONAL	
C5222-3	JOHNSON CONTROLS	**RP971A1007**	OR	FUNCTIONAL	
C5222-3	JOHNSON CONTROLS	**RP971A1015**		FUNCTIONAL	
C5226	JOHNSON CONTROLS	**RP470A1003**	OR	FUNCTIONAL	
C5226	JOHNSON CONTROLS	**RP470B1001**		FUNCTIONAL	
C9200	JOHNSON CONTROLS	**RP971A1007**	OR	FUNCTIONAL	
C9200	JOHNSON CONTROLS	**RP971A1015**		FUNCTIONAL	
C9500-1	JOHNSON CONTROLS	**RP471A1002**	OR	FUNCTIONAL	
C9500-1	JOHNSON CONTROLS	**RP471A1010**		FUNCTIONAL	
C9506	JOHNSON CONTROLS	**RP471A1002**	OR	FUNCTIONAL	
C9506	JOHNSON CONTROLS	**RP471A1010**		FUNCTIONAL	
CCC-1001-2	KREUTER	**RP920A1033**	OR	FUNCTIONAL	
CCC-1001-2	KREUTER	**RP920A1041**	OR	FUNCTIONAL	
CCC-1001-2	KREUTER	**RP920B1056**		FUNCTIONAL	
CCT1112		**NO REPLACEMENT**		NONE	
CCT1406		**NO REPLACEMENT**		NONE	
CCT1415		**NO REPLACEMENT**		NONE	
CCT1451T		**NO REPLACEMENT**		NONE	
CCT1499T		**NO REPLACEMENT**		NONE	
CCT1501T		**NO REPLACEMENT**		NONE	
CCT1502T		**NO REPLACEMENT**		NONE	
CCT1537		**NO REPLACEMENT**		NONE	
CCT1539		**NO REPLACEMENT**		NONE	
CCT1551T		**NO REPLACEMENT**		NONE	
CCT1625		**NO REPLACEMENT**		NONE	
CCT2190		**NO REPLACEMENT**		NONE	

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ITEM NUMBER	MANUFACTURER	REPLACEMENT ITEM		TYPE OF REPLACEMENT	REMARKS
CCT2511		**NONE**		NONE	
CCT2654C		**NONE**		NONE	
CCT3428		**NONE**		NONE	
CCT3863	HONEYWELL	**AK3863**		DIRECT	
CCT729	HONEYWELL	**CCT729A**		DIRECT	
CCT800	HONEYWELL	**MQP800**		DIRECT	
CCT811B		**NONE**		NONE	
CCT817D		**NONE**		NONE	
CP980A	HONEYWELL	**NO REPLACEMENT**		NONE	
CP980B	HONEYWELL	**NO REPLACEMENT**		NONE	
CP980C	HONEYWELL	**NO REPLACEMENT**		NONE	
CP980C1008	HONEYWELL	**CP980C1065**	WITH	DIRECT	
CP980C1008	HONEYWELL	**14003642-002**		DIRECT	
CP980C1016	HONEYWELL	**CP980C1065**	WITH	DIRECT	
CP980C1016	HONEYWELL	**14003642-001**		DIRECT	
CP980C1024	HONEYWELL	**CP980C1065**	WITH	DIRECT	
CP980C1024	HONEYWELL	**14003642-003**		DIRECT	
CP980C1032	HONEYWELL	**CP980C1065**	WITH	DIRECT	
CP980C1032	HONEYWELL	**14003642-004**		DIRECT	
CP980C1040	HONEYWELL	**CP980C1065**	WITH	DIRECT	
CP980C1040	HONEYWELL	**14003749-001**		DIRECT	
CP980C1057	HONEYWELL	**CP980C1065**	WITH	DIRECT	
CP980C1057	HONEYWELL	**14003749-002**		DIRECT	
CP980D	HONEYWELL	**NO REPLACEMENT**		NONE	
CP980D1006	HONEYWELL	**CP980D1063**	WITH	DIRECT	
CP980D1006	HONEYWELL	**14003642-002**		DIRECT	
CP980D1014	HONEYWELL	**CP980D1063**	WITH	DIRECT	
CP980D1014	HONEYWELL	**14003642-001**		DIRECT	
CP980D1022	HONEYWELL	**CP980D1063**	WITH	DIRECT	
CP980D1022	HONEYWELL	**14003642-003**		DIRECT	
CP980D1030	HONEYWELL	**CP980D1063**	WITH	DIRECT	
CP980D1030	HONEYWELL	**14003642-004**		DIRECT	
CP980D1048	HONEYWELL	**CP980D1063**	WITH	DIRECT	
CP980D1048	HONEYWELL	**14003749-001**		DIRECT	
CP980D1055	HONEYWELL	**CP980D1063**	WITH	DIRECT	
CP980D1055	HONEYWELL	**14003749-002**		DIRECT	
CP980E	HONEYWELL	**NO REPLACEMENT**		NONE	
CP980E1003	HONEYWELL	**CP980E1060**	WITH	DIRECT	
CP980E1003	HONEYWELL	**14003642-002**		DIRECT	
CP980E1011	HONEYWELL	**CP980E1060**	WITH	DIRECT	
CP980E1011	HONEYWELL	**14003642-001**		DIRECT	
CP980E1029	HONEYWELL	**CP980E1060**	WITH	DIRECT	
CP980E1029	HONEYWELL	**14003642-003**		DIRECT	
CP980E1037	HONEYWELL	**CP980E1060**	WITH	DIRECT	
CP980E1037	HONEYWELL	**14003642-004**		DIRECT	
CP980E1045	HONEYWELL	**CP980E1060**	WITH	FUNCTIONAL	
CP980E1045	HONEYWELL	**14003749-001**		FUNCTIONAL	
CP980E1052	HONEYWELL	**CP980E1060**	WITH	DIRECT	
CP980E1052	HONEYWELL	**14003749-002**		DIRECT	
CP980F	HONEYWELL	**NO REPLACEMENT**		NONE	

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ITEM NUMBER	MANUFACTURER	REPLACEMENT ITEM		TYPE OF REPLACEMENT	REMARKS
CP980F1001	HONEYWELL	**CP980F1068**	WITH	DIRECT	
CP980F1001	HONEYWELL	**14003642-002**		DIRECT	
CP980F1019	HONEYWELL	**CP980F1068**	WITH	DIRECT	
CP980F1019	HONEYWELL	**14003642-001**		DIRECT	
CP980F1027	HONEYWELL	**CP980F1068**	WITH	DIRECT	
CP980F1027	HONEYWELL	**14003642-003**		DIRECT	
CP980F1035	HONEYWELL	**CP980F1068**	WITH	DIRECT	
CP980F1035	HONEYWELL	**14003642-004**		DIRECT	
CP980F1043	HONEYWELL	**CP980F1068**	WITH	DIRECT	
CP980F1043	HONEYWELL	**14003749-001**		DIRECT	
CP980F1050	HONEYWELL	**CP980F1068**	WITH	DIRECT	
CP980F1050	HONEYWELL	**14003749-002**		DIRECT	
CP981A	HONEYWELL	**NO REPLACEMENT**		NONE	
CP981A1001		**PP905B1008 and a RP920**		FUNCTIONAL	
CP981B	HONEYWELL	**NO REPLACEMENT**		NONE	
CP981B1009	HONEYWELL	**NO REPLACEMENT**		NONE	
CP983A	HONEYWELL	**NO REPLACEMENT**		NONE	
CP983A1009	HONEYWELL	**NO REPLACEMENT**		NONE	
D101	JOHNSON CONTROLS	**MP909D1201**	OR	FUNCTIONAL	
D101	JOHNSON CONTROLS	**MP909D1219**	OR	FUNCTIONAL	
D101	JOHNSON CONTROLS	**MP909D1227**		FUNCTIONAL	
D103	JOHNSON CONTROLS	**MP909E1083**	OR	FUNCTIONAL	
D103	JOHNSON CONTROLS	**MP909E1174**		FUNCTIONAL	
D251	JOHNSON CONTROLS	**MP909D1201**	OR	FUNCTIONAL	
D251	JOHNSON CONTROLS	**MP909D1219**	OR	FUNCTIONAL	
D251	JOHNSON CONTROLS	**MP909D1227**		FUNCTIONAL	
D251(4)	JOHNSON CONTROLS	**MP918B1030**	OR	FUNCTIONAL	
D251(4)	JOHNSON CONTROLS	**MP918B1113**	OR	FUNCTIONAL	
D251(4)	JOHNSON CONTROLS	**MP918B1139**	OR	FUNCTIONAL	
D251(4)	JOHNSON CONTROLS	**MP918B1147**		FUNCTIONAL	
D251(6)	JOHNSON CONTROLS	**MP920B1002**		FUNCTIONAL	
D3031	JOHNSON CONTROLS	**NO REPLACEMENT**		NONE	
D3031-3	JOHNSON CONTROLS	**MP913A1052**		FUNCTIONAL	
D3070-1	JOHNSON CONTROLS	**MP516A1087**		FUNCTIONAL	
D3073-2	JOHNSON CONTROLS	**MP909E1174**		FUNCTIONAL	
D3073-3	JOHNSON CONTROLS	**MP909E1034**		FUNCTIONAL	
D3073-7	JOHNSON CONTROLS	**MP909E1083**		FUNCTIONAL	
D3153-2	JOHNSON CONTROLS	**MP918B1089**		FUNCTIONAL	
D3153-3	JOHNSON CONTROLS	**MP918B1048**		FUNCTIONAL	
G7185	JOHNSON CONTROLS	**SP955A1046**		FUNCTIONAL	
H102	JOHNSON CONTROLS	**HP970A1009**	OR	FUNCTIONAL	
H102	JOHNSON CONTROLS	**HP970B1007**		FUNCTIONAL	
H103	JOHNSON CONTROLS	**HP970A1009**	OR	FUNCTIONAL	
H103	JOHNSON CONTROLS	**HP970B1007**		FUNCTIONAL	
H104	JOHNSON CONTROLS	**RP471A1002**		FUNCTIONAL	
H105	JOHNSON CONTROLS	**HP970A1009**	OR	FUNCTIONAL	
H105	JOHNSON CONTROLS	**HP970B1007**		FUNCTIONAL	
H18	ROBERTSHAW	**HP972A1009**		FUNCTIONAL	
H3610-1002	JOHNSON CONTROLS	**HP970B1015**		FUNCTIONAL	
H4100-201	JOHNSON CONTROLS	**HP970A1009**		FUNCTIONAL	

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ITEM NUMBER	MANUFACTURER	REPLACEMENT ITEM		TYPE OF REPLACEMENT	REMARKS
H4100-203	JOHNSON CONTROLS	**HP970B1007**		FUNCTIONAL	
H5100	JOHNSON CONTROLS	**HP971A1008**		FUNCTIONAL	
HDREMOTE	POWERS/LANDIS & GYR	**LP916A1134**		FUNCTIONAL	
HK18	BARBER COLMAN	**HP970B1007**		FUNCTIONAL	
HKS5033	BARBER COLMAN	**HP971A1024**		FUNCTIONAL	
HO9000A	HONEYWELL	**HP970A1009**		FUNCTIONAL	
HO9000B	HONEYWELL	**HP970B1007**		FUNCTIONAL	
HP2234	ROBERTSHAW	**HP973A1006**		FUNCTIONAL	
HP900A	HONEYWELL	**HP970A1009**		FUNCTIONAL	
HP900B	HONEYWELL	**HP970B1007**		FUNCTIONAL	
HP901	HONEYWELL	**HP971A1008**		FUNCTIONAL	
HP970A	HONEYWELL	**NO REPLACEMENT**		NONE	
HP970B	HONEYWELL	**NO REPLACEMENT**		NONE	
HP971A	HONEYWELL	**NO REPLACEMENT**		NONE	
HP971A1016	HONEYWELL	**HP971A1024**		FUNCTIONAL	
HP972B	HONEYWELL	**NO REPLACEMENT**		NONE	
HP972B1013	HONEYWELL	**HP972B1005**	WITH	FUNCTIONAL	
HP972B1013	HONEYWELL	**14004406-800**	WITH	FUNCTIONAL	
HP972B1013	HONEYWELL	**14002573-001**	WITH	FUNCTIONAL	
HP972B1013	HONEYWELL	**14002913-001**		FUNCTIONAL	
HP973A	HONEYWELL	**NO REPLACEMENT**		NONE	
HT186	POWERS/LANDIS & GYR	**HP971A1008**		FUNCTIONAL	
HT186D	POWERS/LANDIS & GYR	**HP971A1008**		FUNCTIONAL	
HT190	POWERS/LANDIS & GYR	**HP971A1008**		FUNCTIONAL	
HU186D	POWERS/LANDIS & GYR	**HP970A1009**		FUNCTIONAL	
HU186R	POWERS/LANDIS & GYR	**HP970B1007**		FUNCTIONAL	
LO900A	HONEYWELL	**NO REPLACEMENT**		NONE	
LO900B	HONEYWELL	**NO REPLACEMENT**		NONE	
LO900C	HONEYWELL	**NO REPLACEMENT**		NONE	
LO901A	HONEYWELL	**NO REPLACEMENT**		NONE	
LO901B	HONEYWELL	**NO REPLACEMENT**		NONE	
LO902A	HONEYWELL	**NO REPLACEMENT**		NONE	
LO902B	HONEYWELL	**NO REPLACEMENT**		NONE	
LO904A	HONEYWELL	**NO REPLACEMENT**		NONE	
LO904B	HONEYWELL	**NO REPLACEMENT**		NONE	
LO904C	HONEYWELL	**NO REPLACEMENT**		NONE	
LO906A	HONEYWELL	**NO REPLACEMENT**		NONE	
LO907A	HONEYWELL	**NO REPLACEMENT**		NONE	
LO90A	HONEYWELL	**NO REPLACEMENT**		NONE	
LO90B	HONEYWELL	**NO REPLACEMENT**		NONE	
LO91A	HONEYWELL	**NO REPLACEMENT**		NONE	
LO92A	HONEYWELL	**NO REPLACEMENT**		NONE	
LO92B	HONEYWELL	**NO REPLACEMENT**		NONE	
LO92C	HONEYWELL	**NO REPLACEMENT**		NONE	
LO92D	HONEYWELL	**NO REPLACEMENT**		NONE	
LO92E	HONEYWELL	**NO REPLACEMENT**		NONE	
LO93A	HONEYWELL	**NO REPLACEMENT**		NONE	
LO94A	HONEYWELL	**NO REPLACEMENT**		NONE	
LO94B	HONEYWELL	**NO REPLACEMENT**		NONE	
LO94C	HONEYWELL	**NO REPLACEMENT**		NONE	

Pneumatic Product Cross Reference

ITEM NUMBER	MANUFACTURER	REPLACEMENT ITEM		TYPE OF REPLACEMENT	REMARKS
LO95A	HONEYWELL	**NO REPLACEMENT**		NONE	
LO95B	HONEYWELL	**NO REPLACEMENT**		NONE	
LO95C	HONEYWELL	**NO REPLACEMENT**		NONE	
LO97A	HONEYWELL	**NO REPLACEMENT**		NONE	
LP1	JOHNSON CONTROLS	**L4069A1078**	OR	FUNCTIONAL	
LP1	JOHNSON CONTROLS	**L4069A1060**		FUNCTIONAL	
LP900A	HONEYWELL	**NO REPLACEMENT**		NONE	
LP904A	HONEYWELL	**NO REPLACEMENT**		NONE	
LP904B	HONEYWELL	**NO REPLACEMENT**		NONE	
LP904C	HONEYWELL	**NO REPLACEMENT**		NONE	
LP906A	HONEYWELL	**NO REPLACEMENT**		NONE	
LP906A1029	HONEYWELL	**RP920A1025**		FUNCTIONAL	
LP907A	HONEYWELL	**NO REPLACEMENT**		NONE	
LP907B	HONEYWELL	**NO REPLACEMENT**		NONE	
LP909A	HONEYWELL	**NO REPLACEMENT**		NONE	
LP910A	HONEYWELL	**NO REPLACEMENT**		NONE	
LP911A	HONEYWELL	**NO REPLACEMENT**		NONE	
LP911A1022	HONEYWELL	**LP920A1039**		FUNCTIONAL	
LP913A	HONEYWELL	**NO REPLACEMENT**		NONE	
LP913B	HONEYWELL	**NO REPLACEMENT**		NONE	
LP913C	HONEYWELL	**NO REPLACEMENT**		NONE	
LP914A	HONEYWELL	**NO REPLACEMENT**		NONE	
LP914A1029	HONEYWELL	**LP914A1052**		FUNCTIONAL	
LP914A1037	MIRCOSWITCH	**LP914A1060**		FUNCTIONAL	
LP914A1102	MIRCOSWITCH	**LP914A1060**		FUNCTIONAL	
LP914A1110	MIRCOSWITCH	**LP914A1060**		FUNCTIONAL	
LP914A1151	HONEYWELL	**NO REPLACEMENT**		NONE	
LP914A1169	MIRCOSWITCH	**LP914A1011**		FUNCTIONAL	
LP914A1177	HONEYWELL	**NO REPLACEMENT**		NONE	
LP914A1185	HONEYWELL	**NO REPLACEMENT**		NONE	
LP914A1193	HONEYWELL	**NO REPLACEMENT**		NONE	
LP914A1201	HONEYWELL	**NO REPLACEMENT**		NONE	
LP914A1219	HONEYWELL	**NO REPLACEMENT**		NONE	
LP914A1227	HONEYWELL	**NO REPLACEMENT**		NONE	
LP914A1235	HONEYWELL	**NO REPLACEMENT**		NONE	
LP914A1243		**NONE**		NONE	
LP914A1250	HONEYWELL	**LP914A1011**		FUNCTIONAL	
LP915A	HONEYWELL	**NO REPLACEMENT**		NONE	
LP915A1085	HONEYWELL	**LP915A1077**		FUNCTIONAL	
LP916A	HONEYWELL	**NO REPLACEMENT**		NONE	
LP916A1092	HONEYWELL	**NO REPLACEMENT**		NONE	
LP916A1126	MIRCOSWITCH	**LP916B1082**		FUNCTIONAL	
LP916A1167	MIRCOSWITCH	**LP916A1134**		FUNCTIONAL	
LP916B	HONEYWELL	**NO REPLACEMENT**		NONE	
LP916B1058	HONEYWELL	**NO REPLACEMENT**		NONE	
LP916C	HONEYWELL	**NO REPLACEMENT**		NONE	
LP916C1049	HONEYWELL	**NO REPLACEMENT**		NONE	
LP916C1098	HONEYWELL	**LP916C1023**	WITH	FUNCTIONAL	
LP916C1098	HONEYWELL	**14002913-001**	OR	FUNCTIONAL	
LP916C1098	HONEYWELL	**14002913-004**		FUNCTIONAL	

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ITEM NUMBER	MANUFACTURER	REPLACEMENT ITEM		TYPE OF REPLACEMENT	REMARKS
LP916C1106	MIRCOSWITCH	**LP916C1023**		FUNCTIONAL	
LP920A	HONEYWELL	**NO REPLACEMENT**		NONE	
LP920B	HONEYWELL	**NO REPLACEMENT**		NONE	
LP920B1003	MIRCOSWITCH	**LP920A1005**		FUNCTIONAL	
LP920B1011	MIRCOSWITCH	**LP920A1013**		FUNCTIONAL	
LP920B1029	MIRCOSWITCH	**LP920A1021**		FUNCTIONAL	
LP92D	HONEYWELL	**NO REPLACEMENT**		NONE	
LP92E	HONEYWELL	**NO REPLACEMENT**		NONE	
LP975A	HONEYWELL	**NO REPLACEMENT**		NONE	
LP975B	HONEYWELL	**NO REPLACEMENT**		NONE	
LP97A	HONEYWELL	**NO REPLACEMENT**		NONE	
LP97A1153	HONEYWELL	**NO REPLACEMENT**		NONE	
LP97A1443	HONEYWELL	**NO REPLACEMENT**		NONE	
LP97A1757	HONEYWELL	**NO REPLACEMENT**		NONE	
LP97A1898	HONEYWELL	**NO REPLACEMENT**		NONE	
LP97A1906	HONEYWELL	**NO REPLACEMENT**		NONE	
M556-14	ROBERTSHAW	**MP920B1002**	OR	FUNCTIONAL	
M556-14	ROBERTSHAW	**14004345-001**		FUNCTIONAL	
M556-51	ROBERTSHAW	**MP920B1002**		FUNCTIONAL	
M572-2311	ROBERTSHAW	**MP909A1041**		FUNCTIONAL	
M572-3308	ROBERTSHAW	**MP909D1227**		FUNCTIONAL	
M572-5311	ROBERTSHAW	**MP909D1219**		FUNCTIONAL	
M572-6308	ROBERTSHAW	**MP913A1660**		FUNCTIONAL	
M572-8311	ROBERTSHAW	**MP909D1201**		FUNCTIONAL	
M573-2108	ROBERTSHAW	**MP909E1018**		FUNCTIONAL	
M573-2111	ROBERTSHAW	**MP909E1018**		FUNCTIONAL	
M573-3108	ROBERTSHAW	**MP909E1034**		FUNCTIONAL	
M573-5111	ROBERTSHAW	**MP909E1174**		FUNCTIONAL	
M573-8111	ROBERTSHAW	**MP909E1083**		FUNCTIONAL	
M574	ROBERTSHAW	**NO REPLACEMENT**		NONE	
M574-1211	ROBERTSHAW	**MP909H1331**	OR	FUNCTIONAL	
M574-1211	ROBERTSHAW	**MP918A1024**		FUNCTIONAL	
M583	ROBERTSHAW	**NO REPLACEMENT**		NONE	
M583-0520	ROBERTSHAW	**MP516A1087**		FUNCTIONAL	
M584	ROBERTSHAW	**MP516A1087**		FUNCTIONAL	
MK3101	BARBER COLMAN	**MP909E1083**	OR	FUNCTIONAL	
MK3101	BARBER COLMAN	**MP918B1063**		FUNCTIONAL	
MK3111	BARBER COLMAN	**MP909E1034**	OR	FUNCTIONAL	
MK3111	BARBER COLMAN	**MP918B1048**		FUNCTIONAL	
MK3121	BARBER COLMAN	**MP909E1174**	OR	FUNCTIONAL	
MK3121	BARBER COLMAN	**MP918B1097**		FUNCTIONAL	
MK3141	BARBER COLMAN	**MP909E1018**	OR	FUNCTIONAL	
MK3141	BARBER COLMAN	**MP918B1006**		FUNCTIONAL	
MK3201	BARBER COLMAN	**MP909E1083**	OR	FUNCTIONAL	
MK3201	BARBER COLMAN	**MP918B1063**		FUNCTIONAL	
MK3211	BARBER COLMAN	**MP909E1034**	OR	FUNCTIONAL	
MK3211	BARBER COLMAN	**MP918B1048**		FUNCTIONAL	
MK3221	BARBER COLMAN	**MP909E1174**	OR	FUNCTIONAL	
MK3221	BARBER COLMAN	**MP918B1063**		FUNCTIONAL	
MK4-3101	BARBER COLMAN	**MP909H1331**		FUNCTIONAL	

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ITEM NUMBER	MANUFACTURER	REPLACEMENT ITEM		TYPE OF REPLACEMENT	REMARKS
MK4-3111	BARBER COLMAN	**MP909H1331**		FUNCTIONAL	
MK4-3121	BARBER COLMAN	**MP909H1331**		FUNCTIONAL	
MK4-3141	BARBER COLMAN	**MP909H1331**		FUNCTIONAL	
MK4-3801	BARBER COLMAN	**MP909H1331**		FUNCTIONAL	
MK4-3811	BARBER COLMAN	**MP909H1331**		FUNCTIONAL	
MK4-3821	BARBER COLMAN	**MP909H1331**		FUNCTIONAL	
MK4-3841	BARBER COLMAN	**MP909H1331**		FUNCTIONAL	
MK4401	BARBER COLMAN	**MP516A1095**		FUNCTIONAL	
MK4411	BARBER COLMAN	**MP516A1103**		FUNCTIONAL	
MK4421	BARBER COLMAN	**MP909E1158**		FUNCTIONAL	
MK4451	BARBER COLMAN	**MP516A1087**		FUNCTIONAL	
MK4461	BARBER COLMAN	**MP516A1087**		FUNCTIONAL	
MK4-7101	BARBER COLMAN	**MP918A1024**		FUNCTIONAL	
MK4-7121	BARBER COLMAN	**MP918A1024**		FUNCTIONAL	
MK7101	BARBER COLMAN	**MP918B1063**		FUNCTIONAL	
MK7121	BARBER COLMAN	**MP918B1089**		FUNCTIONAL	
MO516A	HONEYWELL	**NO REPLACEMENT**		NONE	
MO900C	HONEYWELL	**NO REPLACEMENT**		NONE	
MO904A	HONEYWELL	**NO REPLACEMENT**		NONE	
MO904B	HONEYWELL	**NO REPLACEMENT**		NONE	
MO906	HONEYWELL	**NO REPLACEMENT**		NONE	
MO907	HONEYWELL	**NO REPLACEMENT**		NONE	
MO953A	HONEYWELL	**NO REPLACEMENT**		NONE	
MO953B	HONEYWELL	**NO REPLACEMENT**		NONE	
MO953C	HONEYWELL	**NO REPLACEMENT**		NONE	
MO953D	HONEYWELL	**NO REPLACEMENT**		NONE	
MP516A	HONEYWELL	**NO REPLACEMENT**		NONE	
MP516B	HONEYWELL	**NO REPLACEMENT**		NONE	
MP516B1002	HONEYWELL	**NO REPLACEMENT**		NONE	
MP516C	HONEYWELL	**NO REPLACEMENT**		NONE	
MP900A	HONEYWELL	**NO REPLACEMENT**		NONE	
MP900B	HONEYWELL	**NO REPLACEMENT**		NONE	
MP903A	HONEYWELL	**NO REPLACEMENT**		NONE	
MP903B	HONEYWELL	**NO REPLACEMENT**		NONE	
MP904A	HONEYWELL	**NO REPLACEMENT**		NONE	
MP904A1145	HONEYWELL	**MP918A1008**		FUNCTIONAL	External Only, 3 psi positioner span
MP904A1145	HONEYWELL	**MP918A1016**		FUNCTIONAL	External Only, 5 psi positioner span
MP904A1145	HONEYWELL	**MP918A1024**		FUNCTIONAL	External Only, 10 psi positioner span
MP904A1145	HONEYWELL	**MP918A1032**		FUNCTIONAL	Internal normally close only, 3 psi positioner span
MP904A1145	HONEYWELL	**MP918A1040**		FUNCTIONAL	Internal normally close only, 5 psi positioner span
MP904A1145	HONEYWELL	**MP918A1057**		FUNCTIONAL	Internal normally close only, 10 psi positioner span
MP904A1152	HONEYWELL	**MP917A1065**		FUNCTIONAL	3 psi positioner span
MP904A1152	HONEYWELL	**MP918A1073**		FUNCTIONAL	5 psi positioner span
MP904A1152	HONEYWELL	**MP918A1081**		FUNCTIONAL	10 psi positioner span
MP904A1186	HONEYWELL	**MP918A1099**		FUNCTIONAL	
MP904B	HONEYWELL	**NO REPLACEMENT**		NONE	
MP904B1028	HONEYWELL	**MP918B1006**		FUNCTIONAL	External Only
MP904B1028	HONEYWELL	**MP918B1014**		FUNCTIONAL	Internal normally closed only
MP904B1093	HONEYWELL	**MP918B1063**		FUNCTIONAL	External Only

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ITEM NUMBER	MANUFACTURER	REPLACEMENT ITEM		TYPE OF REPLACEMENT	REMARKS
MP904B1093	HONEYWELL	**MP918B1071**		FUNCTIONAL	Internal normally closed only
MP904B1101	HONEYWELL	**MP918B1097**		FUNCTIONAL	Internal normally closed only
MP904B1101	HONEYWELL	**MP918B1089**		FUNCTIONAL	External Only
MP904B1119	HONEYWELL	**MP918B1014**		FUNCTIONAL	
MP904B1127	HONEYWELL	**MP918B1022**		FUNCTIONAL	
MP904B1135	HONEYWELL	**MP918B1105**		FUNCTIONAL	
MP904B1150	HONEYWELL	**MP918B1030**		FUNCTIONAL	
MP904C	HONEYWELL	**NO REPLACEMENT**		NONE	
MP904C1026	HONEYWELL	**MP918A1024**		FUNCTIONAL	
MP904C1328	HONEYWELL	**MP918B1006**		FUNCTIONAL	
MP904C1377	HONEYWELL	**MP918B1030**		FUNCTIONAL	
MP909A	HONEYWELL	**NO REPLACEMENT**		NONE	
MP909A1041	MIRCOSWITCH	**MP909D1227**	WITH	FUNCTIONAL	
MP909A1041	MIRCOSWITCH	**14002850-001**	WITH	FUNCTIONAL	
MP909A1041	MIRCOSWITCH	**312867H**		FUNCTIONAL	
MP909A1132	HONEYWELL	**MP909A1652**		FUNCTIONAL	
MP909A1637	MIRCOSWITCH	**MP909D1227**	WITH	FUNCTIONAL	
MP909A1637	MIRCOSWITCH	**14002850-001**	WITH	FUNCTIONAL	
MP909A1637	MIRCOSWITCH	**312867H**		FUNCTIONAL	
MP909A1645	HONEYWELL	**MP909D1227**	WITH	FUNCTIONAL	
MP909A1645	HONEYWELL	**14002850-001**	WITH	FUNCTIONAL	
MP909A1645	HONEYWELL	**315781**	WITH	FUNCTIONAL	
MP909A1645	HONEYWELL	**14002061-001**		FUNCTIONAL	
MP909A1652	MIRCOSWITCH	**MP909D1201**	WITH	FUNCTIONAL	
MP909A1652	MIRCOSWITCH	**14002850-001**	WITH	FUNCTIONAL	
MP909A1652	MIRCOSWITCH	**312867H**		FUNCTIONAL	
MP909A1660	MIRCOSWITCH	**MP909D1219**	WITH	FUNCTIONAL	
MP909A1660	MIRCOSWITCH	**14002850-001**	WITH	FUNCTIONAL	
MP909A1660	MIRCOSWITCH	**312867H**		FUNCTIONAL	
MP909A1744		**MP909E1232**		FUNCTIONAL	
MP909B	HONEYWELL	**NO REPLACEMENT**		NONE	
MP909C	HONEYWELL	**NO REPLACEMENT**		NONE	
MP909C1021	HONEYWELL	**MP918B1063**		FUNCTIONAL	For unitary applications, consult technical support.
MP909C1039	HONEYWELL	**NO REPLACEMENT**			For unitary applications, consult technical support.
MP909C1047	HONEYWELL	**MP918B1048**		FUNCTIONAL	
MP909C1054	HONEYWELL	**MP918B1006**		FUNCTIONAL	External Only
MP909C1054	HONEYWELL	**MP918B1014**		FUNCTIONAL	Internal normally closed only
MP909C1120	HONEYWELL	**NO REPLACEMENT**			For unitary applications, consult technical support.
MP909C1138	HONEYWELL	**NO REPLACEMENT**			For unitary applications, consult technical support.
MP909C1161	HONEYWELL	**MP918B1063**		FUNCTIONAL	External Only
MP909C1161	HONEYWELL	**MP918B1071**		FUNCTIONAL	Internal normally closed only
MP909C1179	HONEYWELL	**MP918B1097**		FUNCTIONAL	Internal normally closed only
MP909C1179	HONEYWELL	**MP918B1089**		FUNCTIONAL	External Only
MP909C1187	HONEYWELL	**MP918B1113**		FUNCTIONAL	For unitary applications, consult technical support.
MP909C1278	HONEYWELL	**NO REPLACEMENT**			For unitary applications, consult technical support.
MP909C1286	HONEYWELL	**MP918B1048**		FUNCTIONAL	
MP909C1294	HONEYWELL	**MP918B1022**		FUNCTIONAL	

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ITEM NUMBER	MANUFACTURER	REPLACEMENT ITEM		TYPE OF REPLACEMENT	REMARKS
MP909C1310	HONEYWELL	**MP918B1063**		FUNCTIONAL	For unitary applications, consult technical support.
MP909C1336	HONEYWELL	**MP918B1063**		FUNCTIONAL	
MP909C1344	HONEYWELL	**MP918B1089**		FUNCTIONAL	For unitary applications, consult technical support.
MP909C1385	HONEYWELL	**NO REPLACEMENT**			For unitary applications, consult technical support.
MP909D	HONEYWELL	**NO REPLACEMENT**		NONE	
MP909D1268	MIRCOSWITCH	**MP909D1201**	WITH	DIRECT	
MP909D1268	MIRCOSWITCH	**14003640-001**		DIRECT	
MP909D1276		**NONE**		NONE	
MP909D1292	MIRCOSWITCH	**MP909D1227**	WITH	FUNCTIONAL	
MP909D1292	MIRCOSWITCH	**315439/00062**		FUNCTIONAL	
MP909D1300	HONEYWELL	**MP909D1201**		FUNCTIONAL	
MP909D1359	MIRCOSWITCH	**MP909D1201**	WITH	FUNCTIONAL	
MP909D1359	MIRCOSWITCH	**14003640-001**	WITH	FUNCTIONAL	
MP909D1359	MIRCOSWITCH	**315781**		FUNCTIONAL	
MP909E	HONEYWELL	**NO REPLACEMENT**		NONE	
MP909E1265		**MP909E1232**		FUNCTIONAL	
MP909E1497	MIRCOSWITCH	**MP909D1201**	WITH	FUNCTIONAL	
MP909E1497	MIRCOSWITCH	**14003640-001**	WITH	FUNCTIONAL	
MP909E1497	MIRCOSWITCH	**315781**		FUNCTIONAL	
MP909E1505	HONEYWELL	**MP909E1034**		FUNCTIONAL	
MP909H	HONEYWELL	**NO REPLACEMENT**		NONE	
MP909H1459	HONEYWELL	**MP909H1392**	WITH	FUNCTIONAL	
MP913A	HONEYWELL	**NO REPLACEMENT**		NONE	
MP913A1045	HONEYWELL	**MP913A1037**		FUNCTIONAL	
MP918A	HONEYWELL	**NO REPLACEMENT**		NONE	
MP918A1115	HONEYWELL	**MP918A1024**		FUNCTIONAL	
MP918A1123	HONEYWELL	**MP918A1057**		FUNCTIONAL	
MP918A115	HONEYWELL	**MP918A1024**		FUNCTIONAL	
MP918B	HONEYWELL	**NO REPLACEMENT**		NONE	
MP918B1220	HONEYWELL	**MP918B1063**		FUNCTIONAL	
MP920A1004	HONEYWELL	**MP920B1002**	WITH	DIRECT	
MP920A1004	HONEYWELL	**14004345-001**		DIRECT	
MP920B	HONEYWELL	**NO REPLACEMENT**		NONE	
MP953A	HONEYWELL	**NO REPLACEMENT**		NONE	
MP953A5005		**NO REPLACEMENT**		NONE	
MP953B	HONEYWELL	**NO REPLACEMENT**		NONE	
MP953C	HONEYWELL	**NO REPLACEMENT**		NONE	
MP953C1562	HONEYWELL	**NO REPLACEMENT**		NONE	
MP953D	HONEYWELL	**NO REPLACEMENT**		NONE	
MP953D1222	HONEYWELL	**MP953D1131**		FUNCTIONAL	
MP953D1255	HONEYWELL	**MP953D1172**		FUNCTIONAL	
MP953E	HONEYWELL	**NO REPLACEMENT**		NONE	
MP953E1392	MIRCOSWITCH	**MP953E1400**	WITH	DIRECT	
MP953E1392	MIRCOSWITCH	**14004212-001**		DIRECT	
MP953F	HONEYWELL	**NO REPLACEMENT**		NONE	
MP958A1033	HONEYWELL	**NO REPLACEMENT**		NONE	
MP958A1041	HONEYWELL	**NO REPLACEMENT**		NONE	
MP958A1058	HONEYWELL	**NO REPLACEMENT**		NONE	

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ITEM NUMBER	MANUFACTURER	REPLACEMENT ITEM		TYPE OF REPLACEMENT	REMARKS
MS	POWERS/LANDIS & GYR	**SP955A1046**		FUNCTIONAL	
N6800-TC4100	JOHNSON CONTROLS	**RP7509A1006**		FUNCTIONAL	
N9000	JOHNSON CONTROLS	**HP973A1006**		FUNCTIONAL	
P10BC	JOHNSON CONTROLS	**P643A1007**		FUNCTIONAL	
P10PA	JOHNSON CONTROLS	**P638A1007**		FUNCTIONAL	
P20-863	ROBERTSHAW	**PP901A1004**		FUNCTIONAL	
P300	ROBERTSHAW	**PP97A1001**	OR	FUNCTIONAL	
P300	ROBERTSHAW	**PP97A1043**		FUNCTIONAL	
P301	ROBERTSHAW	**PP903A1002**	OR	FUNCTIONAL	
P301	ROBERTSHAW	**PP903A1036**		FUNCTIONAL	
P323	ROBERTSHAW	**PP905B1008**		FUNCTIONAL	
P340-112	ROBERTSHAW	**RP920A1025**		FUNCTIONAL	
P340-122	ROBERTSHAW	**RP920B1023**		FUNCTIONAL	
P40	JOHNSON CONTROLS	**CLEPAS2100**		FUNCTIONAL	
P5215	JOHNSON CONTROLS	**PP905B1008**		FUNCTIONAL	
P5217	JOHNSON CONTROLS	**PP905B1008**		FUNCTIONAL	
P643A	HONEYWELL	**NO REPLACEMENT**		NONE	
P658A	HONEYWELL	**NO REPLACEMENT**		NONE	
P658A1005	HONEYWELL	**P658A1013**		DIRECT	
P658A1021	HONEYWELL	**P658A1013**		DIRECT	
P658A1039	HONEYWELL	**P658A1005**		FUNCTIONAL	
P658B	HONEYWELL	**NO REPLACEMENT**		NONE	
P658B1004	HONEYWELL	**P658B1012**		DIRECT	
P658B1020	HONEYWELL	**P658B1012**		DIRECT	
P658C	HONEYWELL	**NO REPLACEMENT**		NONE	
P658C1003	HONEYWELL	**P658B1012**		FUNCTIONAL	
P658E	HONEYWELL	**NO REPLACEMENT**		NONE	
P658E1043	HONEYWELL	**P658E1167**		DIRECT	
P658E1050		**NONE**		NONE	
P658F	HONEYWELL	**NO REPLACEMENT**		NONE	
P67	JOHNSON CONTROLS	**P643A1007**		FUNCTIONAL	
P7100	JOHNSON CONTROLS	**P658B1012**		FUNCTIONAL	
P7220	JOHNSON CONTROLS	**P643A1007**		FUNCTIONAL	
P7221	JOHNSON CONTROLS	**P643A1007**		FUNCTIONAL	
P8000-1	JOHNSON CONTROLS	**PP97A1001**		FUNCTIONAL	
P8000-2	JOHNSON CONTROLS	**PP97A1076**		FUNCTIONAL	
P8575	JOHNSON CONTROLS	**PP903A1036**		FUNCTIONAL	
P920C1054	HONEYWELL	**RP920C1039**		DIRECT	
PA404A	HONEYWELL	**P658A1013**		DIRECT	
PC110	BARBER COLMAN	**P643A1007**	OR	FUNCTIONAL	
PC110	BARBER COLMAN	**P658A1013**		FUNCTIONAL	
PC3001-TC4100	JOHNSON CONTROLS	**RP7509A1006**		FUNCTIONAL	
PKS2011	BARBER COLMAN	**PP905B1008**		FUNCTIONAL	
PM331	POWERS/LANDIS & GYR	**MP920B1002**		FUNCTIONAL	
PM331-4X3H	POWERS/LANDIS & GYR	**MP516A1087**		FUNCTIONAL	
PM331LC	POWERS/LANDIS & GYR	**MP920B1002**	WITH	FUNCTIONAL	
PM331LC	POWERS/LANDIS & GYR	**14004345-001**		FUNCTIONAL	
PO900	HONEYWELL	**NO REPLACEMENT**		NONE	
PO903	HONEYWELL	**NO REPLACEMENT**		NONE	
PO903A2X	HONEYWELL	**NO REPLACEMENT**		NONE	

Pneumatic Product Cross Reference

ITEM NUMBER	MANUFACTURER	REPLACEMENT ITEM		TYPE OF REPLACEMENT	REMARKS
PO903A3X	HONEYWELL	**NO REPLACEMENT**		NONE	
PO91	HONEYWELL	**NO REPLACEMENT**		NONE	
PO97	HONEYWELL	**NO REPLACEMENT**		NONE	
PO97A19X	HONEYWELL	**NO REPLACEMENT**		NONE	
PO97A2X	HONEYWELL	**NO REPLACEMENT**		NONE	
PO97A3X	HONEYWELL	**NO REPLACEMENT**		NONE	
PO97A4X	HONEYWELL	**NO REPLACEMENT**		NONE	
PO97A5X	HONEYWELL	**NO REPLACEMENT**		NONE	
PO97A7X	HONEYWELL	**NO REPLACEMENT**		NONE	
PO97A9X	HONEYWELL	**NO REPLACEMENT**		NONE	
PP1012	BARBER COLMAN	**PP904A1035**		FUNCTIONAL	
PP2301	ROBERTSHAW	**NO REPLACEMENT**		NONE	
PP2341	ROBERTSHAW	**RP920B1023**		FUNCTIONAL	
PP3013	BARBER COLMAN	**PP92B1019**	OR	FUNCTIONAL	
PP3013	BARBER COLMAN	**PP92B1035**		FUNCTIONAL	
PP39964-0765		**NONE**		NONE	
PP901A	HONEYWELL	**NO REPLACEMENT**		NONE	
PP901B	HONEYWELL	**NO REPLACEMENT**		NONE	
PP902A	HONEYWELL	**NO REPLACEMENT**		NONE	
PP902C	HONEYWELL	**NO REPLACEMENT**		NONE	
PP902D	HONEYWELL	**NO REPLACEMENT**		NONE	
PP903A	HONEYWELL	**NO REPLACEMENT**		NONE	
PP903A1002	HONEYWELL	**NO REPLACEMENT**		NONE	
PP903A1010		**PP903A1036**		FUNCTIONAL	
PP904A	HONEYWELL	**NO REPLACEMENT**		NONE	
PP905B	HONEYWELL	**NO REPLACEMENT**		NONE	
PP92A	HONEYWELL	**NO REPLACEMENT**		NONE	
PP92B	HONEYWELL	**NO REPLACEMENT**		NONE	
PP92C	HONEYWELL	**NO REPLACEMENT**		NONE	
PP97A	HONEYWELL	**NO REPLACEMENT**		NONE	
PP97A1001	HONEYWELL	**NO REPLACEMENT**		NONE	
PP97A1019		**PP97A1035**		FUNCTIONAL	
PP97A1027	HONEYWELL	**PP97A1035**		FUNCTIONAL	
PP97A1043		**PP97A1035**		FUNCTIONAL	
PP97A1043		**PP97A1076**		FUNCTIONAL	
PP97A1068	HONEYWELL	**PP97A1076**		FUNCTIONAL	
PP97A1084	HONEYWELL	**NO REPLACEMENT**		NONE	
PP97A1100	HONEYWELL	**NO REPLACEMENT**		NONE	
PP97A1134	HONEYWELL	**NO REPLACEMENT**		NONE	
PR269	POWERS/LANDIS & GYR	**PP92B1035**		FUNCTIONAL	
PR269CAV	POWERS/LANDIS & GYR	**PP904A1035**		FUNCTIONAL	
PR269SP	POWERS/LANDIS & GYR	**PP904A1035**		FUNCTIONAL	
PR378DP	POWERS/LANDIS & GYR	**PP903A1010**		FUNCTIONAL	
PT141	POWERS/LANDIS & GYR	**PP905B1008**		FUNCTIONAL	
R130	JOHNSON CONTROLS	**PP901A1004**		FUNCTIONAL	
R130,A-4000	JOHNSON CONTROLS	**PP901B1002**	OR	FUNCTIONAL	
R130,A-4000	JOHNSON CONTROLS	**PP901A1004**		FUNCTIONAL	
R2080	JOHNSON CONTROLS	**RP970A1008**	OR	FUNCTIONAL	
R2080	JOHNSON CONTROLS	**RP970A1016**		FUNCTIONAL	
R2090	JOHNSON CONTROLS	**RP972A1006**	OR	FUNCTIONAL	
R2090	JOHNSON CONTROLS	**RP972A1030**		FUNCTIONAL	

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ITEM NUMBER	MANUFACTURER	REPLACEMENT ITEM		TYPE OF REPLACEMENT	REMARKS
R3030	JOHNSON CONTROLS	**RP972A1006**	OR	FUNCTIONAL	
R3030	JOHNSON CONTROLS	**RP972A1030**		FUNCTIONAL	
R317	JOHNSON CONTROLS	**PP92B1019**		FUNCTIONAL	
R3180-1	JOHNSON CONTROLS	**CP981A1001**	OR	FUNCTIONAL	
R3180-1	JOHNSON CONTROLS	**CP981B1009**		FUNCTIONAL	
R4000	JOHNSON CONTROLS	**SP970A1005**		FUNCTIONAL	
R416	ROBERTSHAW	**RP972A1006**	OR	FUNCTIONAL	
R416	ROBERTSHAW	**RP972A1030**		FUNCTIONAL	
R427-10	ROBERTSHAW	**RP818A1004**		FUNCTIONAL	
R427-20	ROBERTSHAW	**RP418A1057**	OR	FUNCTIONAL	
R427-20	ROBERTSHAW	**RP418A1123**		FUNCTIONAL	
R427-30	ROBERTSHAW	**RP418A1081**		FUNCTIONAL	
R427-40	ROBERTSHAW	**RP418A1099**		FUNCTIONAL	
R427-60	JOHNSON CONTROLS	**RP418A1073**		FUNCTIONAL	
R427-60	ROBERTSHAW	**RP418A1073**		FUNCTIONAL	
R431	ROBERTSHAW	**RP970A1008**	OR	FUNCTIONAL	
R431	ROBERTSHAW	**RP970A1016**		FUNCTIONAL	
R43176754-001		**NONE**		NONE	
R432	ROBERTSHAW	**RP470B1001**		FUNCTIONAL	
R433	ROBERTSHAW	**RP913A1008**		FUNCTIONAL	
R435	ROBERTSHAW	**CLEPAS2100**		FUNCTIONAL	
R435	JOHNSON CONTROLS	**CLEPAS2100**		FUNCTIONAL	
R436	ROBERTSHAW	**CLEAFS405**		FUNCTIONAL	
R439	ROBERTSHAW	**RP971A1007**	OR	FUNCTIONAL	
R439	ROBERTSHAW	**RP971A1015**	OR	FUNCTIONAL	
R439	ROBERTSHAW	**RP971A1049**		FUNCTIONAL	
R440	ROBERTSHAW	**RP973A1005**		FUNCTIONAL	
R440	JOHNSON CONTROLS	**RP973A1005**		FUNCTIONAL	
R450	ROBERTSHAW	**SP955A1046**		FUNCTIONAL	
R503	ROBERTSHAW	**RP471A1002**	OR	FUNCTIONAL	
R503	ROBERTSHAW	**RP471A1010**		FUNCTIONAL	
R516	ROBERTSHAW	**RP972A1006**	OR	FUNCTIONAL	
R516	ROBERTSHAW	**RP972A1030**		FUNCTIONAL	
R532L	ROBERTSHAW	**RP970A1008**	OR	FUNCTIONAL	
R532L	ROBERTSHAW	**RP970A1016**		FUNCTIONAL	
R533	ROBERTSHAW	**RP913A1008**		FUNCTIONAL	
R539	ROBERTSHAW	**RP971A1015**		FUNCTIONAL	
R540	ROBERTSHAW	**NO REPLACEMENT**		NONE	
R540	ROBERTSHAW	**RP973A1005**		FUNCTIONAL	
R76	ROBERTSHAW	**PP92B1019**		FUNCTIONAL	
RC185	POWERS/LANDIS & GYR	**RP920B1023**		FUNCTIONAL	
RC195	POWERS/LANDIS & GYR	**RP920A1033**	OR	FUNCTIONAL	
RC195	POWERS/LANDIS & GYR	**RP920A1058**	OR	FUNCTIONAL	
RC195	POWERS/LANDIS & GYR	**RP920B1031**	OR	FUNCTIONAL	
RC195	POWERS/LANDIS & GYR	**RP920B1056**		FUNCTIONAL	
RK504-3	ROBERTSHAW	**RP670B1009**		FUNCTIONAL	
RK516	ROBERTSHAW	**RP972A1006**		FUNCTIONAL	
RK539	ROBERTSHAW	**RP971A1015**		FUNCTIONAL	
RKS1001	BARBER COLMAN	**RP920A1033**	OR	FUNCTIONAL	
RKS1001	BARBER COLMAN	**RP920A1058**		FUNCTIONAL	

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ITEM NUMBER	MANUFACTURER	REPLACEMENT ITEM		TYPE OF REPLACEMENT	REMARKS
RKS2001	BARBER COLMAN	**RP920A1025**	OR	FUNCTIONAL	
RKS2001	BARBER COLMAN	**RP920A1041**		FUNCTIONAL	
RKS3002	BARBER COLMAN	**RP920B1031**	OR	FUNCTIONAL	
RKS3002	BARBER COLMAN	**RP920B1056**		FUNCTIONAL	
RKS4002	BARBER COLMAN	**RP920B1023**	OR	FUNCTIONAL	
RKS4002	BARBER COLMAN	**RP920B1049**		FUNCTIONAL	
RKS5001	BARBER COLMAN	**RP920A1033**		FUNCTIONAL	
RKSR4000	BARBER COLMAN	**RP920B1023**	OR	FUNCTIONAL	
RKSR4000	BARBER COLMAN	**RP920B1049**		FUNCTIONAL	
RL139AV	POWERS/LANDIS & GYR	**RP973A1013**		FUNCTIONAL	
RL243A	POWERS/LANDIS & GYR	**RP470A1003**	OR	FUNCTIONAL	
RL243A	POWERS/LANDIS & GYR	**RP971A1007**	OR	FUNCTIONAL	
RL243A	POWERS/LANDIS & GYR	**RP973A1005**		FUNCTIONAL	
RL243AA	POWERS/LANDIS & GYR	**RP470B1001**		FUNCTIONAL	
RL243BR	POWERS/LANDIS & GYR	**RP975A1003**		FUNCTIONAL	
RL243EC	POWERS/LANDIS & GYR	**HP973A1006**		FUNCTIONAL	
RL243H	POWERS/LANDIS & GYR	**RP470A1003**		FUNCTIONAL	
RL243L	POWERS/LANDIS & GYR	**RP470B1001**		FUNCTIONAL	
RL243LH	POWERS/LANDIS & GYR	**RP913A1008**		FUNCTIONAL	
RL243MP	POWERS/LANDIS & GYR	**RP970A1008**	OR	FUNCTIONAL	
RL243MP	POWERS/LANDIS & GYR	**RP972A1006**	OR	FUNCTIONAL	
RL243MP	POWERS/LANDIS & GYR	**RP970A1008**		FUNCTIONAL	
RL243PR	POWERS/LANDIS & GYR	**RP471A1002**		FUNCTIONAL	
RL243RR	POWERS/LANDIS & GYR	**RP971A1007**	OR	FUNCTIONAL	
RL243RR	POWERS/LANDIS & GYR	**RP971A1015**		FUNCTIONAL	
RL243SS	POWERS/LANDIS & GYR	**RP470A1003**	OR	FUNCTIONAL	
RL243SS	POWERS/LANDIS & GYR	**RP470B1001**	OR	FUNCTIONAL	
RL243SS	POWERS/LANDIS & GYR	**RP913A1008**		FUNCTIONAL	
RL243SW	POWERS/LANDIS & GYR	**RP471A1002**		FUNCTIONAL	
RL782HP	POWERS/LANDIS & GYR	**RP470A1003**	OR	FUNCTIONAL	
RL782HP	POWERS/LANDIS & GYR	**RP913A1008**		FUNCTIONAL	
RO403A	HONEYWELL	**NO REPLACEMENT**		NONE	
RO403E	HONEYWELL	**NO REPLACEMENT**		NONE	
RO46	HONEYWELL	**NO REPLACEMENT**		NONE	
RO47	HONEYWELL	**NO REPLACEMENT**		NONE	
RO48A	HONEYWELL	**NO REPLACEMENT**		NONE	
RO48B	HONEYWELL	**NO REPLACEMENT**		NONE	
RO904A	HONEYWELL	**NO REPLACEMENT**		NONE	
RO94C	HONEYWELL	**NO REPLACEMENT**		NONE	
RO95A	HONEYWELL	**NO REPLACEMENT**		NONE	
RO95B	HONEYWELL	**NO REPLACEMENT**		NONE	
RO95C	HONEYWELL	**NO REPLACEMENT**		NONE	
RP2380	ROBERTSHAW	**NO REPLACEMENT**		NONE	
RP30A2A735B	ITT GENERAL CONTROLS	**R856B1002**		FUNCTIONAL	
RP-30A2A736B	ITT GENERAL CONTROLS	**R845A1030**	OR	FUNCTIONAL	
RP-30A2A736B	ITT GENERAL CONTROLS	**R856B1002**		FUNCTIONAL	
RP-30A4A785B	ITT GENERAL CONTROLS	**RA832A1074**		FUNCTIONAL	
RP-30AZA736B	ITT GENERAL CONTROLS	**R182C1051**		FUNCTIONAL	
RP403A	HONEYWELL	**NO REPLACEMENT**		NONE	
RP403D	HONEYWELL	**NO REPLACEMENT**		NONE	

Pneumatic Product Cross Reference

ITEM NUMBER	MANUFACTURER	REPLACEMENT ITEM		TYPE OF REPLACEMENT	REMARKS
RP404A	HONEYWELL	**NO REPLACEMENT**		NONE	
RP405A	HONEYWELL	**NO REPLACEMENT**		NONE	
RP407A	HONEYWELL	**NO REPLACEMENT**		NONE	
RP409A	HONEYWELL	**CLEPAS2100**		FUNCTIONAL	
RP40A00000000	ITT GENERAL CONTROLS	**NO REPLACEMENT**		NONE	
RP412A	HONEYWELL	**NO REPLACEMENT**		NONE	
RP412B	HONEYWELL	**NO REPLACEMENT**		NONE	
RP417A	HONEYWELL	**NO REPLACEMENT**		NONE	
RP417B	HONEYWELL	**NO REPLACEMENT**		NONE	
RP418A	HONEYWELL	**NO REPLACEMENT**		NONE	
RP418A1040	HONEYWELL	**NO REPLACEMENT**		NONE	
RP418A1107	HONEYWELL	**NO REPLACEMENT**		NONE	
RP418A1123	HONEYWELL	**RP418A1057**		FUNCTIONAL	
RP418A1131	HONEYWELL	**RP418A1081**		FUNCTIONAL	
RP418A1149	HONEYWELL	**NO REPLACEMENT**		NONE	
RP418B	HONEYWELL	**NO REPLACEMENT**		NONE	
RP418B1063	HONEYWELL	**RP418A1099**		FUNCTIONAL	
RP418C	HONEYWELL	**NO REPLACEMENT**		NONE	
RP418C1004	MIRCOSWITCH	**RP418A1107**		FUNCTIONAL	
RP44B00000000	ITT GENERAL CONTROLS	**R856B1002**		FUNCTIONAL	
RP47	HONEYWELL	**NO REPLACEMENT**		NONE	
RP470A	HONEYWELL	**NO REPLACEMENT**		NONE	
RP470A1011	HONEYWELL	**RP470A1003**		FUNCTIONAL	
RP470B	HONEYWELL	**NO REPLACEMENT**		NONE	
RP471A	HONEYWELL	**NO REPLACEMENT**		NONE	
RP471A1010	HONEYWELL	**RP471A1002**		FUNCTIONAL	
RP48B	HONEYWELL	**NO REPLACEMENT**		NONE	
RP49A	HONEYWELL	**NO REPLACEMENT**		NONE	
RP670A	HONEYWELL	**NO REPLACEMENT**		NONE	
RP670A1027	HONEYWELL	**RP670A1019**		FUNCTIONAL	
RP670A1035	HONEYWELL	**RP670B1074**		FUNCTIONAL	
RP670B	HONEYWELL	**NO REPLACEMENT**		NONE	
RP670B1025	HONEYWELL	**RP670B1009**		FUNCTIONAL	
RP670B1033	HONEYWELL	**RP670B1017**		FUNCTIONAL	
RP7092	HONEYWELL	**NO REPLACEMENT**		NONE	
RP7093	HONEYWELL	**NO REPLACEMENT**		NONE	
RP725A1006	HONEYWELL	**NO REPLACEMENT**		NONE	
RP7509A	HONEYWELL	**NO REPLACEMENT**		NONE	
RP7509B	HONEYWELL	**NO REPLACEMENT**		NONE	
RP7517A1009	HONEYWELL	**NO REPLACEMENT**		NONE	
RP7517B1016	HONEYWELL	**NO REPLACEMENT**		NONE	
RP7900	HONEYWELL	**NO REPLACEMENT**		NONE	
RP7901	HONEYWELL	**NO REPLACEMENT**		NONE	
RP7902	HONEYWELL	**NO REPLACEMENT**		NONE	
RP7903	HONEYWELL	**NO REPLACEMENT**		NONE	
RP7904	HONEYWELL	**NO REPLACEMENT**		NONE	
RP803B	HONEYWELL	**NO REPLACEMENT**		NONE	
RP803C	HONEYWELL	**NO REPLACEMENT**		NONE	
RP817A	HONEYWELL	**NO REPLACEMENT**		NONE	
RP818A	HONEYWELL	**NO REPLACEMENT**		NONE	

Pneumatic Product Cross Reference

ITEM NUMBER	MANUFACTURER	REPLACEMENT ITEM		TYPE OF REPLACEMENT	REMARKS
RP818A1004	HONEYWELL	**NO REPLACEMENT**		NONE	
RP818A1012	HONEYWELL	**NO REPLACEMENT**		NONE	
RP818B	HONEYWELL	**NO REPLACEMENT**		NONE	
RP818B1010	HONEYWELL	**NO REPLACEMENT**		NONE	
RP818C	HONEYWELL	**NO REPLACEMENT**		NONE	
RP904A	HONEYWELL	**NO REPLACEMENT**		NONE	
RP904B	HONEYWELL	**NO REPLACEMENT**		NONE	
RP904C	HONEYWELL	**NO REPLACEMENT**		NONE	
RP907A	HONEYWELL	**NO REPLACEMENT**		NONE	
RP908A	HONEYWELL	**NO REPLACEMENT**		NONE	
RP908A1005		**RP920A1033 (DA) or RP920A1058 (RA) plus 43188057-001 cover**			
RP908A1013		**RP920A1025 (DA) or RP920A1041 (RA) plus 43188057-001 cover**			
RP908A1039		**RP920A1025 (DA) or RP920A1041 (RA)**			
RP908B1003		**RP920B1031(DA) or RP920B1056 (RA) plus 43188123-001 cover**			
RP908B1011		**RP920B1023 (DA)**		FUNCTIONAL	
RP908B1029		**RP920B1031 (DA) or RP920B1056 (RA)**			
RP908B1037		**RP920B1023 (DA)**		FUNCTIONAL	
RP913A	HONEYWELL	**NO REPLACEMENT**		NONE	
RP914C	HONEYWELL	**NO REPLACEMENT**		NONE	
RP920A	HONEYWELL	**NO REPLACEMENT**		NONE	
RP920A1009	HONEYWELL	**RP920A1025**	WITH	FUNCTIONAL	
RP920A1009	HONEYWELL	**14004322-001**		FUNCTIONAL	
RP920A1041	HONEYWELL	**RP920A1025**		FUNCTIONAL	
RP920A1058	HONEYWELL	**RP920A1033**		FUNCTIONAL	
RP920B	HONEYWELL	**NO REPLACEMENT**		NONE	
RP920B1049	HONEYWELL	**RP920B1023**		FUNCTIONAL	
RP920B1056	HONEYWELL	**RP920B1031**		FUNCTIONAL	
RP920C	HONEYWELL	**NO REPLACEMENT**		NONE	
RP920C1054	HONEYWELL	**RP920C1039**		DIRECT	
RP920D	HONEYWELL	**NO REPLACEMENT**		NONE	
RP920D1037	HONEYWELL	**RP920D1029**		FUNCTIONAL	
RP95A	HONEYWELL	**NO REPLACEMENT**		NONE	
RP95B	HONEYWELL	**NO REPLACEMENT**		NONE	
RP95C	HONEYWELL	**NO REPLACEMENT**		NONE	
RP970A	HONEYWELL	**NO REPLACEMENT**		NONE	
RP970A1016	HONEYWELL	**RP970A1008**		FUNCTIONAL	
RP971A	HONEYWELL	**NO REPLACEMENT**		NONE	
RP971A1049	HONEYWELL	**RP971A1007**		FUNCTIONAL	
RP972A	HONEYWELL	**NO REPLACEMENT**		NONE	
RP972A1030	HONEYWELL	**RP972A1006**		FUNCTIONAL	
RP973A	HONEYWELL	**NO REPLACEMENT**		NONE	
RP973A1013	HONEYWELL	**RP973A1005**		DIRECT	
RP975A	HONEYWELL	**NO REPLACEMENT**		NONE	
RP980A	HONEYWELL	**NO REPLACEMENT**		NONE	
RP980B	HONEYWELL	**NO REPLACEMENT**		NONE	
RP980C	HONEYWELL	**NO REPLACEMENT**		NONE	
RV201PRV	POWERS/LANDIS & GYR	**PP901A1004**	OR	FUNCTIONAL	
RV201PRV	POWERS/LANDIS & GYR	**PP901B1002**		FUNCTIONAL	
S010076		**NO REPLACEMENT**		NONE	
S10	ROBERTSHAW	**NO REPLACEMENT**		NONE	

Pneumatic Product Cross Reference

ITEM NUMBER	MANUFACTURER	REPLACEMENT ITEM		TYPE OF REPLACEMENT	REMARKS
S10-11	ROBERTSHAW	**SP970A1005**	OR	FUNCTIONAL	
S10-11	ROBERTSHAW	**SP970B1003**		FUNCTIONAL	
S223	JOHNSON CONTROLS	**SP970A1005**		FUNCTIONAL	
S224-1	JOHNSON CONTROLS	**SP970C1001**		FUNCTIONAL	
S224-2	JOHNSON CONTROLS	**SP970C1043**		FUNCTIONAL	
S230	JOHNSON CONTROLS	**NO REPLACEMENT**		NONE	
S232-1	JOHNSON CONTROLS	**SP470A1000**	OR	FUNCTIONAL	
S232-1	JOHNSON CONTROLS	**SP470B1008**		FUNCTIONAL	
S232-3	JOHNSON CONTROLS	**SP470A1000**	OR	FUNCTIONAL	
S232-3	JOHNSON CONTROLS	**SP470B1008**		FUNCTIONAL	
S233-1	JOHNSON CONTROLS	**SP470A1018**	OR	FUNCTIONAL	
S233-1	JOHNSON CONTROLS	**SP470B1016**		FUNCTIONAL	
S30	ROBERTSHAW	**SP470A1018**	OR	FUNCTIONAL	
S30	ROBERTSHAW	**SP470B1016**		FUNCTIONAL	
S510	ROBERTSHAW	**SP970A1005**	OR	FUNCTIONAL	
S510	ROBERTSHAW	**SP970B1003**		FUNCTIONAL	
S511	ROBERTSHAW	**NO REPLACEMENT**		NONE	
S520	ROBERTSHAW	**SP470A1000**	OR	FUNCTIONAL	
S520	ROBERTSHAW	**SP470B1008**		FUNCTIONAL	
S53	ROBERTSHAW	**SP470A1000**	OR	FUNCTIONAL	
S53	ROBERTSHAW	**SP470B1008**		FUNCTIONAL	
SP306XX	BARBER COLMAN	**SP955A1046**		FUNCTIONAL	
SP310XX	BARBER COLMAN	**SP955A1046**		FUNCTIONAL	
SP400	HONEYWELL	**NO REPLACEMENT**		NONE	
SP401A	HONEYWELL	**NO REPLACEMENT**		NONE	
SP470A	HONEYWELL	**NO REPLACEMENT**		NONE	
SP470A1026	HONEYWELL	**SP470A1000**		FUNCTIONAL	
SP470A1034	HONEYWELL	**SP470A1018**		FUNCTIONAL	
SP470B	HONEYWELL	**NO REPLACEMENT**		NONE	
SP470B1008	HONEYWELL	**SP470A1000**		FUNCTIONAL	
SP470B1016	HONEYWELL	**SP470A1018**		FUNCTIONAL	
SP47C	HONEYWELL	**NO REPLACEMENT**		NONE	
SP47D	HONEYWELL	**NO REPLACEMENT**		NONE	
SP955A	HONEYWELL	**NO REPLACEMENT**		NONE	
SP955A1046	HONEYWELL	**NO REPLACEMENT**		NONE	
SP970A	HONEYWELL	**NO REPLACEMENT**		NONE	
SP970B	HONEYWELL	**NO REPLACEMENT**		NONE	
SP970B1003	HONEYWELL	**SP970A1005**		FUNCTIONAL	
SP970B1011	HONEYWELL	**SP970A1013**		FUNCTIONAL	
SP970C	HONEYWELL	**NO REPLACEMENT**		NONE	
SP970C1027	HONEYWELL	**SP970C1001**		FUNCTIONAL	
SP970D	HONEYWELL	**NO REPLACEMENT**		NONE	
SP970D1009	HONEYWELL	**SP970C1001**		FUNCTIONAL	
SP970D1033	HONEYWELL	**SP970C1043**		FUNCTIONAL	
SW134-1460	POWERS/LANDIS & GYR	**P658A1013**		FUNCTIONAL	
SW151	POWERS/LANDIS & GYR	**SP970A1005**	OR	FUNCTIONAL	
SW151	POWERS/LANDIS & GYR	**SP970C1001**		FUNCTIONAL	
SW251	POWERS/LANDIS & GYR	**P643A1007**		FUNCTIONAL	
SW251-001	POWERS/LANDIS & GYR	**P643A1007**		FUNCTIONAL	
SW256	POWERS/LANDIS & GYR	**SP955A1046**		FUNCTIONAL	

Pneumatic Product Cross Reference

ITEM NUMBER	MANUFACTURER	REPLACEMENT ITEM		TYPE OF REPLACEMENT	REMARKS
SW269	POWERS/LANDIS & GYR	**CLEPAS2100**		FUNCTIONAL	
SW786	POWERS/LANDIS & GYR	**SP470A1018**		FUNCTIONAL	
T12	ROBERTSHAW	**TP973A2076**	OR	FUNCTIONAL	
T12	ROBERTSHAW	**TP973A2068**		FUNCTIONAL	
T12-301	ROBERTSHAW	**TP970A2234**		FUNCTIONAL	
T12-3011	ROBERTSHAW	**TP970A2234**		FUNCTIONAL	
T13	ROBERTSHAW	**TP973B2066**		FUNCTIONAL	
T13-301	ROBERTSHAW	**TP970B2150**		FUNCTIONAL	
T13-3011	ROBERTSHAW	**TP970B2150**		FUNCTIONAL	
T15	ROBERTSHAW	**TP970A2004**	OR	FUNCTIONAL	
T15	ROBERTSHAW	**TP970A2145**		FUNCTIONAL	
T151	ROBERTSHAW	**NO REPLACEMENT**		NONE	
T16	ROBERTSHAW	**TP970B2002**	OR	FUNCTIONAL	
T16	ROBERTSHAW	**TP970B2077**		FUNCTIONAL	
T18	ROBERTSHAW	**TP970A2004**	OR	FUNCTIONAL	
T18	ROBERTSHAW	**TP970A2145**		FUNCTIONAL	
T18-301	ROBERTSHAW	**TP970A2145**		FUNCTIONAL	
T18-3011	ROBERTSHAW	**TP970A2145**		FUNCTIONAL	
T19	ROBERTSHAW	**TP970B2002**	OR	FUNCTIONAL	
T19	ROBERTSHAW	**TP970B2077**		FUNCTIONAL	
T190	ITT GENERAL CONTROLS	**TS86A1371**		FUNCTIONAL	
T19-301	ROBERTSHAW	**TP970B2077**		FUNCTIONAL	
T19-3011	ROBERTSHAW	**TP970B2077**		FUNCTIONAL	
T20	ROBERTSHAW	**TP971A2029**		FUNCTIONAL	
T201	ROBERTSHAW	**LP907A1002**		FUNCTIONAL	
T21	POWERS/LANDIS & GYR	**NO REPLACEMENT**		NONE	
T21	ROBERTSHAW	**TP971A2029**	OR	FUNCTIONAL	
T21	ROBERTSHAW	**TP971B2019**		FUNCTIONAL	
T21D	POWERS/LANDIS & GYR	**TP971A2029**	OR	FUNCTIONAL	
T21D	POWERS/LANDIS & GYR	**TP971B2019**	OR	FUNCTIONAL	
T21D	POWERS/LANDIS & GYR	**TP973A2068**	OR	FUNCTIONAL	
T21D	POWERS/LANDIS & GYR	**TP973B2066**		FUNCTIONAL	
T21DN	POWERS/LANDIS & GYR	**TP971A2086**	OR	FUNCTIONAL	
T21DN	POWERS/LANDIS & GYR	**TP971B2001**		FUNCTIONAL	
T21DNV	POWERS/LANDIS & GYR	**TP971C2009**		FUNCTIONAL	
T21HC	POWERS/LANDIS & GYR	**TP972A2176**		FUNCTIONAL	
T21SD	POWERS/LANDIS & GYR	**TP970A2004**	OR	FUNCTIONAL	
T21SD	POWERS/LANDIS & GYR	**TP970A2145**		FUNCTIONAL	
T21SR	POWERS/LANDIS & GYR	**TP970B2002**	OR	FUNCTIONAL	
T21SR	POWERS/LANDIS & GYR	**TP970B2077**		FUNCTIONAL	
T23	ROBERTSHAW	**TP971A2029**		FUNCTIONAL	
T23-301	ROBERTSHAW	**TP971A2102**		FUNCTIONAL	
T23-3011	ROBERTSHAW	**TP971A2102**		FUNCTIONAL	
T25	ROBERTSHAW	**TP971A2029**	OR	FUNCTIONAL	
T25	ROBERTSHAW	**TP971B2019**		FUNCTIONAL	
T26	ROBERTSHAW	**TP971A2029**	OR	FUNCTIONAL	
T26	ROBERTSHAW	**TP971B2019**		FUNCTIONAL	
T27	ROBERTSHAW	**TP971A2029**	OR	FUNCTIONAL	
T27	ROBERTSHAW	**TP971B2019**		FUNCTIONAL	
T27-301	ROBERTSHAW	**TP971A2102**		FUNCTIONAL	

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ITEM NUMBER	MANUFACTURER	REPLACEMENT ITEM		TYPE OF REPLACEMENT	REMARKS
T27-3011	ROBERTSHAW	**TP971A2102**		FUNCTIONAL	
T3100-2	JOHNSON CONTROLS	**LP916A1134**		FUNCTIONAL	
T3100-3	JOHNSON CONTROLS	**LP916C1098**		FUNCTIONAL	
T32-301	ROBERTSHAW	**TP972A2192**		FUNCTIONAL	
T32-3011	ROBERTSHAW	**TP972A2192**		FUNCTIONAL	
T32-501	ROBERTSHAW	**TP972A2192**		FUNCTIONAL	
T33	ROBERTSHAW	**TP972A2176**		FUNCTIONAL	
T3300	JOHNSON CONTROLS	**NO REPLACEMENT**		NONE	
T3300-2	JOHNSON CONTROLS	**LP916B1082**		FUNCTIONAL	
T332	JOHNSON CONTROLS	**LP907A1002**		FUNCTIONAL	
T33-301	ROBERTSHAW	**TP972A2220**		FUNCTIONAL	
T3610-1001	JOHNSON CONTROLS	**LP920A1005**		FUNCTIONAL	
T3610-1002	JOHNSON CONTROLS	**LP907A1002**		FUNCTIONAL	
T3610-1003	JOHNSON CONTROLS	**LP907A1002**		FUNCTIONAL	
T4002-201	JOHNSON CONTROLS	**TP970A2145**		FUNCTIONAL	
T4002-202	JOHNSON CONTROLS	**TP970B2077**		FUNCTIONAL	
T4002-203	JOHNSON CONTROLS	**TP970A2145**		FUNCTIONAL	
T4002-204	JOHNSON CONTROLS	**TP970B2077**		FUNCTIONAL	
T4002-6201	JOHNSON CONTROLS	**TP970A2234**		FUNCTIONAL	
T4002-6202	JOHNSON CONTROLS	**TP970B2150**		FUNCTIONAL	
T4002-6203	JOHNSON CONTROLS	**TP970A2234**		FUNCTIONAL	
T4002-6204	JOHNSON CONTROLS	**TP970B2150**		FUNCTIONAL	
T4004	JOHNSON CONTROLS	**TP973A2076**	OR	FUNCTIONAL	
T4004	JOHNSON CONTROLS	**TP973B2066**		FUNCTIONAL	
T400DA	JOHNSON CONTROLS	**LP907A2004**	OR	FUNCTIONAL	
T400DA	JOHNSON CONTROLS	**TP970A2038**		FUNCTIONAL	
T400RA	JOHNSON CONTROLS	**TP970A2002**	OR	FUNCTIONAL	
T400RA	JOHNSON CONTROLS	**TP970A2145**		FUNCTIONAL	
T4010A1003		**NO REPLACEMENT**		NONE	
T401DIRECT	JOHNSON CONTROLS	**TP970A2004**	OR	FUNCTIONAL	
T401DIRECT	JOHNSON CONTROLS	**TP970A2038**		FUNCTIONAL	
T401REVERSE	JOHNSON CONTROLS	**TP970A2002**	OR	FUNCTIONAL	
T401REVERSE	JOHNSON CONTROLS	**TP970A2028**		FUNCTIONAL	
T403DIRECT	JOHNSON CONTROLS	**TP970A2004**	OR	FUNCTIONAL	
T403DIRECT	JOHNSON CONTROLS	**TP970A2038**		FUNCTIONAL	
T403REVERSE	JOHNSON CONTROLS	**TP970B2002**	OR	FUNCTIONAL	
T403REVERSE	JOHNSON CONTROLS	**TP970B2028**		FUNCTIONAL	
T4054-1	JOHNSON CONTROLS	**TP970C2000**		FUNCTIONAL	
T4054-2	JOHNSON CONTROLS	**TP970D2008**		FUNCTIONAL	
T4100-1	JOHNSON CONTROLS	**TP973A2234**		FUNCTIONAL	
T4100-2	JOHNSON CONTROLS	**TP970B2150**		FUNCTIONAL	
T4100-3	JOHNSON CONTROLS	**TP973A2234**		FUNCTIONAL	
T4100-4	JOHNSON CONTROLS	**TP970B2150**		FUNCTIONAL	
T4100-6001	JOHNSON CONTROLS	**TP973A2234**		FUNCTIONAL	
T4100-6002	JOHNSON CONTROLS	**TP970B2150**		FUNCTIONAL	
T4100-6003	JOHNSON CONTROLS	**TP973A2234**		FUNCTIONAL	
T4100-6004	JOHNSON CONTROLS	**TP970B2150**		FUNCTIONAL	
T4110-1	JOHNSON CONTROLS	**TP975A1009**		FUNCTIONAL	
T4110-3	JOHNSON CONTROLS	**TP975B1007**		FUNCTIONAL	

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ITEM NUMBER	MANUFACTURER	REPLACEMENT ITEM		TYPE OF REPLACEMENT	REMARKS
T4502	JOHNSON CONTROLS	**TP971A2003**	OR	FUNCTIONAL	
T4502	JOHNSON CONTROLS	**TP971B2001**		FUNCTIONAL	
T4504	JOHNSON CONTROLS	**TP971A2003**	OR	FUNCTIONAL	
T4504	JOHNSON CONTROLS	**TP971B2001**		FUNCTIONAL	
T4506	JOHNSON CONTROLS	**TP971A2003**	OR	FUNCTIONAL	
T4506	JOHNSON CONTROLS	**TP971B2001**		FUNCTIONAL	
T4506-201	JOHNSON CONTROLS	**TP971A2102**		FUNCTIONAL	
T4506-202	JOHNSON CONTROLS	**TP971A2102**		FUNCTIONAL	
T4506-203	JOHNSON CONTROLS	**TP971A2102**		FUNCTIONAL	
T4506-204	JOHNSON CONTROLS	**TP971A2102**		FUNCTIONAL	
T4506-209	JOHNSON CONTROLS	**NO REPLACEMENT**		NONE	
T4506-209	JOHNSON CONTROLS	**TP971B2019**		FUNCTIONAL	
T4506-6201	JOHNSON CONTROLS	**TP971A2102**		FUNCTIONAL	
T4506-6202	JOHNSON CONTROLS	**TP971A2102**		FUNCTIONAL	
T4506-6203	JOHNSON CONTROLS	**TP971A2102**		FUNCTIONAL	
T4506-6204	JOHNSON CONTROLS	**TP971A2102**		FUNCTIONAL	
T4516-201	JOHNSON CONTROLS	**TP971C2025**		FUNCTIONAL	
T460	JOHNSON CONTROLS	**TP971A**		FUNCTIONAL	
T460	ROBERTSHAW	**LP916B1017**		FUNCTIONAL	
T4600-6001	JOHNSON CONTROLS	**TP979A2005**		FUNCTIONAL	
T4600-6002	JOHNSON CONTROLS	**TP979B2003**		FUNCTIONAL	
T4600-6005	JOHNSON CONTROLS	**TP979C2001**		FUNCTIONAL	
T4600-6006	JOHNSON CONTROLS	**TP979C2001**		FUNCTIONAL	
T461	ROBERTSHAW	**LP916A1019**		FUNCTIONAL	
T462	ROBERTSHAW	**LP916C1023**		FUNCTIONAL	
T4752	JOHNSON CONTROLS	**TP972A2143**		FUNCTIONAL	
T4752-202	JOHNSON CONTROLS	**TP972A2143**		FUNCTIONAL	
T4752-206	JOHNSON CONTROLS	**TP972A2143**		FUNCTIONAL	
T4756	JOHNSON CONTROLS	**NO REPLACEMENT**		NONE	
T4756-201	JOHNSON CONTROLS	**TP972A2200**		FUNCTIONAL	
T4756-205	JOHNSON CONTROLS	**TP972A2192**		FUNCTIONAL	
T4756-206	JOHNSON CONTROLS	**TP972A2192**		FUNCTIONAL	
T4756-207	JOHNSON CONTROLS	**TP972A2200**		FUNCTIONAL	
T4756-216	JOHNSON CONTROLS	**TP972A2200**		FUNCTIONAL	
T4756-217	JOHNSON CONTROLS	**TP972A2192**		FUNCTIONAL	
T4756-6201	JOHNSON CONTROLS	**TP972A2200**		FUNCTIONAL	
T4756-6202	JOHNSON CONTROLS	**TP972A2200**		FUNCTIONAL	
T4756-6205	JOHNSON CONTROLS	**TP972A2192**		FUNCTIONAL	
T4756-6206	JOHNSON CONTROLS	**TP972A2192**		FUNCTIONAL	
T4756-6216	JOHNSON CONTROLS	**TP972A2200**		FUNCTIONAL	
T4756-6217	JOHNSON CONTROLS	**TP972A2192**		FUNCTIONAL	
T52-102	ROBERTSHAW	**TP974A2000**		FUNCTIONAL	
T5302	JOHNSON CONTROLS	**RP920A1033**		FUNCTIONAL	
T53-101	ROBERTSHAW	**TP974A2000**		FUNCTIONAL	
T5312-1	JOHNSON CONTROLS	**RP920A1033**		FUNCTIONAL	
T5800-1	JOHNSON CONTROLS	**RP920A1033**	OR	FUNCTIONAL	
T5800-1	JOHNSON CONTROLS	**RP920A1058**		FUNCTIONAL	
T5800-2	JOHNSON CONTROLS	**RP920C1039**		FUNCTIONAL	
T5800-3	JOHNSON CONTROLS	**RP920B1031**	OR	FUNCTIONAL	
T5800-3	JOHNSON CONTROLS	**RP920B1056**		FUNCTIONAL	

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ITEM NUMBER	MANUFACTURER	REPLACEMENT ITEM		TYPE OF REPLACEMENT	REMARKS
T5800-4	JOHNSON CONTROLS	**RP920D1029**		FUNCTIONAL	
T8000-1	JOHNSON CONTROLS	**LP920A1039**		FUNCTIONAL	
T8000-3	JOHNSON CONTROLS	**LP920A1039**		FUNCTIONAL	
T8000-4	JOHNSON CONTROLS	**LP920A1005**		FUNCTIONAL	
T8000-6	JOHNSON CONTROLS	**LP920A1005**		FUNCTIONAL	
T8020	JOHNSON CONTROLS	**LP920A1013**		FUNCTIONAL	
T9001-1	JOHNSON CONTROLS	**RP920A1025**		FUNCTIONAL	
T9002-1	JOHNSON CONTROLS	**RP920B1023**		FUNCTIONAL	
T9110	JOHNSON CONTROLS	**RP920C1021**		FUNCTIONAL	
T9111	JOHNSON CONTROLS	**RP920C1021**		FUNCTIONAL	
TH180B	POWERS/LANDIS & GYR	**TP973A2076**	OR	FUNCTIONAL	
TH180B	POWERS/LANDIS & GYR	**TP973B2066**		FUNCTIONAL	
TH180D	POWERS/LANDIS & GYR	**TP970A2004**		FUNCTIONAL	
TH180DN	POWERS/LANDIS & GYR	**TP971A2086**		FUNCTIONAL	
TH180DNV	POWERS/LANDIS & GYR	**TP971C2029**		FUNCTIONAL	
TH180HC	POWERS/LANDIS & GYR	**TP972A2176**		FUNCTIONAL	
TH180R	POWERS/LANDIS & GYR	**TP970B2002**		FUNCTIONAL	
TH180RDN	POWERS/LANDIS & GYR	**TP971B2043**		FUNCTIONAL	
TH181HC	POWERS/LANDIS & GYR	**TP972A2176**		FUNCTIONAL	
TH182DC	POWERS/LANDIS & GYR	**TP979A2005**	OR	FUNCTIONAL	
TH182DC	POWERS/LANDIS & GYR	**TP979B2003**	OR	FUNCTIONAL	
TH182DC	POWERS/LANDIS & GYR	**TP979C2001**		FUNCTIONAL	
TH182DN	POWERS/LANDIS & GYR	**TP971A2086**		FUNCTIONAL	
TH182DNV	POWERS/LANDIS & GYR	**TP971C2025**		FUNCTIONAL	
TH182DS	POWERS/LANDIS & GYR	**TP972A2176**		FUNCTIONAL	
TH182HC	POWERS/LANDIS & GYR	**TP972A2176**		FUNCTIONAL	
TH182RDN	POWERS/LANDIS & GYR	**TP971B2043**		FUNCTIONAL	
TH182RDS	POWERS/LANDIS & GYR	**TP972A2176**		FUNCTIONAL	
TH183HC	POWERS/LANDIS & GYR	**LP916B1017**		FUNCTIONAL	
TH183R	POWERS/LANDIS & GYR	**LP916C1023**		FUNCTIONAL	
TH184	POWERS/LANDIS & GYR	**TP974A2000**		FUNCTIONAL	
TH188-0024	POWERS/LANDIS & GYR	**LP916C1023**		FUNCTIONAL	
TH188-0030	POWERS/LANDIS & GYR	**LP916B1017**		FUNCTIONAL	
TH188-0031	POWERS/LANDIS & GYR	**LP916A1134**		FUNCTIONAL	
TH188D	POWERS/LANDIS & GYR	**LP916A1134**		FUNCTIONAL	
TH188HC	POWERS/LANDIS & GYR	**LP916B1017**		FUNCTIONAL	
TH188R	POWERS/LANDIS & GYR	**LP916C1023**		FUNCTIONAL	
TH192-200	POWERS/LANDIS & GYR	**TP970A2145**		FUNCTIONAL	
TH192-201	POWERS/LANDIS & GYR	**TP970B2077**		FUNCTIONAL	
TH192-202	POWERS/LANDIS & GYR	**TP970A2145**		FUNCTIONAL	
TH192-203	POWERS/LANDIS & GYR	**TP970B2077**		FUNCTIONAL	
TH192-204	POWERS/LANDIS & GYR	**TP971A2102**		FUNCTIONAL	
TH192-208	POWERS/LANDIS & GYR	**TP972A2192**		FUNCTIONAL	
TH192-2082	POWERS/LANDIS & GYR	**TP972A2192**		FUNCTIONAL	
TH192-220	POWERS/LANDIS & GYR	**TP970A2234**		FUNCTIONAL	
TH192-221	POWERS/LANDIS & GYR	**TP970B2150**		FUNCTIONAL	
TH192-222	POWERS/LANDIS & GYR	**TP970A2234**		FUNCTIONAL	
TH192-223	POWERS/LANDIS & GYR	**TP970B2150**		FUNCTIONAL	
TH192-224	POWERS/LANDIS & GYR	**TP971A2102**		FUNCTIONAL	
TH192-228	POWERS/LANDIS & GYR	**TP972A2192**		FUNCTIONAL	

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ITEM NUMBER	MANUFACTURER	REPLACEMENT ITEM		TYPE OF REPLACEMENT	REMARKS
TH192DN	POWERS/LANDIS & GYR	**TP971A2086**	OR	FUNCTIONAL	
TH192DN	POWERS/LANDIS & GYR	**TP971B2043**		FUNCTIONAL	
TH192DNV	POWERS/LANDIS & GYR	**TP971C2025**		FUNCTIONAL	
TH192HC	POWERS/LANDIS & GYR	**TP972A2176**		FUNCTIONAL	
TH192S	POWERS/LANDIS & GYR	**NO REPLACEMENT**		NONE	
TH192-XXXX	POWERS/LANDIS & GYR	**NO REPLACEMENT**		NONE	
TH193HC	POWERS/LANDIS & GYR	**NO REPLACEMENT**		NONE	
TH194	POWERS/LANDIS & GYR	**NO REPLACEMENT**		NONE	
TH194-2082	POWERS/LANDIS & GYR	**TP972A2192**		FUNCTIONAL	
TH356-0750	POWERS/LANDIS & GYR	**LP920A1021**		FUNCTIONAL	
TH356D	POWERS/LANDIS & GYR	**LP920A1021**		FUNCTIONAL	
TH357-0001	POWERS/LANDIS & GYR	**LP920A1005**		FUNCTIONAL	
TH357-003	POWERS/LANDIS & GYR	**LP920A1039**		FUNCTIONAL	
TH357D	POWERS/LANDIS & GYR	**LP920A1005**		FUNCTIONAL	
TH360D	POWERS/LANDIS & GYR	**LP920A1005**		FUNCTIONAL	
TH361D	POWERS/LANDIS & GYR	**LP920A1021**		FUNCTIONAL	
TH832D	POWERS/LANDIS & GYR	**TP970A2004**		FUNCTIONAL	
TH832DN	POWERS/LANDIS & GYR	**TP971A2086**		FUNCTIONAL	
TINVI800767	HONEYWELL	**315781**	WITH	FUNCTIONAL	
TINVI800767	HONEYWELL	**315321**	WITH	FUNCTIONAL	
TINVI800767	HONEYWELL	**26026D**		FUNCTIONAL	
TK1001	BARBER COLMAN	**NO REPLACEMENT**		NONE	
TK10101	BARBER COLMAN	**TP979A2005**		FUNCTIONAL	
TK10102	BARBER COLMAN	**TP979A2005**		FUNCTIONAL	
TK10111	BARBER COLMAN	**TP979C2001**		FUNCTIONAL	
TK10112	BARBER COLMAN	**TP979C2001**		FUNCTIONAL	
TK107X	BARBER COLMAN	**TP938A1013**		FUNCTIONAL	
TK1101	BARBER COLMAN	**TP970B2002**	OR	FUNCTIONAL	
TK1101	BARBER COLMAN	**TP970B2028**		FUNCTIONAL	
TK1101-116	BARBER COLMAN	**TP970B2010**		FUNCTIONAL	
TK11101	BARBER COLMAN	**TP979C2001**		FUNCTIONAL	
TK11102	BARBER COLMAN	**TP979C2001**		FUNCTIONAL	
TK11111	BARBER COLMAN	**TP979B2003**		FUNCTIONAL	
TK11112	BARBER COLMAN	**TP979B2003**		FUNCTIONAL	
TK117X	BARBER COLMAN	**TP938B1011**		FUNCTIONAL	
TK1201	BARBER COLMAN	**TP972A2002**	OR	FUNCTIONAL	
TK1201	BARBER COLMAN	**TP972A2028**		FUNCTIONAL	
TK1301	BARBER COLMAN	**TP971A2003**	OR	FUNCTIONAL	
TK1301	BARBER COLMAN	**TP971A2037**		FUNCTIONAL	
TK13131	BARBER COLMAN	**TP979D2009**		FUNCTIONAL	
TK13141	BARBER COLMAN	**TP979E2006**		FUNCTIONAL	
TK13142	BARBER COLMAN	**TP979E2006**		FUNCTIONAL	
TK1381	BARBER COLMAN	**TP971B2001**		FUNCTIONAL	
TK138X	BARBER COLMAN	**NO REPLACEMENT**		NONE	
TK1601	BARBER COLMAN	**TP971C2009**		FUNCTIONAL	
TK1711	BARBER COLMAN	**TP971A2003**		FUNCTIONAL	
TK1727	BARBER COLMAN	**TP979B2003**		FUNCTIONAL	
TK1731	BARBER COLMAN	**TP979C2001**		FUNCTIONAL	
TK173X	BARBER COLMAN	**TP979C2001**		FUNCTIONAL	
TK1741	BARBER COLMAN	**TP972A2143**		FUNCTIONAL	

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ITEM NUMBER	MANUFACTURER	REPLACEMENT ITEM		TYPE OF REPLACEMENT	REMARKS
TK174X	BARBER COLMAN	**TP972A2143**		FUNCTIONAL	
TK1751	BARBER COLMAN	**TP971A2003**		FUNCTIONAL	
TK1761	BARBER COLMAN	**TP971B2001**		FUNCTIONAL	
TK18	BARBER COLMAN	**TP970A2004**	OR	FUNCTIONAL	
TK18	BARBER COLMAN	**TP970A2038**		FUNCTIONAL	
TK1801	BARBER COLMAN	**TP970C2000**		FUNCTIONAL	
TK1811	BARBER COLMAN	**TP970D2008**		FUNCTIONAL	
TK2001	BARBER COLMAN	**LP916A1134**		FUNCTIONAL	
TK2012	BARBER COLMAN	**LP907A1044**		FUNCTIONAL	
TK2201	BARBER COLMAN	**LP916B1082**		FUNCTIONAL	
TK3001	BARBER COLMAN	**LP916A1134**		FUNCTIONAL	
TK300-30A-3FM		**NO REPLACEMENT**		NONE	
TK3201	BARBER COLMAN	**LP916B1082**		FUNCTIONAL	
TK4001	BARBER COLMAN	**LP920A1005**	OR	FUNCTIONAL	
TK4001	BARBER COLMAN	**LP916A1134**		FUNCTIONAL	
TK4012	BARBER COLMAN	**LP920A1005**	OR	FUNCTIONAL	
TK4012	BARBER COLMAN	**LP916A1134**		FUNCTIONAL	
TK5001	BARBER COLMAN	**TP973A2076**		FUNCTIONAL	
TK5005	BARBER COLMAN	**TP979A2005**		FUNCTIONAL	
TK5015	BARBER COLMAN	**TP979C2001**		FUNCTIONAL	
TK5101	BARBER COLMAN	**TP973B2066**		FUNCTIONAL	
TK51511	BARBER COLMAN	**TP979B2003**		FUNCTIONAL	
TK51512	BARBER COLMAN	**TP979B2003**		FUNCTIONAL	
TKR1001	BARBER COLMAN	**TP970A2004**	OR	FUNCTIONAL	
TKR1001	BARBER COLMAN	**TP970A2038**		FUNCTIONAL	
TKS2031	BARBER COLMAN	**LP914A1037**		FUNCTIONAL	
TKS4014	BARBER COLMAN	**LP915A1077**		FUNCTIONAL	
TKS401X	BARBER COLMAN	**LP915A1077**		FUNCTIONAL	
TKS4032	BARBER COLMAN	**LP915A1077**		FUNCTIONAL	
TKS5001	BARBER COLMAN	**TP974A2000**		FUNCTIONAL	
TKS6001	BARBER COLMAN	**TP925A1000**		FUNCTIONAL	
TKS7001	BARBER COLMAN	**TP925A1000**		FUNCTIONAL	
TKS8031	BARBER COLMAN	**LP914A1060**		FUNCTIONAL	
TKS8033	BARBER COLMAN	**LP914A1052**		FUNCTIONAL	
TKS9014	BARBER COLMAN	**LP914A1003**	OR	FUNCTIONAL	
TKS9014	BARBER COLMAN	**LP914A1243**		FUNCTIONAL	
TKS9033	BARBER COLMAN	**LP914A1268**		FUNCTIONAL	
TO300A1005	HONEYWELL	**NO REPLACEMENT**		NONE	
TO300A1013	HONEYWELL	**NO REPLACEMENT**		NONE	
TO300A1047	HONEYWELL	**NO REPLACEMENT**		NONE	
TO300A1054	HONEYWELL	**NO REPLACEMENT**		NONE	
TO300A1X-3X	HONEYWELL	**NO REPLACEMENT**		NONE	
TO300B1003	HONEYWELL	**NO REPLACEMENT**		NONE	
TO300B1011	HONEYWELL	**NO REPLACEMENT**		NONE	
TO300B1045	HONEYWELL	**NO REPLACEMENT**		NONE	
TO300B1052	HONEYWELL	**NO REPLACEMENT**		NONE	
TO300B1X-3X	HONEYWELL	**NO REPLACEMENT**		NONE	
TO400A1X-3X	HONEYWELL	**TP970A+RP471A**		FUNCTIONAL	
TO410A1002	HONEYWELL	**TP970A**	WITH	FUNCTIONAL	
TO410A1002	HONEYWELL	**RP471A**		FUNCTIONAL	

Pneumatic Product Cross Reference

ITEM NUMBER	MANUFACTURER	REPLACEMENT ITEM		TYPE OF REPLACEMENT	REMARKS
TO410A1028	HONEYWELL	**TP970A**	WITH	FUNCTIONAL	
TO410A1028	HONEYWELL	**RP471A**		FUNCTIONAL	
TO410A1X-3X	HONEYWELL	**TP970A**	WITH	FUNCTIONAL	
TO410A1X-3X	HONEYWELL	**RP471A**		FUNCTIONAL	
TO410B1000	HONEYWELL	**TP970A**	WITH	FUNCTIONAL	
TO410B1000	HONEYWELL	**RP471A**		FUNCTIONAL	
TO410B1026	HONEYWELL	**TP970A**	WITH	FUNCTIONAL	
TO410B1026	HONEYWELL	**RP471A**		FUNCTIONAL	
TO410B1X-3X	HONEYWELL	**TP970A**	WITH	FUNCTIONAL	
TO410B1X-3X	HONEYWELL	**RP471A**		FUNCTIONAL	
TO41A1X	HONEYWELL	**TP970A**	WITH	FUNCTIONAL	
TO41A1X	HONEYWELL	**RP471A**		FUNCTIONAL	
TO42A1X	HONEYWELL	**TP970A**	WITH	FUNCTIONAL	
TO42A1X	HONEYWELL	**RP471A**		FUNCTIONAL	
TO43A18X-24X	HONEYWELL	**TP970A**	WITH	FUNCTIONAL	
TO43A18X-24X	HONEYWELL	**RP471A**		FUNCTIONAL	
TO43A1X-3X	HONEYWELL	**TP970A**	WITH	FUNCTIONAL	
TO43A1X-3X	HONEYWELL	**RP471A**		FUNCTIONAL	
TO43AX4X-X17X	HONEYWELL	**TP970A**	WITH	FUNCTIONAL	
TO43AX4X-X17X	HONEYWELL	**RP471A**		FUNCTIONAL	
TO900A	HONEYWELL	**NO REPLACEMENT**		NONE	
TO900A10X	HONEYWELL	**TP970A2053**	OR	FUNCTIONAL	
TO900A10X	HONEYWELL	**TP970B2036**		FUNCTIONAL	
TO900A14X	HONEYWELL	**TP970A2053**	OR	FUNCTIONAL	
TO900A14X	HONEYWELL	**TP970B2036**		FUNCTIONAL	
TO900A16X	HONEYWELL	**TP970A2053**	OR	FUNCTIONAL	
TO900A16X	HONEYWELL	**TP970B2036**		FUNCTIONAL	
TO900A17X	HONEYWELL	**TP970A2095**		FUNCTIONAL	
TO900A18X	HONEYWELL	**TP970A2095**		FUNCTIONAL	
TO900A19X	HONEYWELL	**TP970A2095**		FUNCTIONAL	
TO900A1X	HONEYWELL	**TP970A2053**	OR	FUNCTIONAL	
TO900A1X	HONEYWELL	**TP970B2036**		FUNCTIONAL	
TO900A24X	HONEYWELL	**TP970A2095**		FUNCTIONAL	
TO900A26X	HONEYWELL	**TP970A2053**	OR	FUNCTIONAL	
TO900A26X	HONEYWELL	**TP970B2036**		FUNCTIONAL	
TO900A27X	HONEYWELL	**TP970A2053**	OR	FUNCTIONAL	
TO900A27X	HONEYWELL	**TP970B2036**		FUNCTIONAL	
TO900A2X	HONEYWELL	**TP970A2053**	OR	FUNCTIONAL	
TO900A2X	HONEYWELL	**TP970B2036**		FUNCTIONAL	
TO900A3	HONEYWELL	**TP970A**		FUNCTIONAL	
TO900A30X	HONEYWELL	**TP970A2053**	OR	FUNCTIONAL	
TO900A30X	HONEYWELL	**TP970B2036**		FUNCTIONAL	
TO900A31X	HONEYWELL	**TP970A2053**	OR	FUNCTIONAL	
TO900A31X	HONEYWELL	**TP970B2036**		FUNCTIONAL	
TO900A32X	HONEYWELL	**TP970A2053**	OR	FUNCTIONAL	
TO900A32X	HONEYWELL	**TP970B2036**		FUNCTIONAL	
TO900A34X	HONEYWELL	**TP970A2053**	OR	FUNCTIONAL	
TO900A34X	HONEYWELL	**TP970B2036**		FUNCTIONAL	
TO900A36X	HONEYWELL	**TP970A2053**	OR	FUNCTIONAL	
TO900A36X	HONEYWELL	**TP970B2036**		FUNCTIONAL	

Pneumatic Product Cross Reference

ITEM NUMBER	MANUFACTURER	REPLACEMENT ITEM		TYPE OF REPLACEMENT	REMARKS
TO900A3X	HONEYWELL	**TP970A2053**	OR	FUNCTIONAL	
TO900A3X	HONEYWELL	**TP970B2036**		FUNCTIONAL	
TO900A49X	HONEYWELL	**TP970A2020**	OR	NONE	
TO900A49X	HONEYWELL	**TP970B2010**		NONE	
TO900A4X	HONEYWELL	**TP970A2053**	OR	FUNCTIONAL	
TO900A4X	HONEYWELL	**TP970B2036**		FUNCTIONAL	
TO900A50X	HONEYWELL	**NO REPLACEMENT**		NONE	
TO900A51X	HONEYWELL	**NO REPLACEMENT**		NONE	
TO900A52X	HONEYWELL	**TP970A2053**	OR	FUNCTIONAL	
TO900A52X	HONEYWELL	**TP970B2036**		FUNCTIONAL	
TO900A53X	HONEYWELL	**NO REPLACEMENT**		NONE	
TO900A54X	HONEYWELL	**TP970A2053**	OR	FUNCTIONAL	
TO900A54X	HONEYWELL	**TP970B2036**		FUNCTIONAL	
TO900A55X	HONEYWELL	**TP970A2053**	OR	FUNCTIONAL	
TO900A55X	HONEYWELL	**TP970B2036**		FUNCTIONAL	
TO900A56X	HONEYWELL	**TP970A2053**	OR	FUNCTIONAL	
TO900A56X	HONEYWELL	**TP970B2036**		FUNCTIONAL	
TO900A57X	HONEYWELL	**TP970A2053**	OR	FUNCTIONAL	
TO900A57X	HONEYWELL	**TP970B2036**		FUNCTIONAL	
TO900A58X	HONEYWELL	**TP970A2095**		FUNCTIONAL	
TO900A59X	HONEYWELL	**TP970A2053**	OR	FUNCTIONAL	
TO900A59X	HONEYWELL	**TP970B2036**		FUNCTIONAL	
TO900A5X	HONEYWELL	**TP970A2053**	OR	FUNCTIONAL	
TO900A5X	HONEYWELL	**TP970B2036**		FUNCTIONAL	
TO900A60X	HONEYWELL	**TP970A2053**	OR	FUNCTIONAL	
TO900A60X	HONEYWELL	**TP970B2036**		FUNCTIONAL	
TO900A61X	HONEYWELL	**TP970A2053**	OR	FUNCTIONAL	
TO900A61X	HONEYWELL	**TP970B2036**		FUNCTIONAL	
TO900A62X	HONEYWELL	**TP970A2053**	OR	FUNCTIONAL	
TO900A62X	HONEYWELL	**TP970B2036**		FUNCTIONAL	
TO900A63X	HONEYWELL	**TP970A2053**	OR	FUNCTIONAL	
TO900A63X	HONEYWELL	**TP970B2036**		FUNCTIONAL	
TO900A64X	HONEYWELL	**TP970A2053**	OR	FUNCTIONAL	
TO900A64X	HONEYWELL	**TP970B2036**		FUNCTIONAL	
TO900A65X	HONEYWELL	**TP970A2053**	OR	FUNCTIONAL	
TO900A65X	HONEYWELL	**TP970B2036**		FUNCTIONAL	
TO900A66X	HONEYWELL	**TP970A2053**	OR	FUNCTIONAL	
TO900A66X	HONEYWELL	**TP970B2036**		FUNCTIONAL	
TO900A67X	HONEYWELL	**TP970A2053**	OR	FUNCTIONAL	
TO900A67X	HONEYWELL	**TP970B2036**		FUNCTIONAL	
TO900A68X	HONEYWELL	**TP970A2053**	OR	FUNCTIONAL	
TO900A68X	HONEYWELL	**TP970B2036**		FUNCTIONAL	
TO900A69X	HONEYWELL	**TP970A2053**	OR	FUNCTIONAL	
TO900A69X	HONEYWELL	**TP970B2036**		FUNCTIONAL	
TO900A6X	HONEYWELL	**TP970A2053**	OR	FUNCTIONAL	
TO900A6X	HONEYWELL	**TP970B2036**		FUNCTIONAL	
TO900A70X	HONEYWELL	**TP970A2053**	OR	FUNCTIONAL	
TO900A70X	HONEYWELL	**TP970B2036**		FUNCTIONAL	
TO900A71X	HONEYWELL	**TP970A2053**	OR	FUNCTIONAL	
TO900A71X	HONEYWELL	**TP970B2036**		FUNCTIONAL	

Pneumatic Product Cross Reference

ITEM NUMBER	MANUFACTURER	REPLACEMENT ITEM		TYPE OF REPLACEMENT	REMARKS
TO900A72X	HONEYWELL	**TP970A2053**	OR	FUNCTIONAL	
TO900A72X	HONEYWELL	**TP970B2036**		FUNCTIONAL	
TO900A73X	HONEYWELL	**TP970A2053**	OR	FUNCTIONAL	
TO900A73X	HONEYWELL	**TP970B2036**		FUNCTIONAL	
TO900A74X	HONEYWELL	**TP970A2053**	OR	FUNCTIONAL	
TO900A74X	HONEYWELL	**TP970B2036**		FUNCTIONAL	
TO900A75X	HONEYWELL	**TP970A2053**	OR	FUNCTIONAL	
TO900A75X	HONEYWELL	**TP970B2036**		FUNCTIONAL	
TO900A76X	HONEYWELL	**TP970A2053**	OR	FUNCTIONAL	
TO900A76X	HONEYWELL	**TP970B2036**		FUNCTIONAL	
TO900A77X	HONEYWELL	**TP970A2053**	OR	FUNCTIONAL	
TO900A77X	HONEYWELL	**TP970B2036**		FUNCTIONAL	
TO900A78X	HONEYWELL	**TP970A2053**	OR	FUNCTIONAL	
TO900A78X	HONEYWELL	**TP970B2036**		FUNCTIONAL	
TO900A79X	HONEYWELL	**TP970A2053**	OR	FUNCTIONAL	
TO900A79X	HONEYWELL	**TP970B2036**		FUNCTIONAL	
TO900A7X	HONEYWELL	**TP970A2053**	OR	FUNCTIONAL	
TO900A7X	HONEYWELL	**TP970B2036**		FUNCTIONAL	
TO900A80X	HONEYWELL	**TP970A2053**	OR	FUNCTIONAL	
TO900A80X	HONEYWELL	**TP970B2036**		FUNCTIONAL	
TO900A81X	HONEYWELL	**TP970A2053**	OR	FUNCTIONAL	
TO900A81X	HONEYWELL	**TP970B2036**		FUNCTIONAL	
TO900A82X	HONEYWELL	**TP970A2053**	OR	FUNCTIONAL	
TO900A82X	HONEYWELL	**TP970B2036**		FUNCTIONAL	
TO900A83X	HONEYWELL	**TP970A2053**	OR	FUNCTIONAL	
TO900A83X	HONEYWELL	**TP970B2036**		FUNCTIONAL	
TO900A84X	HONEYWELL	**TP970A2020**	OR	FUNCTIONAL	
TO900A84X	HONEYWELL	**TP970B2010**		FUNCTIONAL	
TO900A88X	HONEYWELL	**TP970A2053**	OR	FUNCTIONAL	
TO900A88X	HONEYWELL	**TP970B2036**		FUNCTIONAL	
TO900A89X	HONEYWELL	**TP970A2053**	OR	FUNCTIONAL	
TO900A89X	HONEYWELL	**TP970B2036**		FUNCTIONAL	
TO900A8X	HONEYWELL	**TP970A2053**	OR	FUNCTIONAL	
TO900A8X	HONEYWELL	**TP970B2036**		FUNCTIONAL	
TO900A90X	HONEYWELL	**TP970A2053**	OR	FUNCTIONAL	
TO900A90X	HONEYWELL	**TP970B2036**		FUNCTIONAL	
TO900A91X	HONEYWELL	**TP970A2053**	OR	FUNCTIONAL	
TO900A91X	HONEYWELL	**TP970B2036**		FUNCTIONAL	
TO900A92X	HONEYWELL	**TP970A2053**	OR	FUNCTIONAL	
TO900A92X	HONEYWELL	**TP970B2036**		FUNCTIONAL	
TO900A9X	HONEYWELL	**TP970A2053**	OR	FUNCTIONAL	
TO900A9X	HONEYWELL	**TP970B2036**		FUNCTIONAL	
TO900AX11X	HONEYWELL	**TP970A2053**	OR	FUNCTIONAL	
TO900AX11X	HONEYWELL	**TP970B2036**		FUNCTIONAL	
TO900AX12X	HONEYWELL	**TP970A2053**	OR	FUNCTIONAL	
TO900AX12X	HONEYWELL	**TP970B2036**		FUNCTIONAL	
TO900AX13X	HONEYWELL	**TP970A2053**	OR	FUNCTIONAL	
TO900AX13X	HONEYWELL	**TP970B2036**		FUNCTIONAL	
TO900AX15X	HONEYWELL	**TP970A2053**	OR	FUNCTIONAL	
TO900AX15X	HONEYWELL	**TP970B2036**		FUNCTIONAL	

ITEM NUMBER	MANUFACTURER	REPLACEMENT ITEM		TYPE OF REPLACEMENT	REMARKS
TO900AX20X	HONEYWELL	**TP970A2095**		FUNCTIONAL	
TO900AX21X	HONEYWELL	**TP970A2095**		FUNCTIONAL	
TO900AX22X	HONEYWELL	**TP970A2095**		FUNCTIONAL	
TO900AX23X	HONEYWELL	**TP970A2095**		FUNCTIONAL	
TO900AX25X	HONEYWELL	**TP970A2053**	OR	FUNCTIONAL	
TO900AX25X	HONEYWELL	**TP970B2036**		FUNCTIONAL	
TO900AX28X	HONEYWELL	**TP970A2053**	OR	FUNCTIONAL	
TO900AX28X	HONEYWELL	**TP970B2036**		FUNCTIONAL	
TO900AX29X	HONEYWELL	**TP970A2053**	OR	FUNCTIONAL	
TO900AX29X	HONEYWELL	**TP970B2036**		FUNCTIONAL	
TO900AX33X	HONEYWELL	**TP970A2053**	OR	FUNCTIONAL	
TO900AX33X	HONEYWELL	**TP970B2036**		FUNCTIONAL	
TO900AX35X	HONEYWELL	**TP970A2053**	OR	FUNCTIONAL	
TO900AX35X	HONEYWELL	**TP970B2036**		FUNCTIONAL	
TO900AX37X	HONEYWELL	**TP970A2053**	OR	FUNCTIONAL	
TO900AX37X	HONEYWELL	**TP970B2036**		FUNCTIONAL	
TO900AX38X	HONEYWELL	**TP970A2095**		FUNCTIONAL	
TO900AX39X	HONEYWELL	**TP970A2053**	OR	FUNCTIONAL	
TO900AX39X	HONEYWELL	**TP970B2036**		FUNCTIONAL	
TO900AX40X	HONEYWELL	**NO REPLACEMENT**		NONE	
TO900AX41X	HONEYWELL	**NO REPLACEMENT**		NONE	
TO900AX42X	HONEYWELL	**NO REPLACEMENT**		NONE	
TO900AX43X	HONEYWELL	**NO REPLACEMENT**		NONE	
TO900AX44X	HONEYWELL	**NO REPLACEMENT**		NONE	
TO900AX45X	HONEYWELL	**NO REPLACEMENT**		NONE	
TO900AX46X	HONEYWELL	**NO REPLACEMENT**		NONE	
TO900AX47X	HONEYWELL	**NO REPLACEMENT**		NONE	
TO900B	HONEYWELL	**NO REPLACEMENT**		NONE	
TO900B1X	HONEYWELL	**TP971A2003**	OR	FUNCTIONAL	
TO900B1X	HONEYWELL	**TP970B2002**		FUNCTIONAL	
TO900B2X	HONEYWELL	**TP971A2003**	OR	FUNCTIONAL	
TO900B2X	HONEYWELL	**TP970B2002**		FUNCTIONAL	
TO900B3X	HONEYWELL	**TP971A2003**	OR	FUNCTIONAL	
TO900B3X	HONEYWELL	**TP970B2002**		FUNCTIONAL	
TO900B4X	HONEYWELL	**TP971A2003**	OR	FUNCTIONAL	
TO900B4X	HONEYWELL	**TP970B2002**		FUNCTIONAL	
TO900B5X	HONEYWELL	**TP971A2003**	OR	FUNCTIONAL	
TO900B5X	HONEYWELL	**TP970B2002**		FUNCTIONAL	
TO900BX10X	HONEYWELL	**TP971A2003**	OR	FUNCTIONAL	
TO900BX10X	HONEYWELL	**TP970B2002**		FUNCTIONAL	
TO900BX11X	HONEYWELL	**TP971A2003**	OR	FUNCTIONAL	
TO900BX11X	HONEYWELL	**TP970B2002**		FUNCTIONAL	
TO900BX12X	HONEYWELL	**TP971A2003**	OR	FUNCTIONAL	
TO900BX12X	HONEYWELL	**TP970B2002**		FUNCTIONAL	
TO900BX13X	HONEYWELL	**TP971A2011**		FUNCTIONAL	
TO900BX14X	HONEYWELL	**TP971A2003**	OR	FUNCTIONAL	
TO900BX14X	HONEYWELL	**TP970B2002**		FUNCTIONAL	
TO900BX15X	HONEYWELL	**TP971A2003**	OR	FUNCTIONAL	
TO900BX15X	HONEYWELL	**TP970B2002**		FUNCTIONAL	

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ITEM NUMBER	MANUFACTURER	REPLACEMENT ITEM		TYPE OF REPLACEMENT	REMARKS
TO900BX16X	HONEYWELL	**TP971A2003**	OR	FUNCTIONAL	
TO900BX16X	HONEYWELL	**TP970B2002**		FUNCTIONAL	
TO900BX17X	HONEYWELL	**TP971A2003**	OR	FUNCTIONAL	
TO900BX17X	HONEYWELL	**TP970B2002**		FUNCTIONAL	
TO900BX6X	HONEYWELL	**TP971A2003**	OR	FUNCTIONAL	
TO900BX6X	HONEYWELL	**TP970B2002**		FUNCTIONAL	
TO900BX7X	HONEYWELL	**TP971A2003**	OR	FUNCTIONAL	
TO900BX7X	HONEYWELL	**TP970B2002**		FUNCTIONAL	
TO900BX8X	HONEYWELL	**TP971A2003**	OR	FUNCTIONAL	
TO900BX8X	HONEYWELL	**TP970B2002**		FUNCTIONAL	
TO900BX9X	HONEYWELL	**TP971A2003**	OR	FUNCTIONAL	
TO900BX9X	HONEYWELL	**TP970B2002**		FUNCTIONAL	
TO900C10X	HONEYWELL	**NO REPLACEMENT**		NONE	
TO900C11X	HONEYWELL	**NO REPLACEMENT**		NONE	
TO900C12X	HONEYWELL	**NO REPLACEMENT**		NONE	
TO900C13X	HONEYWELL	**NO REPLACEMENT**		NONE	
TO900C14X	HONEYWELL	**NO REPLACEMENT**		NONE	
TO900C15X	HONEYWELL	**NO REPLACEMENT**		NONE	
TO900C16X	HONEYWELL	**NO REPLACEMENT**		NONE	
TO900C17X	HONEYWELL	**NO REPLACEMENT**		NONE	
TO900C18X	HONEYWELL	**NO REPLACEMENT**		NONE	
TO900C19X	HONEYWELL	**NO REPLACEMENT**		NONE	
TO900C1X	HONEYWELL	**NO REPLACEMENT**		NONE	
TO900C20X	HONEYWELL	**NO REPLACEMENT**		NONE	
TO900C21X	HONEYWELL	**NO REPLACEMENT**		NONE	
TO900C22X	HONEYWELL	**NO REPLACEMENT**		NONE	
TO900C23X	HONEYWELL	**NO REPLACEMENT**		NONE	
TO900C24X	HONEYWELL	**NO REPLACEMENT**		NONE	
TO900C25X	HONEYWELL	**NO REPLACEMENT**		NONE	
TO900C26X	HONEYWELL	**NO REPLACEMENT**		NONE	
TO900C27X	HONEYWELL	**NO REPLACEMENT**		NONE	
TO900C28X	HONEYWELL	**NO REPLACEMENT**		NONE	
TO900C29X	HONEYWELL	**NO REPLACEMENT**		NONE	
TO900C2X	HONEYWELL	**NO REPLACEMENT**		NONE	
TO900C30X	HONEYWELL	**NO REPLACEMENT**		NONE	
TO900C31X	HONEYWELL	**NO REPLACEMENT**		NONE	
TO900C32X	HONEYWELL	**NO REPLACEMENT**		NONE	
TO900C3X	HONEYWELL	**NO REPLACEMENT**		NONE	
TO900C4X	HONEYWELL	**NO REPLACEMENT**		NONE	
TO900C5X	HONEYWELL	**NO REPLACEMENT**		NONE	
TO900C6X	HONEYWELL	**NO REPLACEMENT**		NONE	
TO900C7X	HONEYWELL	**NO REPLACEMENT**		NONE	
TO900C8X	HONEYWELL	**NO REPLACEMENT**		NONE	
TO900C9X	HONEYWELL	**NO REPLACEMENT**		NONE	
TO900D	HONEYWELL	**NO REPLACEMENT**		NONE	
TO900D13X	HONEYWELL	**TP972A2044**		FUNCTIONAL	
TO900D15X	HONEYWELL	**TP972A2044**		FUNCTIONAL	
TO900D16X	HONEYWELL	**TP972A2044**		FUNCTIONAL	
TO900D17X	HONEYWELL	**TP972A2044**		FUNCTIONAL	
TO900D18X	HONEYWELL	**TP972A2044**		FUNCTIONAL	

ITEM NUMBER	MANUFACTURER	REPLACEMENT ITEM		TYPE OF REPLACEMENT	REMARKS
TO900D19X	HONEYWELL	**TP972A2044**		FUNCTIONAL	
TO900D1X	HONEYWELL	**TP972A2044**		FUNCTIONAL	
TO900D20X	HONEYWELL	**TP972A2044**		FUNCTIONAL	
TO900D2X	HONEYWELL	**TP972A2044**		FUNCTIONAL	
TO900D3X	HONEYWELL	**TP972A2044**		FUNCTIONAL	
TO900D8X	HONEYWELL	**TP972A2044**		FUNCTIONAL	
TO900DX14X	HONEYWELL	**TP972A2044**		FUNCTIONAL	
TO900DX4X	HONEYWELL	**TP972A2044**		FUNCTIONAL	
TO900DX5X	HONEYWELL	**TP972A2044**		FUNCTIONAL	
TO900DX6X	HONEYWELL	**TP972A2044**		FUNCTIONAL	
TO900DX7X	HONEYWELL	**TP972A2044**		FUNCTIONAL	
TO900EX1X	HONEYWELL	**NO REPLACEMENT**		NONE	
TO900EX2X	HONEYWELL	**NO REPLACEMENT**		NONE	
TO900F1X	HONEYWELL	**NO REPLACEMENT**		NONE	
TO900F2X	HONEYWELL	**NO REPLACEMENT**		NONE	
TO900F3X	HONEYWELL	**NO REPLACEMENT**		NONE	
TO900F4X	HONEYWELL	**NO REPLACEMENT**		NONE	
TO900F5X	HONEYWELL	**NO REPLACEMENT**		NONE	
TO900F6X	HONEYWELL	**NO REPLACEMENT**		NONE	
TO900F7X	HONEYWELL	**NO REPLACEMENT**		NONE	
TO900F8X	HONEYWELL	**NO REPLACEMENT**		NONE	
TO900F9X	HONEYWELL	**NO REPLACEMENT**		NONE	
TO900G	HONEYWELL	**NO REPLACEMENT**		NONE	
TO900G1X	HONEYWELL	**TP971A2045**		FUNCTIONAL	
TO900H	HONEYWELL	**NO REPLACEMENT**		NONE	
TO900H1X	HONEYWELL	**TP971C2009**		FUNCTIONAL	
TO900H2X	HONEYWELL	**TP971C2009**		FUNCTIONAL	
TO900X10X	HONEYWELL	**TP972A2044**		FUNCTIONAL	
TO900X11X	HONEYWELL	**TP972A2044**		FUNCTIONAL	
TO900X12X	HONEYWELL	**TP972A2044**		FUNCTIONAL	
TO900X9X	HONEYWELL	**TP972A2044**		FUNCTIONAL	
TO901A	HONEYWELL	**NO REPLACEMENT**		NONE	
TO901A1X	HONEYWELL	**TP973A2092**		FUNCTIONAL	
TO901A2X	HONEYWELL	**TP973A2092**		FUNCTIONAL	
TO901A3X	HONEYWELL	**TP973A2092**		FUNCTIONAL	
TO901A4X	HONEYWELL	**TP973A2092**		FUNCTIONAL	
TO901A5X	HONEYWELL	**TP973A2092**		FUNCTIONAL	
TO901A6X	HONEYWELL	**TP973A2092**		FUNCTIONAL	
TO901A7X	HONEYWELL	**TP973A2092**		FUNCTIONAL	
TO901A8X	HONEYWELL	**TP973A2092**		FUNCTIONAL	
TO901B	HONEYWELL	**NO REPLACEMENT**		NONE	
TO901B1X	HONEYWELL	**TP973B2066**		FUNCTIONAL	
TO901B2X	HONEYWELL	**TP973B2066**		FUNCTIONAL	
TO901C	HONEYWELL	**NO REPLACEMENT**		NONE	
TO901C1X	HONEYWELL	**TP973A2092**		FUNCTIONAL	
TO901C2X	HONEYWELL	**TP973A2092**		FUNCTIONAL	
TO901C3X	HONEYWELL	**TP973A2092**		FUNCTIONAL	
TO902A	HONEYWELL	**NO REPLACEMENT**		NONE	
TO902A1X	HONEYWELL	**TP970A2053**		FUNCTIONAL	
TO902A2X	HONEYWELL	**TP970A2053**		FUNCTIONAL	

Pneumatic Product Cross Reference

ITEM NUMBER	MANUFACTURER	REPLACEMENT ITEM		TYPE OF REPLACEMENT	REMARKS
TO9037X	HONEYWELL	**TP970A2053**	OR	FUNCTIONAL	
TO9037X	HONEYWELL	**TP970B2036**		FUNCTIONAL	
TO9038X	HONEYWELL	**TP970A2053**	OR	FUNCTIONAL	
TO9038X	HONEYWELL	**TP970B2036**		FUNCTIONAL	
TO903A	HONEYWELL	**NO REPLACEMENT**		NONE	
TO903A1X	HONEYWELL	**TP970A2053**	OR	FUNCTIONAL	
TO903A1X	HONEYWELL	**TP970B2036**		FUNCTIONAL	
TO903A2X	HONEYWELL	**TP970A2053**	OR	FUNCTIONAL	
TO903A2X	HONEYWELL	**TP970B2036**		FUNCTIONAL	
TO903A3X	HONEYWELL	**TP970A2053**	OR	FUNCTIONAL	
TO903A3X	HONEYWELL	**TP970B2036**		FUNCTIONAL	
TO903A4X	HONEYWELL	**TP970A2053**	OR	FUNCTIONAL	
TO903A4X	HONEYWELL	**TP970B2036**		FUNCTIONAL	
TO903A5X	HONEYWELL	**TP970A2053**	OR	FUNCTIONAL	
TO903A5X	HONEYWELL	**TP970B2036**		FUNCTIONAL	
TO903A6X	HONEYWELL	**TP970A2053**	OR	FUNCTIONAL	
TO903A6X	HONEYWELL	**TP970B2036**		FUNCTIONAL	
TO903B	HONEYWELL	**NO REPLACEMENT**		NONE	
TO903B1X	HONEYWELL	**TP971A2045**	OR	FUNCTIONAL	
TO903B1X	HONEYWELL	**TP971B2001**		FUNCTIONAL	
TO903B2X	HONEYWELL	**TP971A2045**	OR	FUNCTIONAL	
TO903B2X	HONEYWELL	**TP971B2001**		FUNCTIONAL	
TO903B3X	HONEYWELL	**TP971A2045**	OR	FUNCTIONAL	
TO903B3X	HONEYWELL	**TP971B2001**		FUNCTIONAL	
TO903B4X	HONEYWELL	**TP971A2045**	OR	FUNCTIONAL	
TO903B4X	HONEYWELL	**TP971B2001**		FUNCTIONAL	
TO903B5X	HONEYWELL	**TP971A2045**	OR	FUNCTIONAL	
TO903B5X	HONEYWELL	**TP971B2001**		FUNCTIONAL	
TO903B6X	HONEYWELL	**TP971A2045**	OR	FUNCTIONAL	
TO903B6X	HONEYWELL	**TP971B2001**		FUNCTIONAL	
TO903B7X	HONEYWELL	**TP971A2045**	OR	FUNCTIONAL	
TO903B7X	HONEYWELL	**TP971B2001**		FUNCTIONAL	
TO903B8X	HONEYWELL	**TP971A2045**	OR	FUNCTIONAL	
TO903B8X	HONEYWELL	**TP971B2001**		FUNCTIONAL	
TO910A	HONEYWELL	**NO REPLACEMENT**		NONE	
TO910A10X	HONEYWELL	**TP970A2053**		FUNCTIONAL	
TO910A11X	HONEYWELL	**TP970A2053**		FUNCTIONAL	
TO910A12X	HONEYWELL	**TP970A2053**		FUNCTIONAL	
TO910A13X	HONEYWELL	**TP970A2053**		FUNCTIONAL	
TO910A14X	HONEYWELL	**TP970A2095**		FUNCTIONAL	
TO910A15X	HONEYWELL	**TP970A2053**		FUNCTIONAL	
TO910A16X	HONEYWELL	**TP970A2053**		FUNCTIONAL	
TO910A17X	HONEYWELL	**TP970A2053**		FUNCTIONAL	
TO910A18X	HONEYWELL	**TP970A2053**		FUNCTIONAL	
TO910A19X	HONEYWELL	**TP970A2053**		FUNCTIONAL	
TO910A1X	HONEYWELL	**TP970A2053**		FUNCTIONAL	
TO910A20X	HONEYWELL	**TP970A2053**		FUNCTIONAL	
TO910A21X	HONEYWELL	**TP970A2053**		FUNCTIONAL	
TO910A22X	HONEYWELL	**TP970A2095**		FUNCTIONAL	
TO910A23X	HONEYWELL	**TP970A2095**		FUNCTIONAL	

Pneumatic Product Cross Reference

ITEM NUMBER	MANUFACTURER	REPLACEMENT ITEM		TYPE OF REPLACEMENT	REMARKS
TO910A24X	HONEYWELL	**TP970A2053**		FUNCTIONAL	
TO910A2X	HONEYWELL	**TP970A2053**		FUNCTIONAL	
TO910A3X	HONEYWELL	**TP970A2053**		FUNCTIONAL	
TO910A4X	HONEYWELL	**TP970A2095**		FUNCTIONAL	
TO910A5X	HONEYWELL	**TP970A2053**		FUNCTIONAL	
TO910A6X	HONEYWELL	**TP970A2053**		FUNCTIONAL	
TO910A7X	HONEYWELL	**TP970A2053**		FUNCTIONAL	
TO910A8X	HONEYWELL	**TP970A2053**		FUNCTIONAL	
TO910A9X	HONEYWELL	**TP970A2053**		FUNCTIONAL	
TO910B11X	HONEYWELL	**TP970B2036**		FUNCTIONAL	
TO910B12X	HONEYWELL	**TP970B2036**		FUNCTIONAL	
TO910B13X	HONEYWELL	**TP970B2036**		FUNCTIONAL	
TO910B14X	HONEYWELL	**NO REPLACEMENT**		NONE	
TO910B15X	HONEYWELL	**TP970B2036**		FUNCTIONAL	
TO910B16X	HONEYWELL	**TP970B2036**		FUNCTIONAL	
TO910B17X	HONEYWELL	**TP970B2036**		FUNCTIONAL	
TO910B18X	HONEYWELL	**TP970B2036**		FUNCTIONAL	
TO910B19X	HONEYWELL	**TP970B2036**		FUNCTIONAL	
TO910B1X	HONEYWELL	**TP970B2036**		FUNCTIONAL	
TO910B20X	HONEYWELL	**TP970B2036**		FUNCTIONAL	
TO910B21X	HONEYWELL	**TP970B2036**		FUNCTIONAL	
TO910B22X	HONEYWELL	**TP970B2036**		FUNCTIONAL	
TO910B2X	HONEYWELL	**TP970B2036**		FUNCTIONAL	
TO910B3X	HONEYWELL	**TP970B2036**		FUNCTIONAL	
TO910B4X	HONEYWELL	**NO REPLACEMENT**		NONE	
TO910B5X	HONEYWELL	**TP970B2036**		FUNCTIONAL	
TO910B6X	HONEYWELL	**TP970B2036**		FUNCTIONAL	
TO910B7X	HONEYWELL	**TP970B2036**		FUNCTIONAL	
TO910B8X	HONEYWELL	**TP970B2036**		FUNCTIONAL	
TO910B9X	HONEYWELL	**TP970B2036**		FUNCTIONAL	
TO910BX	HONEYWELL	**TP970B2036**		FUNCTIONAL	
TO911A	HONEYWELL	**NO REPLACEMENT**		NONE	
TO911A1X	HONEYWELL	**TP971A2045**		FUNCTIONAL	
TO911A2X	HONEYWELL	**TP971A2045**		FUNCTIONAL	
TO911A3X	HONEYWELL	**TP971A2045**		FUNCTIONAL	
TO911A4X	HONEYWELL	**TP971A2045**		FUNCTIONAL	
TO911B	HONEYWELL	**NO REPLACEMENT**		NONE	
TO911B1X	HONEYWELL	**TP971B2068**		FUNCTIONAL	
TO911B2X	HONEYWELL	**TP971B2068**		FUNCTIONAL	
TO911C1X	HONEYWELL	**TP971C0258**		FUNCTIONAL	
TO911C2X	HONEYWELL	**TP971C0258**		FUNCTIONAL	
TO913A	HONEYWELL	**NO REPLACEMENT**		NONE	
TO91A	HONEYWELL	**NO REPLACEMENT**		NONE	
TO91A1X	HONEYWELL	**TP970A2004**	OR	FUNCTIONAL	
TO91A1X	HONEYWELL	**TP970A2038**		FUNCTIONAL	
TO92A1X	HONEYWELL	**TP970A**	WITH	FUNCTIONAL	
TO92A1X	HONEYWELL	**RP471A**		FUNCTIONAL	
TO93A	HONEYWELL	**NO REPLACEMENT**		NONE	
TO93A1X1	HONEYWELL	**TP970A2004**	OR	FUNCTIONAL	
TO93A1X1	HONEYWELL	**TP970A2038**		FUNCTIONAL	

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ITEM NUMBER	MANUFACTURER	REPLACEMENT ITEM		TYPE OF REPLACEMENT	REMARKS
TO93A2X2	HONEYWELL	**TP970A2004**	OR	FUNCTIONAL	
TO93A2X2	HONEYWELL	**TP970A2038**		FUNCTIONAL	
TO93A3X	HONEYWELL	**TP970A2004**	OR	FUNCTIONAL	
TO93A3X	HONEYWELL	**TP970A2038**		FUNCTIONAL	
TO93AX4X-X17X	HONEYWELL	**TP970A2004**	OR	FUNCTIONAL	
TO93AX4X-X17X	HONEYWELL	**TP970A2038**		FUNCTIONAL	
TO93B	HONEYWELL	**NO REPLACEMENT**		NONE	
TO93B1X-24X	HONEYWELL	**TP970A2004**	OR	FUNCTIONAL	
TO93B1X-24X	HONEYWELL	**TP970A2038**		FUNCTIONAL	
TO93C	HONEYWELL	**NO REPLACEMENT**		NONE	
TO93D	HONEYWELL	**NO REPLACEMENT**		NONE	
TO93D1X-19X	HONEYWELL	**TP973A2068**	OR	FUNCTIONAL	
TO93D1X-19X	HONEYWELL	**TP973A2076**		FUNCTIONAL	
TO93E1X-19X	HONEYWELL	**TP973B2066**		FUNCTIONAL	
TO94A,B1X-19X	HONEYWELL	**NO REPLACEMENT**		NONE	
TO95A1X,2X	HONEYWELL	**NO REPLACEMENT**		NONE	
TO95AX3X-X8X	HONEYWELL	**NO REPLACEMENT**		NONE	
TO95B1X-3X	HONEYWELL	**TP938A**		FUNCTIONAL	
TO95C	HONEYWELL	**NO REPLACEMENT**		NONE	
TO95D	HONEYWELL	**NO REPLACEMENT**		NONE	
TO96A1X-7X,X8X	HONEYWELL	**NO REPLACEMENT**		NONE	
TO96B1X-7X,X8X	HONEYWELL	**NO REPLACEMENT**		NONE	
TO96C1X-7X,X8X	HONEYWELL	**NO REPLACEMENT**		NONE	
TO97A1X,2X	HONEYWELL	**NO REPLACEMENT**		NONE	
TP2210	ROBERTSHAW	**NO REPLACEMENT**		NONE	
TP2212	ROBERTSHAW	**TP970C2000**	OR	FUNCTIONAL	
TP2212	ROBERTSHAW	**TP970D2008**		FUNCTIONAL	
TP2213	ROBERTSHAW	**NO REPLACEMENT**		NONE	
TP2214	ROBERTSHAW	**TP971A2029**	OR	FUNCTIONAL	
TP2214	ROBERTSHAW	**TP971B2019**		FUNCTIONAL	
TP2216	ROBERTSHAW	**TP971C2009**		FUNCTIONAL	
TP900A	HONEYWELL	**NO REPLACEMENT**		NONE	
TP900A1009	HONEYWELL	**TP970A2053**	OR	FUNCTIONAL	
TP900A1009	HONEYWELL	**TP970B2036**		FUNCTIONAL	
TP900A1017	HONEYWELL	**TP970A2053**	OR	FUNCTIONAL	
TP900A1017	HONEYWELL	**TP970B2036**		FUNCTIONAL	
TP900A1025	HONEYWELL	**TP970A2053**	OR	FUNCTIONAL	
TP900A1025	HONEYWELL	**TP970B2036**		FUNCTIONAL	
TP900A1033	HONEYWELL	**TP970A2053**	OR	FUNCTIONAL	
TP900A1033	HONEYWELL	**TP970B2036**		FUNCTIONAL	
TP900A1041	HONEYWELL	**TP970A2053**	OR	FUNCTIONAL	
TP900A1041	HONEYWELL	**TP970B2036**		FUNCTIONAL	
TP900A1058	HONEYWELL	**TP970A2053**	OR	FUNCTIONAL	
TP900A1058	HONEYWELL	**TP970B2036**		FUNCTIONAL	
TP900A1066	HONEYWELL	**TP970A2053**	OR	FUNCTIONAL	
TP900A1066	HONEYWELL	**TP970B2036**		FUNCTIONAL	
TP900A1074	HONEYWELL	**TP970A2053**	OR	FUNCTIONAL	
TP900A1074	HONEYWELL	**TP970B2036**		FUNCTIONAL	
TP900A1082	HONEYWELL	**NO REPLACEMENT**		NONE	
TP900A1090	HONEYWELL	**NO REPLACEMENT**		NONE	
TP900A1108	HONEYWELL	**NO REPLACEMENT**		NONE	

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ITEM NUMBER	MANUFACTURER	REPLACEMENT ITEM		TYPE OF REPLACEMENT	REMARKS
TP900A1116	HONEYWELL	**NO REPLACEMENT**		NONE	
TP900A1124	HONEYWELL	**NO REPLACEMENT**		NONE	
TP900A1132	HONEYWELL	**NO REPLACEMENT**		NONE	
TP900A1140	HONEYWELL	**NO REPLACEMENT**		NONE	
TP900A1157	HONEYWELL	**NO REPLACEMENT**		NONE	
TP900A1165	HONEYWELL	**NO REPLACEMENT**		NONE	
TP900B	HONEYWELL	**NO REPLACEMENT**		NONE	
TP900B1007	HONEYWELL	**TP971A2003**	OR	FUNCTIONAL	
TP900B1007	HONEYWELL	**TP970B2002**		FUNCTIONAL	
TP900B1015	HONEYWELL	**TP971A2003**	OR	FUNCTIONAL	
TP900B1015	HONEYWELL	**TP970B2002**		FUNCTIONAL	
TP900B1023	HONEYWELL	**TP971A2003**	OR	FUNCTIONAL	
TP900B1023	HONEYWELL	**TP970B2002**		FUNCTIONAL	
TP900B1031	HONEYWELL	**TP971A2003**	OR	FUNCTIONAL	
TP900B1031	HONEYWELL	**TP970B2002**		FUNCTIONAL	
TP900C	HONEYWELL	**NO REPLACEMENT**		NONE	
TP900C1005	HONEYWELL	**NO REPLACEMENT**		NONE	
TP900C1013	HONEYWELL	**NO REPLACEMENT**		NONE	
TP900C1021	HONEYWELL	**NO REPLACEMENT**		NONE	
TP900C1039	HONEYWELL	**NO REPLACEMENT**		NONE	
TP900C1270	HONEYWELL	**NO REPLACEMENT**		NONE	
TP900D	HONEYWELL	**NO REPLACEMENT**		NONE	
TP900D1003	HONEYWELL	**TP972A2044**		FUNCTIONAL	
TP900D1011	HONEYWELL	**TP972A2044**		FUNCTIONAL	
TP900D1029	HONEYWELL	**TP972A2044**		FUNCTIONAL	
TP900F1008	HONEYWELL	**NO REPLACEMENT**		NONE	
TP900F1016	HONEYWELL	**NO REPLACEMENT**		NONE	
TP900F1024	HONEYWELL	**NO REPLACEMENT**		NONE	
TP900F1032	HONEYWELL	**NO REPLACEMENT**		NONE	
TP900F1040	HONEYWELL	**NO REPLACEMENT**		NONE	
TP900F1057	HONEYWELL	**NO REPLACEMENT**		NONE	
TP900G	HONEYWELL	**NO REPLACEMENT**		NONE	
TP900G1006	HONEYWELL	**TP971A2045**		FUNCTIONAL	
TP900G1014	HONEYWELL	**TP971A2045**		FUNCTIONAL	
TP900H1004	HONEYWELL	**TP971C2009**		FUNCTIONAL	
TP900H1012	HONEYWELL	**TP971C2009**		FUNCTIONAL	
TP900H1020	HONEYWELL	**TP971C2009**		FUNCTIONAL	
TP901A	HONEYWELL	**NO REPLACEMENT**		NONE	
TP901B	HONEYWELL	**NO REPLACEMENT**		NONE	
TP901C1004	HONEYWELL	**TP973A2092**		FUNCTIONAL	
TP901C1012	HONEYWELL	**TP973A2092**		FUNCTIONAL	
TP901C1020	HONEYWELL	**TP973A2092**		FUNCTIONAL	
TP901C1038	HONEYWELL	**TP973A2092**		FUNCTIONAL	
TP901C1045	HONEYWELL	**TP973A2092**		FUNCTIONAL	
TP901C1053	HONEYWELL	**TP973A2092**		FUNCTIONAL	
TP901C1061	HONEYWELL	**TP973A2092**		FUNCTIONAL	
TP902A1007	HONEYWELL	**TP970A2053**		FUNCTIONAL	
TP902A1015	HONEYWELL	**TP970A2053**		FUNCTIONAL	
TP902A1023	HONEYWELL	**TP970A2053**		FUNCTIONAL	
TP902A1031	HONEYWELL	**TP970A2053**		FUNCTIONAL	

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ITEM NUMBER	MANUFACTURER	REPLACEMENT ITEM		TYPE OF REPLACEMENT	REMARKS
TP903A1006	HONEYWELL	**TP970A2053**	OR	FUNCTIONAL	
TP903A1006	HONEYWELL	**TP970B2036**		FUNCTIONAL	
TP903A1014	HONEYWELL	**TP970A2053**	OR	FUNCTIONAL	
TP903A1014	HONEYWELL	**TP970B2036**		FUNCTIONAL	
TP903A1022	HONEYWELL	**TP970A2053**	OR	FUNCTIONAL	
TP903A1022	HONEYWELL	**TP970B2036**		FUNCTIONAL	
TP903A1030	HONEYWELL	**TP970A2053**	OR	FUNCTIONAL	
TP903A1030	HONEYWELL	**TP970B2036**		FUNCTIONAL	
TP903B1004	HONEYWELL	**TP971A2045**	OR	FUNCTIONAL	
TP903B1004	HONEYWELL	**TP971B2001**		FUNCTIONAL	
TP903B1012	HONEYWELL	**TP971A2045**	OR	FUNCTIONAL	
TP903B1012	HONEYWELL	**TP971B2001**		FUNCTIONAL	
TP903B1020	HONEYWELL	**TP971A2045**	OR	FUNCTIONAL	
TP903B1020	HONEYWELL	**TP971B2001**		FUNCTIONAL	
TP903B1038	HONEYWELL	**TP971A2045**	OR	FUNCTIONAL	
TP903B1038	HONEYWELL	**TP971B2001**		FUNCTIONAL	
TP910A1007	HONEYWELL	**TP970A2053**		FUNCTIONAL	
TP910A1015	HONEYWELL	**TP970A2053**		FUNCTIONAL	
TP910A1023	HONEYWELL	**TP970A2053**		FUNCTIONAL	
TP910A1031	HONEYWELL	**TP970A2053**		FUNCTIONAL	
TP910A1049	HONEYWELL	**TP970A2053**		FUNCTIONAL	
TP910A1064	HONEYWELL	**TP970A2053**		FUNCTIONAL	
TP910A1072	HONEYWELL	**TP970A2053**		FUNCTIONAL	
TP910A1080	HONEYWELL	**TP970A2053**		FUNCTIONAL	
TP910A1098	HONEYWELL	**TP970A2053**		FUNCTIONAL	
TP910A1106	HONEYWELL	**TP970A2053**		FUNCTIONAL	
TP910A1114	HONEYWELL	**TP970A2053**		FUNCTIONAL	
TP910A1122	HONEYWELL	**TP970A2095**		FUNCTIONAL	
TP910A1247	HONEYWELL	**TP970A2053**		FUNCTIONAL	
TP910A1254	HONEYWELL	**TP970A2053**		FUNCTIONAL	
TP910A1262	HONEYWELL	**TP970A2053**		FUNCTIONAL	
TP910A1270	HONEYWELL	**TP970A2053**		FUNCTIONAL	
TP910A1288	HONEYWELL	**TP970A2053**		FUNCTIONAL	
TP910A1338	HONEYWELL	**TP970A2053**		FUNCTIONAL	
TP910A1346	HONEYWELL	**TP970A2053**		FUNCTIONAL	
TP910A1379	HONEYWELL	**TP970A2053**		FUNCTIONAL	
TP910A1387	HONEYWELL	**TP970A2053**		FUNCTIONAL	
TP910A1403	HONEYWELL	**TP970A2053**		FUNCTIONAL	
TP910A1411	HONEYWELL	**TP970A2053**		FUNCTIONAL	
TP910A1429	HONEYWELL	**TP970A2053**		FUNCTIONAL	
TP910A1437	HONEYWELL	**TP970A2053**		FUNCTIONAL	
TP910A1445	HONEYWELL	**TP970A2053**		FUNCTIONAL	
TP910A1452	HONEYWELL	**TP970A2053**		FUNCTIONAL	
TP910A1460	HONEYWELL	**TP970A2053**		FUNCTIONAL	
TP910A1478	HONEYWELL	**TP970A2053**		FUNCTIONAL	
TP910A1486	HONEYWELL	**TP970A2095**		FUNCTIONAL	
TP910A1494	HONEYWELL	**TP970A2053**		FUNCTIONAL	
TP910A1502	HONEYWELL	**TP970A2053**		FUNCTIONAL	
TP910A1510	HONEYWELL	**TP970A2053**		FUNCTIONAL	
TP910A1528	HONEYWELL	**TP970A2053**		FUNCTIONAL	

ITEM NUMBER	MANUFACTURER	REPLACEMENT ITEM		TYPE OF REPLACEMENT	REMARKS
TP910A1536	HONEYWELL	**TP970A2053**		FUNCTIONAL	
TP910A1544	HONEYWELL	**TP970A2053**		FUNCTIONAL	
TP910A1577	HONEYWELL	**TP970A2053**		FUNCTIONAL	
TP910A1585	HONEYWELL	**TP970A2053**		FUNCTIONAL	
TP910A1593	HONEYWELL	**TP970A2053**		FUNCTIONAL	
TP910A1601	HONEYWELL	**TP970A2053**		FUNCTIONAL	
TP910A1619	HONEYWELL	**TP970A2053**		FUNCTIONAL	
TP910A1627	HONEYWELL	**TP970A2053**		FUNCTIONAL	
TP910A1635	HONEYWELL	**TP970A2053**		FUNCTIONAL	
TP910A1643	HONEYWELL	**TP970A2053**		FUNCTIONAL	
TP910A1650	HONEYWELL	**TP970A2095**		FUNCTIONAL	
TP910A1668	HONEYWELL	**TP970A2053**		FUNCTIONAL	
TP910A1670	HONEYWELL	**TP970A2053**		FUNCTIONAL	
TP910A1676	HONEYWELL	**TP970A2053**		FUNCTIONAL	
TP910A1684	HONEYWELL	**TP970A2053**		FUNCTIONAL	
TP910A1726	HONEYWELL	**TP970A2053**		FUNCTIONAL	
TP910A1734	HONEYWELL	**TP970A2053**		FUNCTIONAL	
TP910B	HONEYWELL	**NO REPLACEMENT**		NONE	
TP910B1005	HONEYWELL	**TP970B2036**		FUNCTIONAL	
TP910B1013	HONEYWELL	**TP970B2036**		FUNCTIONAL	
TP910B1021	HONEYWELL	**TP970B2036**		FUNCTIONAL	
TP910B1030	HONEYWELL	**NO REPLACEMENT**		NONE	
TP910B1047	HONEYWELL	**TP970B2036**		FUNCTIONAL	
TP910B1053	HONEYWELL	**TP970B2036**		FUNCTIONAL	
TP910B1054	HONEYWELL	**TP970B2036**		FUNCTIONAL	
TP910B1062	HONEYWELL	**TP970B2036**		FUNCTIONAL	
TP910B1146	HONEYWELL	**TP970B2036**		FUNCTIONAL	
TP910B1161	HONEYWELL	**TP970B2036**		FUNCTIONAL	
TP910B1179	HONEYWELL	**TP970B2036**		FUNCTIONAL	
TP910B1187	HONEYWELL	**TP970B2036**		FUNCTIONAL	
TP910B1229	HONEYWELL	**TP970B2036**		FUNCTIONAL	
TP910B1237	HONEYWELL	**TP970B2036**		FUNCTIONAL	
TP910B1252	HONEYWELL	**TP970B2036**		FUNCTIONAL	
TP910B1260	HONEYWELL	**TP970B2036**		FUNCTIONAL	
TP910B1278	HONEYWELL	**NO REPLACEMENT**		NONE	
TP910B1286	HONEYWELL	**TP970B2036**		FUNCTIONAL	
TP910B1294	HONEYWELL	**TP970B2036**		FUNCTIONAL	
TP910B1302	HONEYWELL	**TP970B2036**		FUNCTIONAL	
TP910B1310	HONEYWELL	**TP970B2036**		FUNCTIONAL	
TP910B1328	HONEYWELL	**TP970B2036**		FUNCTIONAL	
TP910B1336	HONEYWELL	**TP970B2036**		FUNCTIONAL	
TP910B1344	HONEYWELL	**TP970B2036**		FUNCTIONAL	
TP910B1351	HONEYWELL	**TP970B2036**		FUNCTIONAL	
TP910B1369	HONEYWELL	**TP970B2036**		FUNCTIONAL	
TP910B1377	HONEYWELL	**NO REPLACEMENT**		NONE	
TP910B1385	HONEYWELL	**TP970B2036**		FUNCTIONAL	
TP911A	HONEYWELL	**NO REPLACEMENT**		NONE	
TP911A1006	HONEYWELL	**TP971A2045**		FUNCTIONAL	
TP911A1014	HONEYWELL	**TP971A2045**		FUNCTIONAL	
TP911A1048	HONEYWELL	**TP971A2045**		FUNCTIONAL	

Pneumatic Product Cross Reference

ITEM NUMBER	MANUFACTURER	REPLACEMENT ITEM		TYPE OF REPLACEMENT	REMARKS
TP911A1055	HONEYWELL	**TP971A2045**		FUNCTIONAL	
TP911A1063	HONEYWELL	**TP971A2045**		FUNCTIONAL	
TP911A1089	HONEYWELL	**TP971A2045**		FUNCTIONAL	
TP911A1105	HONEYWELL	**TP971A2045**		FUNCTIONAL	
TP911A1113	HONEYWELL	**TP971A2045**		FUNCTIONAL	
TP911A1121	HONEYWELL	**TP971A2045**		FUNCTIONAL	
TP911A1139	HONEYWELL	**TP971A2045**		FUNCTIONAL	
TP911B	HONEYWELL	**NO REPLACEMENT**		NONE	
TP911C	HONEYWELL	**NO REPLACEMENT**		NONE	
TP911C1002	HONEYWELL	**TP971C2058**		FUNCTIONAL	
TP911C1028	HONEYWELL	**TP971C2058**		FUNCTIONAL	
TP911C1036	HONEYWELL	**TP971C2058**		FUNCTIONAL	
TP911C1044	HONEYWELL	**TP971C2058**		FUNCTIONAL	
TP911C1051	HONEYWELL	**TP971C2058**		FUNCTIONAL	
TP913A	HONEYWELL	**NO REPLACEMENT**		NONE	
TP913B	HONEYWELL	**NO REPLACEMENT**		NONE	
TP913C	HONEYWELL	**NO REPLACEMENT**		NONE	
TP913D	HONEYWELL	**NO REPLACEMENT**		NONE	
TP914A	HONEYWELL	**NO REPLACEMENT**		NONE	
TP915A	HONEYWELL	**NO REPLACEMENT**		NONE	
TP916A	HONEYWELL	**NO REPLACEMENT**		NONE	
TP917A	HONEYWELL	**NO REPLACEMENT**		NONE	
TP918A	HONEYWELL	**NO REPLACEMENT**		NONE	
TP918B	HONEYWELL	**NO REPLACEMENT**		NONE	
TP919A	HONEYWELL	**NO REPLACEMENT**		NONE	
TP920A	HONEYWELL	**NO REPLACEMENT**		NONE	
TP920B	HONEYWELL	**NO REPLACEMENT**		NONE	
TP921A	HONEYWELL	**NO REPLACEMENT**		NONE	
TP922A	HONEYWELL	**NO REPLACEMENT**		NONE	
TP923A	HONEYWELL	**NO REPLACEMENT**		NONE	
TP923B	HONEYWELL	**NO REPLACEMENT**		NONE	
TP924A	HONEYWELL	**NO REPLACEMENT**		NONE	
TP925A	HONEYWELL	**NO REPLACEMENT**		NONE	
TP926A	HONEYWELL	**NO REPLACEMENT**		NONE	
TP928A1007	MIRCOSWITCH	**NO REPLACEMENT**		NONE	
TP928A1023	MIRCOSWITCH	**NO REPLACEMENT**		NONE	
TP928A1031	MIRCOSWITCH	**NO REPLACEMENT**		NONE	
TP928A1080	MIRCOSWITCH	**NO REPLACEMENT**		NONE	
TP928A1098	MIRCOSWITCH	**NO REPLACEMENT**		NONE	
TP930A	HONEYWELL	**NO REPLACEMENT**		NONE	
TP931B	HONEYWELL	**NO REPLACEMENT**		NONE	
TP933A	HONEYWELL	**NO REPLACEMENT**		NONE	
TP937B1004		**NO REPLACEMENT**		NONE	
TP938A	HONEYWELL	**NO REPLACEMENT**		NONE	
TP938B	HONEYWELL	**NO REPLACEMENT**		NONE	
TP93A	HONEYWELL	**NO REPLACEMENT**		NONE	
TP940A	HONEYWELL	**NO REPLACEMENT**		NONE	
TP940B	HONEYWELL	**NO REPLACEMENT**		NONE	
TP954A1020	HONEYWELL	**TP954A1384**		FUNCTIONAL	
TP954A1038	HONEYWELL	**TP954A1418**		FUNCTIONAL	

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ITEM NUMBER	MANUFACTURER	REPLACEMENT ITEM		TYPE OF REPLACEMENT	REMARKS
TP954A1046	HONEYWELL	**NO REPLACEMENT**		NONE	
TP954A1053	HONEYWELL	**TP954A1517**		FUNCTIONAL	
TP954A1103	HONEYWELL	**TP954A1442**		FUNCTIONAL	
TP954A1111	HONEYWELL	**TP954A1491**		FUNCTIONAL	
TP954A1186	HONEYWELL	**NO REPLACEMENT**		NONE	
TP954A1285	HONEYWELL	**NO REPLACEMENT**		NONE	
TP954A1293	HONEYWELL	**NO REPLACEMENT**		NONE	
TP954A1301	HONEYWELL	**TP954A1467**		FUNCTIONAL	
TP954A1566	HONEYWELL	**TP954A1426**		FUNCTIONAL	
TP95B	HONEYWELL	**NO REPLACEMENT**		NONE	
TP9603B1000	HONEYWELL	**TP9600B1006**		FUNCTIONAL	
TP9610B1005	HONEYWELL	**TP971B2068**		FUNCTIONAL	
TP9613A1000	HONEYWELL	**TP9610A1006**		FUNCTIONAL	
TP9613B1009	HONEYWELL	**TP971B2068**		FUNCTIONAL	
TP9623A1009	HONEYWELL	**TP9620A1005**		FUNCTIONAL	
TP9633A1008	HONEYWELL	**TP9630A1004**		FUNCTIONAL	
TP9633B1007	HONEYWELL	**TP9630B1003**		FUNCTIONAL	
TP970A	HONEYWELL	**NO REPLACEMENT**		NONE	
TP970A02160	HONEYWELL	**TP970A2283**		FUNCTIONAL	
TP970A2087	HONEYWELL	**TP970A2004**	WITH	FUNCTIONAL	
TP970A2087	HONEYWELL	**14004406-111**	WITH	FUNCTIONAL	
TP970A2087	HONEYWELL	**14003192-001**		FUNCTIONAL	
TP970A2095	MIRCOSWITCH	**TP970A2012**	WITH	DIRECT	
TP970A2095	MIRCOSWITCH	**14002573-001**		DIRECT	
TP970A2103	HONEYWELL	**TP970A2004**	WITH	FUNCTIONAL	
TP970A2103	HONEYWELL	**14004407-300**		FUNCTIONAL	
TP970A2111		**NONE**		NONE	
TP970A2129	HONEYWELL	**TP970A2004**	WITH	DIRECT	
TP970A2129	HONEYWELL	**14004406-121**		DIRECT	
TP970A2160	HONEYWELL	**TP970A2283**		FUNCTIONAL	
TP970A2178	HONEYWELL	**TP970A2242**	OR	FUNCTIONAL	
TP970A2178	HONEYWELL	**TP9600A1007**		FUNCTIONAL	
TP970A2186	HONEYWELL	**TP970A2242**	OR	FUNCTIONAL	
TP970A2186	HONEYWELL	**TP9603A1001**		FUNCTIONAL	
TP970A2194	HONEYWELL	**TP970A2259**		FUNCTIONAL	
TP970A2202	HONEYWELL	**NO REPLACEMENT**		NONE	
TP970A2210	HONEYWELL	**TP970A2004**		FUNCTIONAL	
TP970A2267	HONEYWELL	**TP970A2004**	WITH	DIRECT	
TP970A2267	HONEYWELL	**14004878-910**		DIRECT	
TP970A2275	HONEYWELL	**TP970A2004**	WITH	DIRECT	
TP970A2275	HONEYWELL	**14004878-910**	WITH	DIRECT	
TP970A2275	HONEYWELL	**14004401-004**		DIRECT	
TP970A2291	MIRCOSWITCH	**NO REPLACEMENT**		NONE	
TP970A2325		**NONE**		NONE	
TP970B	HONEYWELL	**NO REPLACEMENT**		NONE	
TP970B1002	HONEYWELL	**TP970B2002**		DIRECT	
TP970B1010	HONEYWELL	**TP970B2010**		DIRECT	
TP970B1028	HONEYWELL	**TP970B2028**		DIRECT	
TP970B1036	HONEYWELL	**TP970B2036**		DIRECT	
TP970B1044	HONEYWELL	**NO REPLACEMENT**		NONE	

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ITEM NUMBER	MANUFACTURER	REPLACEMENT ITEM		TYPE OF REPLACEMENT	REMARKS
TP970B1069	HONEYWELL	**TP970B2069**		DIRECT	
TP970B1077	HONEYWELL	**TP970B2077**		DIRECT	
TP970B2028	HONEYWELL	**TP970B2002**	WITH	DIRECT	
TP970B2028	HONEYWELL	**14004406-111**	WITH	DIRECT	
TP970B2028	HONEYWELL	**14002573-001**		DIRECT	
TP970B2036	HONEYWELL	**TP970B2002**	WITH	DIRECT	
TP970B2036	HONEYWELL	**14004406-111**	WITH	DIRECT	
TP970B2036	HONEYWELL	**14003192-001**		DIRECT	
TP970B2069	HONEYWELL	**NO REPLACEMENT**		NONE	
TP970B2093	HONEYWELL	**TP970B2216**		FUNCTIONAL	
TP970B2101	HONEYWELL	**TP970B2216**		FUNCTIONAL	
TP970B2119	HONEYWELL	**TP970B2216**		FUNCTIONAL	
TP970B2135	HONEYWELL	**TP970B2216**		FUNCTIONAL	
TP970B2190	HONEYWELL	**TP970B2002**	WITH	DIRECT	
TP970B2190	HONEYWELL	**14004878-910**	OR	DIRECT	
TP970B2190	HONEYWELL	**TP9600B1006**		DIRECT	
TP970B2208	HONEYWELL	**TP970B2002**	WITH	DIRECT	
TP970B2208	HONEYWELL	**14004878-910**	WITH	DIRECT	
TP970B2208	HONEYWELL	**14004401-004**		DIRECT	
TP970C	HONEYWELL	**NO REPLACEMENT**		NONE	
TP970C1000	HONEYWELL	**TP970C2000**		DIRECT	
TP970C1018	HONEYWELL	**NO REPLACEMENT**		NONE	
TP970D	HONEYWELL	**NO REPLACEMENT**		NONE	
TP970D1008	HONEYWELL	**TP970D2008**		DIRECT	
TP970D1016	HONEYWELL	**NO REPLACEMENT**		NONE	
TP970D2008	HONEYWELL	**TP970C2000**	WITH	FUNCTIONAL	
TP970D2008	HONEYWELL	**RP972A1006**		FUNCTIONAL	
TP971A	HONEYWELL	**NO REPLACEMENT**		NONE	
TP971A1003	HONEYWELL	**TP971A2003**		DIRECT	
TP971A1009	HONEYWELL	**TP971A2009**		DIRECT	
TP971A1011	HONEYWELL	**TP971A2011**		DIRECT	
TP971A1029	HONEYWELL	**TP971A2029**		DIRECT	
TP971A1037	HONEYWELL	**TP971A2037**		DIRECT	
TP971A1045	HONEYWELL	**TP971A2045**		DIRECT	
TP971A1052	HONEYWELL	**TP971A2052**		DIRECT	
TP971A1060	HONEYWELL	**TP971A2060**		DIRECT	
TP971A1078	HONEYWELL	**NO REPLACEMENT**		NONE	
TP971A1086	HONEYWELL	**TP971A2086**		DIRECT	
TP971A1094	HONEYWELL	**TP971A2094**		DIRECT	
TP971A1102	HONEYWELL	**TP971A2102**		DIRECT	
TP971A2037	HONEYWELL	**TP971A2003**	WITH	DIRECT	
TP971A2037	HONEYWELL	**14004406-111**	WITH	DIRECT	
TP971A2037	HONEYWELL	**14002573-001**		DIRECT	
TP971A2045	HONEYWELL	**TP971A2003**	WITH	DIRECT	
TP971A2045	HONEYWELL	**14004406-111**	WITH	DIRECT	
TP971A2045	HONEYWELL	**14003192-001**		DIRECT	
TP971A2094	HONEYWELL	**TP971A2191**	WITH	FUNCTIONAL	
TP971A2094	HONEYWELL	**14004407-121**		FUNCTIONAL	
TP971A2110	HONEYWELL	**TP971A2191**		FUNCTIONAL	
TP971A2144	HONEYWELL	**TP971A2191**		FUNCTIONAL	

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ITEM NUMBER	MANUFACTURER	REPLACEMENT ITEM		TYPE OF REPLACEMENT	REMARKS
TP971A2169	HONEYWELL	**TP971A2191**		FUNCTIONAL	
TP971A2209	HONEYWELL	**TP971A2003**	WITH	DIRECT	
TP971A2209	HONEYWELL	**14004878-910**	WITH	DIRECT	
TP971A2209	HONEYWELL	**14002373-001**		DIRECT	
TP971A2217	HONEYWELL	**TP971A2003**	WITH	DIRECT	
TP971A2217	HONEYWELL	**14004878-910**	WITH	DIRECT	
TP971A2217	HONEYWELL	**14004401-002**	WITH	DIRECT	
TP971A2217	HONEYWELL	**14002373-001**		DIRECT	
TP971A2218	HONEYWELL	**TP971A2003**	WITH	FUNCTIONAL	
TP971A2218	HONEYWELL	**14004878-910**		FUNCTIONAL	
TP971A2225	HONEYWELL	**NO REPLACEMENT**		NONE	
TP971B1001	HONEYWELL	**TP971B2001**		DIRECT	
TP971B1027	HONEYWELL	**TP971B2027**		DIRECT	
TP971B1035	HONEYWELL	**TP971B2035**		DIRECT	
TP971B1043	HONEYWELL	**TP971B2043**		DIRECT	
TP971B1050	HONEYWELL	**TP971B2050**		DIRECT	
TP971B2074	HONEYWELL	**TP971B2001**	WITH	DIRECT	
TP971B2074	HONEYWELL	**14004878-910**	WITH	DIRECT	
TP971B2074	HONEYWELL	**14002373-001**		DIRECT	
TP971C1009	HONEYWELL	**TP971C2009**		DIRECT	
TP971C1017	HONEYWELL	**TP971C2017**		DIRECT	
TP971C1025	HONEYWELL	**TP971C2025**		DIRECT	
TP971C1043	HONEYWELL	**TP971C2043**		DIRECT	
TP971C2033	MIRCOSWITCH	**TP971C2017**	WITH	FUNCTIONAL	
TP971C2033	MIRCOSWITCH	**14002373-001**		FUNCTIONAL	
TP971D1007	HONEYWELL	**TP971D2007**		DIRECT	
TP971E1004	HONEYWELL	**TP971E2004**		DIRECT	
TP972A1002	HONEYWELL	**TP972A2002**		DIRECT	
TP972A1010	HONEYWELL	**TP972A2010**		DIRECT	
TP972A1028	HONEYWELL	**TP972A2028**		DIRECT	
TP972A1036	HONEYWELL	**TP972A2036**		DIRECT	
TP972A1044	HONEYWELL	**TP972A2044**		DIRECT	
TP972A1051	HONEYWELL	**NO REPLACEMENT**		NONE	
TP972A1077	HONEYWELL	**NO REPLACEMENT**		NONE	
TP972A1085	HONEYWELL	**NO REPLACEMENT**		NONE	
TP972A1093	HONEYWELL	**NO REPLACEMENT**		NONE	
TP972A1101	HONEYWELL	**NO REPLACEMENT**		NONE	
TP972A1119	HONEYWELL	**NO REPLACEMENT**		NONE	
TP972A1127	HONEYWELL	**NO REPLACEMENT**		NONE	
TP972A1143	HONEYWELL	**TP972A2143**		DIRECT	
TP972A1150	HONEYWELL	**TP972A2150**		DIRECT	
TP972A1168	HONEYWELL	**TP972A2168**		DIRECT	
TP972A1176	HONEYWELL	**TP972A2176**		DIRECT	
TP972A1184	HONEYWELL	**TP972A2184**		DIRECT	
TP972A2028	HONEYWELL	**TP972A2002**	WITH	DIRECT	
TP972A2028	HONEYWELL	**14004406-111**	WITH	DIRECT	
TP972A2028	HONEYWELL	**14002573-001**		DIRECT	
TP972A2044	HONEYWELL	**TP972A2002**	WITH	DIRECT	
TP972A2044	HONEYWELL	**14004406-111**	OR	DIRECT	
TP972A2044	HONEYWELL	**14003192-001**		DIRECT	

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ITEM NUMBER	MANUFACTURER	REPLACEMENT ITEM		TYPE OF REPLACEMENT	REMARKS
TP972A2135	MIRCOSWITCH	**TP972A2010**		FUNCTIONAL	
TP972A2168	HONEYWELL	**TP972A2002**	WITH	FUNCTIONAL	
TP972A2168	HONEYWELL	**14002373-001**		FUNCTIONAL	
TP972A2176	HONEYWELL	**NO REPLACEMENT**		NONE	
TP972A2200	MIRCOSWITCH	**TP972A2226**	WITH	FUNCTIONAL	
TP972A2200	MIRCOSWITCH	**14004401-002**		FUNCTIONAL	
TP972A2218	HONEYWELL	**TP972A2242**		FUNCTIONAL	
TP972A2234	HONEYWELL	**TP972A2242**	WITH	FUNCTIONAL	
TP972A2234	HONEYWELL	**14002373-001**		FUNCTIONAL	
TP972A2257	HONEYWELL	**TP972A2002**	WITH	FUNCTIONAL	
TP972A2257	HONEYWELL	**14004878-910**		FUNCTIONAL	
TP972A2265	HONEYWELL	**TP972A2002**	WITH	DIRECT	
TP972A2265	HONEYWELL	**14004878-910**	WITH	DIRECT	
TP972A2265	HONEYWELL	**14004401-002**		DIRECT	
TP973A1068	HONEYWELL	**TP973A2068**		DIRECT	
TP973A1076	HONEYWELL	**TP973A2076**		DIRECT	
TP973A1084	HONEYWELL	**TP973A2084**		DIRECT	
TP973A1092	HONEYWELL	**TP973A2092**		DIRECT	
TP973A1100	HONEYWELL	**TP973A2100**		DIRECT	
TP973A1118	HONEYWELL	**NO REPLACEMENT**		NONE	
TP973A1126	HONEYWELL	**NO REPLACEMENT**		NONE	
TP973A1134	HONEYWELL	**NO REPLACEMENT**		NONE	
TP973A1142	HONEYWELL	**NO REPLACEMENT**		NONE	
TP973A1159	HONEYWELL	**TP973A2159**		DIRECT	
TP973A1167	HONEYWELL	**TP973A2167**		DIRECT	
TP973A1175	HONEYWELL	**TP973A2175**		DIRECT	
TP973A1183	HONEYWELL	**TP973A2183**		DIRECT	
TP973A2068	HONEYWELL	**TP973A2076**	WITH	DIRECT	
TP973A2068	HONEYWELL	**14004406-111**	OR	DIRECT	
TP973A2068	HONEYWELL	**14002573-001**		DIRECT	
TP973A2092	HONEYWELL	**TP973A2076**	WITH	DIRECT	
TP973A2092	HONEYWELL	**14004406-111**	WITH	DIRECT	
TP973A2092	HONEYWELL	**14003192-001**	WITH	DIRECT	
TP973A2092	HONEYWELL	**14002913-001**		DIRECT	
TP973A2215	HONEYWELL	**TP973A2076**	WITH	DIRECT	
TP973A2215	HONEYWELL	**14004878-910**		DIRECT	
TP973B1066	HONEYWELL	**TP973B2066**		DIRECT	
TP973B1074	HONEYWELL	**TP973B2074**		DIRECT	
TP973B1090	HONEYWELL	**TP973B2090**		DIRECT	
TP973B1108	HONEYWELL	**TP973B2108**		DIRECT	
TP973B1116	HONEYWELL	**TP973B2116**		DIRECT	
TP973B1124	HONEYWELL	**TP973B2124**		DIRECT	
TP973B1132	HONEYWELL	**TP973B2132**		DIRECT	
TP973B1140	HONEYWELL	**TP973B2140**		DIRECT	
TP973B1157	HONEYWELL	**TP973B2157**		DIRECT	
TP973B2090		**TP973B2066**		FUNCTIONAL	
TP973B2140	HONEYWELL	**TP973B2066**	WITH	DIRECT	
TP973B2140	HONEYWELL	**14004407-300**		DIRECT	
TP973B2157	HONEYWELL	**TP973A2076**	WITH	FUNCTIONAL	
TP973B2157	HONEYWELL	**14004407-121**		FUNCTIONAL	

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ITEM NUMBER	MANUFACTURER	REPLACEMENT ITEM		TYPE OF REPLACEMENT	REMARKS
TP973B2189	HONEYWELL	**TP973B2066**	WITH	DIRECT	
TP973B2189	HONEYWELL	**14004878-910**		DIRECT	
TP974A	HONEYWELL	**NO REPLACEMENT**		NONE	
TP974A1000	HONEYWELL	**TP974A2000**		DIRECT	
TP975A	HONEYWELL	**NO REPLACEMENT**		NONE	
TP975B	HONEYWELL	**NO REPLACEMENT**		NONE	
TP976A	HONEYWELL	**NO REPLACEMENT**		NONE	
TP978A	HONEYWELL	**NO REPLACEMENT**		NONE	
TP978A1006	HONEYWELL	**NO REPLACEMENT**		NONE	
TP978B	HONEYWELL	**NO REPLACEMENT**		NONE	
TP978B1004	HONEYWELL	**NO REPLACEMENT**		NONE	
TP978C	HONEYWELL	**NO REPLACEMENT**		NONE	
TP978C1002	HONEYWELL	**NO REPLACEMENT**		NONE	
TP978D	HONEYWELL	**NO REPLACEMENT**		NONE	
TP978D1000	HONEYWELL	**NO REPLACEMENT**		NONE	
TP978E1007	HONEYWELL	**TP978E2007**		DIRECT	
TP979A	HONEYWELL	**NO REPLACEMENT**		NONE	
TP979A1005	HONEYWELL	**TP979A2005**		DIRECT	
TP979A2005	HONEYWELL	**TP970A2259**	WITH	FUNCTIONAL	
TP979A2005	HONEYWELL	**14004068-001**		FUNCTIONAL	
TP979A2013	HONEYWELL	**TP970A2259**	WITH	FUNCTIONAL	
TP979A2013	HONEYWELL	**14004068-001**		FUNCTIONAL	
TP979B	HONEYWELL	**NO REPLACEMENT**		NONE	
TP979B1003	HONEYWELL	**TP979B2003**		DIRECT	
TP979B2003	HONEYWELL	**TP970B2182**	WITH	FUNCTIONAL	
TP979B2003	HONEYWELL	**14004068-001**		FUNCTIONAL	
TP979C	HONEYWELL	**NO REPLACEMENT**		NONE	
TP979C1001	HONEYWELL	**TP979C2001**		DIRECT	
TP979C2001	HONEYWELL	**TP970A2259**	WITH	FUNCTIONAL	
TP979C2001	HONEYWELL	**TP970B2182**	WITH	FUNCTIONAL	
TP979C2001	HONEYWELL	**14004068-001**		FUNCTIONAL	
TP979C2019	HONEYWELL	**TP970A2259**	WITH	DIRECT	
TP979C2019	HONEYWELL	**TP970B2182**	WITH	DIRECT	
TP979C2019	HONEYWELL	**14004068-001**		DIRECT	
TP979D	HONEYWELL	**NO REPLACEMENT**		NONE	
TP979D1009	HONEYWELL	**TP979D2009**		DIRECT	
TP979D2009	HONEYWELL	**NO REPLACEMENT**		NONE	
TP979E	HONEYWELL	**NO REPLACEMENT**		NONE	
TP979E1006	HONEYWELL	**TP979E2006**		DIRECT	
TP979E2006	HONEYWELL	**NO REPLACEMENT**		NONE	
TT180	POWERS/LANDIS & GYR	**TP974A2000**		FUNCTIONAL	
TYPE158	POWERS/LANDIS & GYR	**RP970A1008**	OR	FUNCTIONAL	
TYPE158	POWERS/LANDIS & GYR	**RP972A1006**		FUNCTIONAL	
TYPE241	POWERS/LANDIS & GYR	**RP471A1002**	OR	FUNCTIONAL	
TYPE241	POWERS/LANDIS & GYR	**RP471A1010**		FUNCTIONAL	
TYPE305	POWERS/LANDIS & GYR	**RP471A1002**	OR	FUNCTIONAL	
TYPE305	POWERS/LANDIS & GYR	**RP471A1010**		FUNCTIONAL	
V3854-5	JOHNSON CONTROLS	**VP525A1119**	OR	FUNCTIONAL	
V3854-5	JOHNSON CONTROLS	**VP513A1048**		FUNCTIONAL	
V3854-7	JOHNSON CONTROLS	**VP525A1416**	OR	FUNCTIONAL	
V3854-7	JOHNSON CONTROLS	**VP513A1188**		FUNCTIONAL	

Pneumatic Product Cross Reference

ITEM NUMBER	MANUFACTURER	REPLACEMENT ITEM		TYPE OF REPLACEMENT	REMARKS
V3854-8	JOHNSON CONTROLS	**VP525A1119**	OR	FUNCTIONAL	
V3854-8	JOHNSON CONTROLS	**VP513A1188**		FUNCTIONAL	
V3854-9	JOHNSON CONTROLS	**VP525A1200**	OR	FUNCTIONAL	
V3854-9	JOHNSON CONTROLS	**VP513A1055**		FUNCTIONAL	
V4332-1004	JOHNSON CONTROLS	**VP526A1100**		FUNCTIONAL	
V4332-1006	JOHNSON CONTROLS	**VP526A1118**		FUNCTIONAL	
V4332-1007	JOHNSON CONTROLS	**VP526A1084**		FUNCTIONAL	
V6000-01310	ROBERTSHAW	**VP519C1006**		FUNCTIONAL	
V6101-01310	ROBERTSHAW	**VP513B1053**		FUNCTIONAL	
V6101-10307	ROBERTSHAW	**VP513B1053**		FUNCTIONAL	
V6401-01302	ROBERTSHAW	**VP512A1213**		FUNCTIONAL	
V6401-04302	ROBERTSHAW	**VP512A1643**		FUNCTIONAL	
V6401-16302	ROBERTSHAW	**VP512A1684**		FUNCTIONAL	
V6401-16307	ROBERTSHAW	**VP512A1296**		FUNCTIONAL	
V6401-25302	ROBERTSHAW	**VP512A1726**		FUNCTIONAL	
V6401-30302	ROBERTSHAW	**VP512A1767**		FUNCTIONAL	
V6501	ROBERTSHAW	**NO REPLACEMENT**		NONE	
V6501-25302	ROBERTSHAW	**VP512A1742**		FUNCTIONAL	
V6501-30302	ROBERTSHAW	**VP512A1783**		FUNCTIONAL	
V6600	ROBERTSHAW	**NO REPLACEMENT**		NONE	
V6900	ROBERTSHAW	**NO REPLACEMENT**		NONE	
V6900-01330	ROBERTSHAW	**VP522A1005**		FUNCTIONAL	
V6900-10330	ROBERTSHAW	**VP522A1039**		FUNCTIONAL	
V6900-20330	ROBERTSHAW	**VP522A1047**		FUNCTIONAL	
V6901	ROBERTSHAW	**NO REPLACEMENT**		NONE	
V6901-01331	ROBERTSHAW	**VP522B1003**		FUNCTIONAL	
V6901-20331	ROBERTSHAW	**VP522B1029**		FUNCTIONAL	
V8000	ROBERTSHAW	**NO REPLACEMENT**		NONE	
V8000-01111	ROBERTSHAW	**VP525A1077**		FUNCTIONAL	
V8000-03108	ROBERTSHAW	**VP525A1416**	OR	FUNCTIONAL	
V8000-03108	ROBERTSHAW	**VP531A1004**		FUNCTIONAL	
V8000-03111	ROBERTSHAW	**VP525A1077**	OR	FUNCTIONAL	
V8000-03111	ROBERTSHAW	**VP531A1012**		FUNCTIONAL	
V8000-04108	ROBERTSHAW	**VP525A1119**	OR	FUNCTIONAL	
V8000-04108	ROBERTSHAW	**VP531A1020**		FUNCTIONAL	
V8000-04111	ROBERTSHAW	**VP525A1101**	OR	FUNCTIONAL	
V8000-04111	ROBERTSHAW	**VP531A1038**		FUNCTIONAL	
V8000-15108	ROBERTSHAW	**VP525A1200**	OR	FUNCTIONAL	
V8000-15108	ROBERTSHAW	**VP531A1046**		FUNCTIONAL	
V8000-15111	ROBERTSHAW	**VP525A1150**	OR	FUNCTIONAL	
V8000-15111	ROBERTSHAW	**VP531A1053**		FUNCTIONAL	
V8000-16108	ROBERTSHAW	**VP525A1200**		FUNCTIONAL	
V8000-16111	ROBERTSHAW	**VP525A1192**		FUNCTIONAL	
V8100-04108	ROBERTSHAW	**VP525A1135**		FUNCTIONAL	
V8100-04111	ROBERTSHAW	**VP525A1127**		FUNCTIONAL	
V8100-15111	ROBERTSHAW	**VP525A1168**		FUNCTIONAL	
V8100-16108	ROBERTSHAW	**VP525A1226**		FUNCTIONAL	
V8100-16111	ROBERTSHAW	**VP525A1218**		FUNCTIONAL	
V8200-01108	ROBERTSHAW	**VP527A1059**		FUNCTIONAL	
V8200-02108	ROBERTSHAW	**VP527A1059**		FUNCTIONAL	

ITEM NUMBER	MANUFACTURER	REPLACEMENT ITEM		TYPE OF REPLACEMENT	REMARKS
V8200-03108	ROBERTSHAW	**VP527A1075**		FUNCTIONAL	
V8200-05108	ROBERTSHAW	**VP527A1067**		FUNCTIONAL	
V8300-03108	ROBERTSHAW	**VP526A1027**		FUNCTIONAL	
VK1114-201-3-4	BARBER COLMAN	**VP525A1135**		FUNCTIONAL	
VK1114-201-3-5	BARBER COLMAN	**VP525A1226**		FUNCTIONAL	
VK1114-211-3-3	BARBER COLMAN	**VP525A1085**		FUNCTIONAL	
VK1114-211-3-4	BARBER COLMAN	**VP525A1127**		FUNCTIONAL	
VK1114-211-3-5	BARBER COLMAN	**VP525A1218**		FUNCTIONAL	
VK1115-401-3-5	BARBER COLMAN	**VP512A1700**		FUNCTIONAL	
VK1115-401-3-6	BARBER COLMAN	**VP512A1700**		FUNCTIONAL	
VK1115-401-3-8	BARBER COLMAN	**VP512A1742**		FUNCTIONAL	
VK1115-401-3-9	BARBER COLMAN	**VP512A1783**		FUNCTIONAL	
VK9211-201-4-3	BARBER COLMAN	**VP525A1416**		FUNCTIONAL	
VK9211-201-4-4	BARBER COLMAN	**VP525A1119**		FUNCTIONAL	
VK9211-201-4-5	BARBER COLMAN	**VP525A1200**		FUNCTIONAL	
VK9211-202-4-3	BARBER COLMAN	**VP525A1077**		FUNCTIONAL	
VK9211-202-4-4	BARBER COLMAN	**VP525A1101**		FUNCTIONAL	
VK9211-202-4-5	BARBER COLMAN	**VP525A1192**		FUNCTIONAL	
VK9211-301-4-1	BARBER COLMAN	**VP512A1205**		FUNCTIONAL	
VK9211-301-4-2	BARBER COLMAN	**VP512A1221**		FUNCTIONAL	
VK9211-301-4-3	BARBER COLMAN	**VP512A1643**		FUNCTIONAL	
VK9211-301-4-5	BARBER COLMAN	**VP512A1270**		FUNCTIONAL	
VK9211-301-4-6	BARBER COLMAN	**VP512A1684**		FUNCTIONAL	
VK9211-301-4-8	BARBER COLMAN	**VP512A1726**		FUNCTIONAL	
VK9211-301-4-9	BARBER COLMAN	**VP512A1767**		FUNCTIONAL	
VK9211-302-4-5	BARBER COLMAN	**VP512A1296**		FUNCTIONAL	
VK9212-201-4-1	BARBER COLMAN	**VP527A1059**		FUNCTIONAL	
VK9212-201-4-2	BARBER COLMAN	**VP527A1067**		FUNCTIONAL	
VK9212-201-4-3	BARBER COLMAN	**VP513A1188**		FUNCTIONAL	
VK9212-202-4-1	BARBER COLMAN	**VP527A1018**		FUNCTIONAL	
VK9212-202-4-2	BARBER COLMAN	**VP527A1034**		FUNCTIONAL	
VK9212-202-4-3	BARBER COLMAN	**VP513A1204**		FUNCTIONAL	
VK9212-202-4-4	BARBER COLMAN	**VP513A1055**		FUNCTIONAL	
VK9212-301-4-3	BARBER COLMAN	**VP513A1188**		FUNCTIONAL	
VK9212-302-4-3	BARBER COLMAN	**VP513A1048**		FUNCTIONAL	
VK9213-201-4-2	BARBER COLMAN	**VP531A1004**		FUNCTIONAL	
VK9213-202-4-2	BARBER COLMAN	**VP531A1012**		FUNCTIONAL	
VK9213-202-4-3	BARBER COLMAN	**VP531A1038**		FUNCTIONAL	
VK9213-202-4-4	BARBER COLMAN	**VP531A1079**		FUNCTIONAL	
VK9213-301-4-3	BARBER COLMAN	**VP531A1020**		FUNCTIONAL	
VK9213-301-4-5	BARBER COLMAN	**VP531A1061**	OR	FUNCTIONAL	
VK9213-301-4-5	BARBER COLMAN	**VP512A1684**		FUNCTIONAL	
VK9221	BARBER COLMAN	**NO REPLACEMENT**		NONE	
VK9222-303-4-2	BARBER COLMAN	**VP513B1038**		FUNCTIONAL	
VK9222-303-4-3	BARBER COLMAN	**VP513B1053**		FUNCTIONAL	
VK9222-303-4-4	BARBER COLMAN	**VP513B1053**		FUNCTIONAL	
VK9312-201-4-2	BARBER COLMAN	**VP526A1035**		FUNCTIONAL	
VK9312-202-4-2	BARBER COLMAN	**VP526A1019**		FUNCTIONAL	
VK9312-203-4-2	BARBER COLMAN	**VP526A1050**		FUNCTIONAL	
VK9312-302-4-4	BARBER COLMAN	**VP517A1150**		FUNCTIONAL	

Pneumatic Product Cross Reference

ITEM NUMBER	MANUFACTURER	REPLACEMENT ITEM		TYPE OF REPLACEMENT	REMARKS
VK9332-203-4-2	BARBER COLMAN	**VP522A1005**		FUNCTIONAL	
VK9332-203-4-3	BARBER COLMAN	**VP522A1039**		FUNCTIONAL	
VK9332-203-4-4	BARBER COLMAN	**VP522A1047**		FUNCTIONAL	
VK9332-313-4-2	BARBER COLMAN	**VP522B1003**		FUNCTIONAL	
VK9332-313-4-3	BARBER COLMAN	**VP522B1011**		FUNCTIONAL	
VK9332-313-4-4	BARBER COLMAN	**VP522B1029**		FUNCTIONAL	
VO500A	HONEYWELL	**VP525**	OR	FUNCTIONAL	
VO500A	HONEYWELL	**VP513A**		FUNCTIONAL	
VO501A	HONEYWELL	**VP525A**	OR	FUNCTIONAL	
VO501A	HONEYWELL	**VP513A**		FUNCTIONAL	
VO502C	HONEYWELL	**NO REPLACEMENT**		NONE	
VO503A	HONEYWELL	**NO REPLACEMENT**		NONE	
VO503B	HONEYWELL	**NO REPLACEMENT**		NONE	
VO504A	HONEYWELL	**NO REPLACEMENT**		NONE	
VO504B	HONEYWELL	**NO REPLACEMENT**		NONE	
VO505A	HONEYWELL	**NO REPLACEMENT**		NONE	
VO505B	HONEYWELL	**NO REPLACEMENT**		NONE	
VO506A	HONEYWELL	**NO REPLACEMENT**		NONE	
VO506B	HONEYWELL	**NO REPLACEMENT**		NONE	
VO508A	HONEYWELL	**NO REPLACEMENT**		NONE	
VO510A	HONEYWELL	**NO REPLACEMENT**		NONE	
VO511A	HONEYWELL	**NO REPLACEMENT**		NONE	
VO512A	HONEYWELL	**NO REPLACEMENT**		NONE	
VO513A	HONEYWELL	**NO REPLACEMENT**		NONE	
VO514C	HONEYWELL	**NO REPLACEMENT**		NONE	
VO514D	HONEYWELL	**NO REPLACEMENT**		NONE	
VO516C	HONEYWELL	**NO REPLACEMENT**		NONE	
VO517A	HONEYWELL	**NO REPLACEMENT**		NONE	
VO518C	HONEYWELL	**NO REPLACEMENT**		NONE	
VO519C	HONEYWELL	**NO REPLACEMENT**		NONE	
VO51A	HONEYWELL	**NO REPLACEMENT**		NONE	
VO51B	HONEYWELL	**NO REPLACEMENT**		NONE	
VO51C	HONEYWELL	**NO REPLACEMENT**		NONE	
VO51F	HONEYWELL	**NO REPLACEMENT**		NONE	
VO51G	HONEYWELL	**NO REPLACEMENT**		NONE	
VO520A	HONEYWELL	**NO REPLACEMENT**		NONE	
VO521A	HONEYWELL	**NO REPLACEMENT**		NONE	
VO522A	HONEYWELL	**VP522A1005**		FUNCTIONAL	
VO52A	HONEYWELL	**NO REPLACEMENT**		NONE	
VO53A	HONEYWELL	**NO REPLACEMENT**		NONE	
VO53B	HONEYWELL	**NO REPLACEMENT**		NONE	
VO53C	HONEYWELL	**NO REPLACEMENT**		NONE	
VO53D	HONEYWELL	**NO REPLACEMENT**		NONE	
VO53E	HONEYWELL	**NO REPLACEMENT**		NONE	
VO53F	HONEYWELL	**NO REPLACEMENT**		NONE	
VO54A	HONEYWELL	**NO REPLACEMENT**		NONE	
VO54B	HONEYWELL	**NO REPLACEMENT**		NONE	
VO54C	HONEYWELL	**NO REPLACEMENT**		NONE	
VO54D	HONEYWELL	**NO REPLACEMENT**		NONE	
VO54E	HONEYWELL	**NO REPLACEMENT**		NONE	

Pneumatic Product Cross Reference

ITEM NUMBER	MANUFACTURER	REPLACEMENT ITEM		TYPE OF REPLACEMENT	REMARKS
VO54F	HONEYWELL	**NO REPLACEMENT**		NONE	
VO55A	HONEYWELL	**NO REPLACEMENT**		NONE	
VO55B	HONEYWELL	**NO REPLACEMENT**		NONE	
VO55C	HONEYWELL	**NO REPLACEMENT**		NONE	
VO56A	HONEYWELL	**NO REPLACEMENT**		NONE	
VO56B	HONEYWELL	**NO REPLACEMENT**		NONE	
VO90A	HONEYWELL	**NO REPLACEMENT**		NONE	
VO90B	HONEYWELL	**NO REPLACEMENT**		NONE	
VO91A	HONEYWELL	**NO REPLACEMENT**		NONE	
VO91B	HONEYWELL	**NO REPLACEMENT**		NONE	
VP500A	HONEYWELL	**NO REPLACEMENT**		NONE	
VP501A	HONEYWELL	**NO REPLACEMENT**		NONE	
VP502B	HONEYWELL	**NO REPLACEMENT**		NONE	
VP512A	HONEYWELL	**NO REPLACEMENT**		NONE	
VP512A1205	MIRCOSWITCH	**VP525C1008**		FUNCTIONAL	
VP512A1213	HONEYWELL	**NO REPLACEMENT**		NONE	
VP512A1213	MIRCOSWITCH	**VP525C1016**		FUNCTIONAL	
VP512A1221	MIRCOSWITCH	**VP525C1016**		FUNCTIONAL	
VP512A1270	MIRCOSWITCH	**VP525C1032**		FUNCTIONAL	
VP512A1296	HONEYWELL	**NO REPLACEMENT**		NONE	
VP512A1296	MIRCOSWITCH	**VP525C1032**		FUNCTIONAL	
VP512A1494	MIRCOSWITCH	**VP525C1065**		FUNCTIONAL	
VP512A1643	MIRCOSWITCH	**VP525C1016**		FUNCTIONAL	
VP512A1684	MIRCOSWITCH	**VP525C1032**		FUNCTIONAL	
VP512A1700	MIRCOSWITCH	**VP525C1065**		FUNCTIONAL	
VP513A	HONEYWELL	**NO REPLACEMENT**		NONE	
VP513B	HONEYWELL	**NO REPLACEMENT**		NONE	
VP514A	HONEYWELL	**NO REPLACEMENT**		NONE	
VP514B	HONEYWELL	**NO REPLACEMENT**		NONE	
VP514C	HONEYWELL	**NO REPLACEMENT**		NONE	
VP514D	HONEYWELL	**NO REPLACEMENT**		NONE	
VP516C	HONEYWELL	**NO REPLACEMENT**		NONE	
VP517A	HONEYWELL	**NO REPLACEMENT**		NONE	
VP517A1044	HONEYWELL	**VP517A1069**		FUNCTIONAL	
VP517A1044	MIRCOSWITCH	**NO REPLACEMENT**		NONE	
VP517A1069	MIRCOSWITCH	**NO REPLACEMENT**		NONE	
VP517A1150	MIRCOSWITCH	**NO REPLACEMENT**		NONE	
VP518C	HONEYWELL	**MP953C1026**		FUNCTIONAL	
VP519C	HONEYWELL	**NO REPLACEMENT**		NONE	
VP519C1014	MIRCOSWITCH	**VP519C1006**		FUNCTIONAL	
VP520A	HONEYWELL	**NO REPLACEMENT**		NONE	
VP522A	HONEYWELL	**NO REPLACEMENT**		NONE	
VP522B	HONEYWELL	**NO REPLACEMENT**		NONE	
VP524A	HONEYWELL	**NO REPLACEMENT**		NONE	
VP525A	HONEYWELL	**NO REPLACEMENT**		NONE	
VP525A1077	MIRCOSWITCH	**VP525C1016**		DIRECT	
VP525A1085	MIRCOSWITCH	**VP525C1040**		FUNCTIONAL	
VP525A1101	HONEYWELL	**VP525C1073**		FUNCTIONAL	
VP525A1119	HONEYWELL	**VP525C1073**		FUNCTIONAL	

Pneumatic Product Cross Reference

ITEM NUMBER	MANUFACTURER	REPLACEMENT ITEM		TYPE OF REPLACEMENT	REMARKS
VP525A1127	MIRCOSWITCH	**VP525C1057**	OR	FUNCTIONAL	
VP525A1127	MIRCOSWITCH	**VP525C1040**		FUNCTIONAL	
VP525A1135	MIRCOSWITCH	**VP525C1040**	WITH	FUNCTIONAL	
VP525A1135	MIRCOSWITCH	**316027/0042**	OR	FUNCTIONAL	
VP525A1135	MIRCOSWITCH	**VP525C1057**	WITH	FUNCTIONAL	
VP525A1135	MIRCOSWITCH	**316027/0042**		FUNCTIONAL	
VP525A1150	MIRCOSWITCH	**VP525C1024**		DIRECT	
VP525A1168	MIRCOSWITCH	**VP525C1057**		FUNCTIONAL	
VP525A1192	MIRCOSWITCH	**VP525C1032**		DIRECT	
VP525A1200	MIRCOSWITCH	**VP525C1032**		DIRECT	
VP525A1218	MIRCOSWITCH	**VP525C1065**		FUNCTIONAL	
VP525A1226	MIRCOSWITCH	**VP525C1057**	WITH	FUNCTIONAL	
VP525A1226	MIRCOSWITCH	**316027/0042**		FUNCTIONAL	
VP525A1408	MIRCOSWITCH	**VP525C1008**		FUNCTIONAL	
VP525A1416	MIRCOSWITCH	**VP525C1016**		DIRECT	
VP525C9001		**VP525C**		FUNCTIONAL	
VP526A	HONEYWELL	**NO REPLACEMENT**		NONE	
VP526A9061		**NONE**		NONE	
VP527A	HONEYWELL	**NO REPLACEMENT**		NONE	
VP531A	HONEYWELL	**NO REPLACEMENT**		NONE	
VP531A1004	MIRCOSWITCH	**VP531C1000**		DIRECT	
VP531A1012	MIRCOSWITCH	**VP531C1000**		DIRECT	
VP531A1020	HONEYWELL	**VP531C1067**		FUNCTIONAL	
VP531A1038	MIRCOSWITCH	**VP531C1000**	WITH	FUNCTIONAL	
VP531A1038	MIRCOSWITCH	**315913/00041**		FUNCTIONAL	
VP531A1046	MIRCOSWITCH	**VP531C1018**		FUNCTIONAL	
VP531A1053	MIRCOSWITCH	**VP531C1018**	WITH	FUNCTIONAL	
VP531A1053	MIRCOSWITCH	**315913/00041**		FUNCTIONAL	
VP531A1061	MIRCOSWITCH	**VP531C1026**		FUNCTIONAL	
VP531A1079	MIRCOSWITCH	**VP531C1026**	WITH	FUNCTIONAL	
VP531A1079	MIRCOSWITCH	**315913/00041**		FUNCTIONAL	
VP531A1087	MIRCOSWITCH	**VP531C1034**		DIRECT	
VP531A1095	MIRCOSWITCH	**VP531C1034**	WITH	FUNCTIONAL	
VP531A1095	MIRCOSWITCH	**315913/00041**		FUNCTIONAL	
VP531A1103	MIRCOSWITCH	**VP531C1042**		FUNCTIONAL	
VP531A1111	MIRCOSWITCH	**VP531C1042**	WITH	FUNCTIONAL	
VP531A1111	MIRCOSWITCH	**315913/00041**		FUNCTIONAL	
VP531A1129	MIRCOSWITCH	**VP531C1059**		FUNCTIONAL	
VP531A1137	MIRCOSWITCH	**VP531C1059**	WITH	FUNCTIONAL	
VP531A1137	MIRCOSWITCH	**315913/00041**		FUNCTIONAL	
VP656NO	POWERS/LANDIS & GYR	**NO REPLACEMENT**		NONE	
VP656U	POWERS/LANDIS & GYR	**NO REPLACEMENT**		NONE	
VP656UC	POWERS/LANDIS & GYR	**NO REPLACEMENT**		NONE	
VP657	POWERS/LANDIS & GYR	**NO REPLACEMENT**		NONE	
VP657S	POWERS/LANDIS & GYR	**VP522A1005**		FUNCTIONAL	
VP657SC	POWERS/LANDIS & GYR	**VP522B1003**		FUNCTIONAL	
VP657UC	POWERS/LANDIS & GYR	**NO REPLACEMENT**		NONE	
VP657UV	POWERS/LANDIS & GYR	**NO REPLACEMENT**		NONE	
VP657WM	POWERS/LANDIS & GYR	**NO REPLACEMENT**		NONE	

Honeywell

ENVIRONMENTAL AND COMBUSTION CONTROL PRODUCTS
WARRANTY POLICY

Honeywell warrants the products in this catalog (except those parts designated on Honeywell's price lists as not covered by this warranty) to be free from defects due to workmanship or materials, under normal use and service, for the following warranty periods. Honeywell VisionPRO®, Commercial VisionPRO™, FocusPRO®, PRO 4000, PRO 3000, LineVolt™ PRO, Digital Round™, and Modern Round ™ (T87K, N) Series Thermostats with a date code of 0501 or later: sixty (60) months from date of installation. CommercialPRO, PRO 2000 and PRO 1000 thermostats: twenty-four (24) months from date of installation. All other Honeywell thermostats and thermostats with a date code of 0452 or earlier: twelve (12) months from date of installation, unless specified otherwise. Honeywell Air Cleaners, Humidifiers, Ventilators, Ultraviolet Treatment and Zoning Products with a date code of 0501 or later, excluding replacement maintenance parts: sixty (60) months from date of installation. All other Honeywell indoor air quality and zoning products with a date code of 0452 or earlier: twenty-four (24) months from date of installation, unless specified otherwise. Variable frequency drive devices (VFD) and accessories: new products for thirty-six (36) months and factory refurbished drives for twelve (12) months from date of installation when start-up and commissioning is performed by Honeywell VFD Authorized and trained personnel. All VFD warranty return products must have prior authorization (Form No. 87-0284) and be returned only to the VFD Service Center in Chattanooga, TN. MS, MN and Fact Acting 2-position Direct Coupled Actuators: sixty (60) months from date of installation. The warranty period for all other products is twelve (12) months from date of installation.

If a product is defective due to workmanship or materials, is removed within the applicable warranty period, and is returned to Honeywell in accordance with the procedure described below, Honeywell will, at its option, either repair, replace or credit the customer for the purchase price of the product, in accordance with the procedure described below. This warranty extends only to persons or organizations who purchase products in this catalog for resale.

The expressed warranty above constitutes the entire warranty of Honeywell with respect to the products in this catalog and IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE. IN NO EVENT SHALL HONEYWELL BE RESPONSIBLE FOR ANY CONSEQUENTIAL DAMAGES OF ANY NATURE WHATSOEVER.

INSTRUCTIONS—INSTALLING OR SERVICING CONTRACTOR OR DEALER

When replacing a Honeywell product under warranty, including those products furnished on original heating and/or cooling equipment, you should rely on your local Honeywell Wholesaler or Distributor for prompt and efficient product replacement service.

A Honeywell Returned Goods Identification Tag (form 87-0030) or an electronic data notification system must be completed and approved by the servicing dealer/contractor prior to submitting the product to the Honeywell Wholesaler or Distributor. (Tags may be obtained from the Wholesaler or Distributor in advance.) No warranty claim for product replacement or credit will be honored by the Wholesaler/Distributor without a completed warranty tag attached or electronic notification.

INSTRUCTIONS—WHOLESALER OR DISTRIBUTOR

The following will apply to the return of any product to Honeywell under this warranty:

Any products which are not variable frequency drives and are:

(i) identified with Honeywell's Returned Goods Identification Tag (form 87-0030), or electronic notification system;

(ii) are listed individually with Returned Goods ID Tag numbers and date codes listed on Honeywell's Returned Goods Order (form 71-96024) or a similar form;

(iii) packed separately from other returns and protected from shipping damage;

(iv) have certification by the installer or servicing dealer that the product was removed, due to failure, within the applicable warranty period;

(v) are received transportation pre-paid at:
Honeywell Return Goods
Dock 4 MN10-3860
1885 Douglas Drive
Golden Valley, MN 55422

(vi) and are found by Honeywell's inspection to be defective in workmanship or materials under normal use and service

will be handled in accordance with one of the two following procedures, as specified by the customer making the return:

All VFD warranty return products must have prior authorization (Form No. 87-0284) and be returned only to the VFD Service Center in Chattanooga, TN.

1. *CREDIT PROCEDURE.* Honeywell will issue credit, at Honeywell's lowest wholesaler net price in effect at the time of the return (as set forth on Honeywell's then current price sheet) or at the actual invoice amount if a copy of that invoice is attached to the packing list. (TRADELINE Replacement Exchange Products will be at Honeywell's lowest replacement exchange net price in effect at the time of such return, as shown on Honeywell's then current price sheet.) Honeywell reserves the right to disallow this credit option in cases of warranty abuse.
2. *REPAIR OR REPLACEMENT PROCEDURE.* Honeywell will, at its option, either repair or replace the product free of charge and return it or its replacement lowest cost transportation prepaid. The replacement will be a functionally equivalent new TRADELINE product. Premium transportation will be used at customer's request and expense.

The warranty will not be honored if:

(i) product is damaged or missing parts or accessory items including batteries.

(ii) product exhibits evidence of field mis-applications.

Final disposition of any warranty claim will be determined solely by Honeywell. If inspection by Honeywell does not disclose any defect covered by the warranty, the product will be returned or scrapped as instructed by the customer and Honeywell's regular service charges will apply. Products returned to the customer may be sent shipping charges collect.

If you have any questions relative to product returns to Honeywell, contact your Customer Care Representative:

Honeywell International Inc.
Customer Care MN10-1461
1985 Douglas Drive
Golden Valley, MN 55422
(763) 954-5720

SPECIAL MESSAGE TO INDUSTRIAL USERS AND BUILDING OWNERS

Thank you for using Honeywell products.

As a user, when you purchase a Honeywell product from this catalog you should expect performance from the product and, if it fails, replacement of the product by the installing dealer.

Typically, you will have purchased a Honeywell product under the following circumstances:

1. To modernize or refurbish your existing commercial and/or process control system.
2. You have purchased new commercial and/or process heating, cooling, air cleaning or humidification equipment that is furnished with Honeywell controls or components (refer to your owner's manual furnished with the equipment).
3. A control has failed on your existing commercial and/or process heating and/or cooling equipment and is replaced by a Honeywell TRADELINE product.

With few exceptions, you utilize the services of a competent plumbing, heating and/or cooling dealer/contractor for new or replacement work performed.

Although our warranty does not extend to you, Honeywell does extend a warranty to your supplier.

Your supplier can rely on its local Honeywell Wholesaler/Distributor or Honeywell for prompt replacement.

If you have any questions, need additional information or would like to comment on Honeywell's products or services, please write or phone:

Honeywell International Inc.
Customer Care MN10-1461
1985 Douglas Drive North
Golden Valley, MN 55422-4386
(763) 954-5720

or check your telephone directory (white pages) for one of many Honeywell field sales offices.

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Automation and Control Solutions

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