





# PENN Commercial Refrigeration



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# Comprehensive linecard

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### Mechanical thermostats



270XT



A19 / A28, IP30



A19 / A28, IP65



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F61



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P736



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V46



V46SA



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V246 / V248



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# Comprehensive linecard

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Mechanical  
humidity stat



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1-phase condenser  
fan speed control



P215PR



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# Refrigerants and product material compatibility

Requirements such as material compatibility with refrigerants, refrigerant oils and other medias, system operating pressures and temperatures, and operating environment must be considered when selecting pressure controls, fan speed controls, water regulating valves and/or pressure transducers for HVACR applications.

The table below provides a listing of the PENN products that are materially compatible with the most common commercially available refrigerants. As a standard practice, please review the applicable PENN product technical bulletin to confirm that the respective control's maximum working pressure is suitable for the refrigerant being used. In addition, you should confirm that the product's operating temperatures and enclosure are suitable for the intended application.

## Note

Controls used with flammable refrigerants typically require special construction and safety agency approvals including, ATEX compliance. Selective PENN P77, P78, P100 and P599 series controls are ATEX compliant. The requirement for ATEX compliance and other safety agency approvals depends on the refrigerant and the application's explosion hazard zone.

ATEX compliant controls are not always required when flammable refrigerants are involved. However, you should always check with the proper authorities to confirm the requirements.

## Refrigerants and product material compatibility

Refrigerant Safety Class	Refrigerant	P20	P28	P74	P735/P736	P77/P78	P100	P215	P216 (P499 transducer)	P266 (P266SNR-1C, -2C)	P315	P499	P597	P599	V46/V48	V246/V248
A1	R22	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	R124	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	R134a	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	R404A	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	R407A	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	R407C	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	R407F	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	R407H	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	R410A	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	R422D	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	R438A	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	R448A	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	R449A	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	R449B	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	R450A	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	R452A	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	R507A	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	R513A	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	R744 (CO <sub>2</sub> )	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■



## Refrigerants and product material compatibility

Refrigerant Safety Class	Refrigerant	P20	P28	P74	P735/P736	P77/P78	P100	P215	P216 (P499 transducer)	P266 (P266SNR-1C, -2C)	P315	P499	P597	P599	V46/V48	V246/V248
A2L	R32	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	R447A	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	R454A	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	R454B	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	R454C	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	R455A	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	R1234yf	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	R1234ze	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
B2L	R717 (NH3)	-	■ <sup>1</sup>	■ <sup>1</sup>	-	■ <sup>1</sup>	-	-	■ <sup>1</sup>	■ <sup>1</sup>	-	■ <sup>1</sup>	■ <sup>1</sup>	■ <sup>1</sup>	-	-
A3	R290 (Propane)	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	R600a (Isobutane)	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	R1270	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■

### Note

<sup>1</sup> Selected models only

■ Material compatible with refrigerant and refrigerant oils

- Material not compatible with refrigerant and/or refrigerant oils

Always ensure that the control's maximum operating and test pressures do not exceed the equipment's maximum allowable system pressure.

Also check for other refrigerant and application-related conditions that may impact control usage.

Product portfolio changes may have occurred since this table was published.

Please check with your Johnson Controls representative to confirm product availability.











# Temperature controls



# 270XT

## Freeze protection, IP30

Sensing element is 3 or 6 meters long to permit attaching across the surface of a coil to guard against freezing at any point. When any 30 cm or more of this element senses a temperature as low as the control setpoint, it will "switch off".

A special version is available with bulb and 2 m capillary, range -24 to 18°C for clamp on or immersion purposes.

SPDT change over contacts permit the use of an alarm signal.

### Application

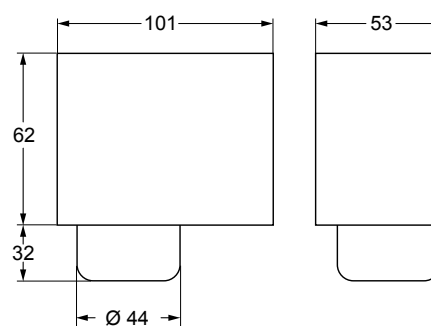
These controls are designed for protection against freeze up of hydronic heating coils, cooling coils and similar application.

### Features

- Dust tight PENN switch
- SPDT contacts
- 270XTAN provided with trip-free manual reset
- Controls have adjustable range

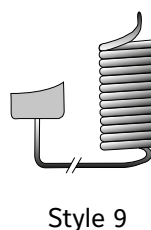
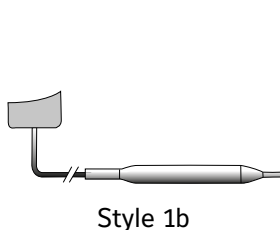


### Dimensions (in mm)



## Ordering information

Codes	Range (°C)	Diff. (K) fixed	Style	Cap. length (m)	Bulb size (mm)	Switch 8A	Additional features
270XT-95008	-10 to 12	3	9	---	3.2 x 6000	SPDT open low	Automatic recycle
270XT-95078	-10 to 12	3	9	---	3.2 x 3000	SPDT open low	Automatic recycle
270XT-95068	-24 to 18	4	1b	2	9.5 x 80	SPDT open low	Automatic recycle
270XTAN-95008	-10 to 12	---	9	---	3.2 x 6000	SPDT open low	Manual reset
270XTAN-95088	-10 to 12	---	9	---	3.2 x 3000	SPDT open low	Manual reset
270XTAN-95048	-24 to 18	---	1b	2	9.5 x 80	SPDT open low	Manual reset







# A19

## Capillary and space thermostat, IP30

These thermostats are available with fixed or adjustable differential. The various control ranges cover a broad range of temperature applications with a minimum number of models.

On request a built-in high or low limit stop is possible and can be adjusted quickly and easily in the field.

All models have a universal way of adjustment.

For this purpose a knob and sealing cap are enclosed.

All are equipped with IP30 enclosure.

### Application

These thermostats are designed for refrigeration, cooling, heating, ventilation and air-conditioning applications.

Standard models are provided for remote sensing or room sensing. Models with manual reset are available for low or high limit functions.

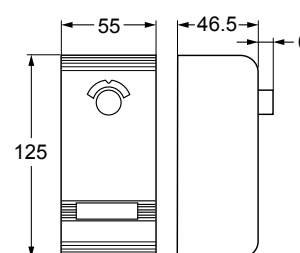
### Features

- Liquid filled sensing element
- Dust tight Penn switch
- Trip free manual reset
- Front adjustment
- Suited to be used in the presence of A2L refrigerants

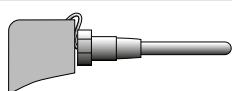
### Ordering information



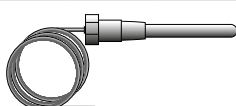
Dimensions (in mm)



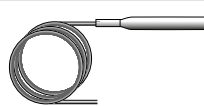
Codes	Range (°C)	Diff. (K) fixed	Style	Cap. length (m)	Bulb size (mm)	Switch 8A Auto recycle	Additional features
A19AAC-9005	-5 to 28	2	1b	2	135	SPDT open low	---
A19AAC-9009	40 to 120	3.5	1b	2	100	SPDT open high	---
A19AAC-9102	-35 to 10	2.5	1b	2	110	SPDT open high	---
A19AAC-9107	35 to 150	4	1a	2	265	SPDT open high	Ø 5 mm bulb
A19AAC-9108	90 to 290	5.5	1a	2	155	SPDT open high	---
A19AAC-9123	0 to 10	2.5	1a	2	80	SPDT open low	Bulb Ø 9.3 mm
A19AAC-9127	1 to 60	1.5	1b	3	115	SPDT open low	Maximum bulb temperature 85 °C
A19AAC-9130	-10 to 14	2.5	1b	2	110	SPDT open low	Case compensation, low limit stop at 2 °C
A19AAF-9102	0 to 10	1.5	1a	2	80	SPDT open low	Ø 9.3 mm bulb, case compensation
A19AAF-9103	5 to 32	0.8	1b	2	155	SPDT open high	---



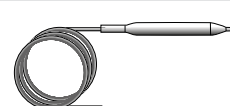
Style 2



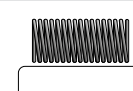
Style 4H



Style 1a



Style 1b



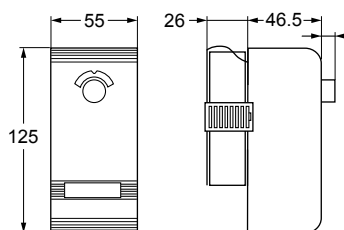
Style 3



# A19

Capillary and space thermostats, IP30

## Dimensions (in mm)



### A19A capillary thermostats

Codes	Range (°C)	Diff. (K) fixed	Style	Cap. length (m)	Bulb size (mm)	Switch 8A Auto recycle	Additional features
A19ABC-9011	40 to 120	3 to 13	2	---	---	SPDT open high	1/2-14NPT connector
A19ABC-9012	40 to 120	3 to 13	4H	2	---	SPDT open high	1/2-14NPT connector
A19ABC-9036	-35 to 40	2.8 to 8	1b	6.5	110	SPDT open low	Universal replacement
A19ABC-9037	-35 to 40	2.8 to 8	1b	3.5	110	SPDT open low	Universal replacement
A19ABC-9103	-35 to 10	2.8 to 11	1b	2	110	SPDT open low	---
A19ABC-9104	-5 to 28	2 to 8	1b	2	135	SPDT open low	---
A19ABC-9106	10 to 95	3.5 to 14	1a	3.5	75	SPDT open high	Ø 7.4 mm bulb
A19ABC-9116	1 to 60	2 to 8.5	1b	3	115	SPDT open low	Max. bulb temp. 85 °C
A19ABC-9117	1 to 60	2 to 8.5	1b	5	115	SPDT open low	Max. bulb temp. 85 °C

### A19ACC capillary thermostat, lock-out low with manual reset

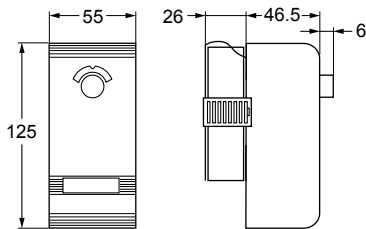
Codes	Range (°C)	Diff. (K) fixed	Style	Cap. length (m)	Bulb size (mm)	Switch 8A Auto recycle	Additional features
A19ACC-9100	-35 to 10	6	1b	2	110	SPDT open low	---
A19ACC-9101	-5 to 28	4	1b	2	135	SPDT open low	---
A19ACC-9103	-5 to 28	4	1b	5	135	SPDT open low	---
A19ACC-9105	-35 to 10	6	1b	3.5	110	SPDT open low	Low limit stop set at 2 °C
A19ACC-9107	-5 to 28	4	1b	3	135	SPDT open low	---
A19ACC-9116	-35 to 10	6	1b	6.5	110	SPDT open low	Low limit stop set at 3 °C, universal replacement



## A19

Capillary and space thermostats, IP30

### Dimensions (in mm)



#### A19ADC capillary thermostat, lock-out high with manual reset

Code	Range (°C)	Diff. (K) fixed	Style	Cap. length (m)	Bulb size (mm)	Switch 8A Auto recycle	Additional features
A19ADC-9200	40 to 120	7	2	---	---	SPDT open high	1/2-14 NPT connector

#### A19B space thermostats

Codes	Range (°C)	Diff. (K) fixed	Style	Cap. length (m)	Bulb size (mm)	Switch 8A Auto recycle	Additional features
A19BAC-9001	0 to 43	2	3	---	---	SPDT open high	Vinyl coated element
A19BAC-9250	-35 to 10	2.5	3	---	---	SPDT open high	Vinyl coated element
A19BAC-9251	-5 to 28	2	3	---	---	SPDT open low	Vinyl coated element
A19BBC-9275	-35 to 40	2.8 to 8	3	---	---	SPDT open low, 5A	Vinyl coated element

#### A19D strap-on thermostats

Codes	Range (°C)	Diff. (K) fixed	Style	Cap. length (m)	Bulb size (mm)	Switch 8A Auto recycle	Additional features
A19DAC-9001	40 to 120	4.5	20	---	---	SPDT open high	8 A switch, NEMA 1 enclosure, universal adjustment, including mounting strap
A19DAF-9001	92 to 116	2	20	---	---	SPDT open high	3 A switch, universal adjustment, including mounting strap







# A19

## Capillary and space thermostat, IP65

These thermostats are available with fixed or adjustable differential.

The various control ranges cover a broad range of temperature applications with a minimum number of models.

SPDT contacts are standard on all models.

### Application

These thermostats are designed for applications where a splash-proof and/or dust-tight enclosure is required.

Four types are available:

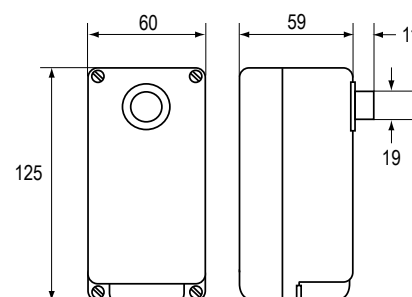
- Types A19ARC are general purpose capillary thermostats.
- Types A19BRC and A19BQC are space thermostats with coiled element to be used as farm control, outdoor thermostats or in cold storage rooms.
- Types A19AQF is specially designed for milkcool-tank applications.
- Type A19AQC-9101 is specially designed for ice-bank application.



### Features

- Liquid filled sensing element
- Dust tight PENN switch
- IP65 protection class
- Front adjustment
- Suited to be used in the presence of A2L refrigerants

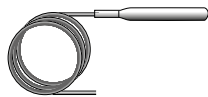
### Dimensions (in mm)



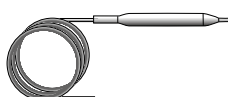
# A19

Capillary and space thermostat, IP65

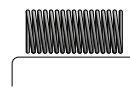
## Ordering information



Style 1a



Style 1b



Style 3

Codes	Range (°C)	Diff. (K) adjust.	Style	Cap. length (m)	Bulb size (mm)	Switch 8A Auto recycle	Additional features
A19ARC-9100	-35 to 10	2.8 to 11	1b	2	110	SPDT open low	---
A19ARC-9101	-5 to +28	2 to 8	1b	2	135	SPDT open low	---
A19ARC-9104	-20 to 65	3.5 to 13	1a	3.5	75	SPDT open low	Ø 7.4 mm bulb
A19ARC-9105	5 to 50	2.5 to 11	1b	2	110	SPDT open low	Concealed scale, screwdriver adjustment, bulb and cap. rubber coated
A19ARC-9107	40 to 120	3.5 to 13.5	1b	2	100	SPDT open low	---
A19ARC-9109	1 to 60	2 to 8.5	1b	3	115	SPDT open low	Maximum bulb temperature 85 °C
A19ARC-9113	-35 to 40	2.8 to 11	1b	2	110	SPDT open low	---



# A19

Capillary and space thermostat, IP65

## Ordering information

Codes	Range (°C)	Diff. (K) adjust.	Style	Cap. length (m)	Bulb size (mm)	Switch 8A Auto recycle	Additional features
A19A capillary thermostats							
A19AQC-9101	-5 to 5	2 fixed	1a	2	80	SPDT open low	5 A switch, Ice bank control, bulb Ø 9.3 mm, case compensation, concealed scale, screwdriver adjustment, scale calibrated at increasing temperature
A19AQC-9102	-5 to 28	2 fixed	1b	2	135	SPDT open low	8 A switch, calibrated and set at 2 °C, case compensation, pointer adjust, PG16 connect., 1/2 - 14 NPT WELL connector
A19AQC-9200	-5 to 55	2.5 fixed	2	---	---	SPDT open low	---
A19AQF-9102	0 to 13	1.5 fixed	1a	3	80	SPDT open low	3 A switch, cap. thermostat, bulb Ø 9.3 mm, case compensation, concealed scale, screwdriver adjustment
A19B space thermostats							
A19BRC-9250	-5 to 28	2 to 8	3	---	---	SPDT open low	Vinyl coated element
A19BRC-9251	0 to 43	2 to 8	3	---	---	SPDT open low	Vinyl coated element
A19BRC-9253	-35 to 40	2.8 to 11	3	---	---	SPDT open low	Vinyl coated element
A19BQC-9252	-5 to 25	2 fixed	3	---	---	SPDT open low	Concealed scale, screwdriver adjustment





# A28

## 2-stage capillary and space thermostat, IP30 / IP65

Controls are compact with fixed differential per stage and (on most models) adjustable differential between stages. Liquid filled element provides wide range, constant differential over whole range and no influence from barometric pressure. Since the bulb contains the major portion of the total fill the thermostat may be considered as cross-ambient, capillary and cup temperature variations affect the operating point only slightly due to the small amount of fill they contain.

For quantity orders it is possible to have the below stated optional constructions:

- Without case and cover for panel mounting
- Close differential per stage
- Different capillary lengths

All standard IP30 enclosure models have a universal way of adjustment. For this purpose a knob and sealing cap are enclosed.



## Application

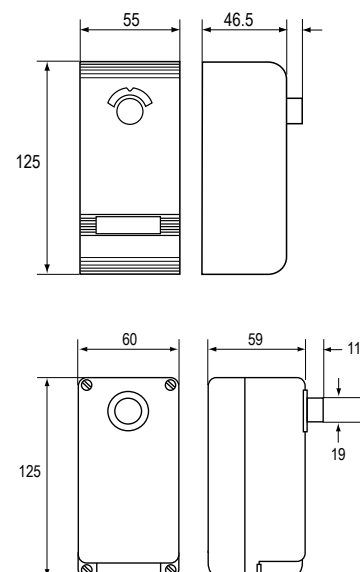
These thermostats are designed for various types of heating, cooling, ventilation, or air-conditioning applications. All models have two SPDT switches providing the following control possibilities:

- 2 stage heating
- 2 stage cooling
- Heating/cooling with automatic changeover

## Features

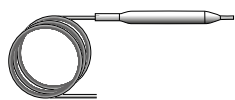
- Liquid filled sensing element
- Dust tight Penn switch
- IP65 protection class models available
- Front adjustment
- Suited to be used in the presence of A2L refrigerants

## Dimensions (in mm)



# A28

2-stage capillary and space thermostat, IP30 / IP65



Style 1b



Style 3

## Ordering information

Codes	Range (°C)	Diff. (K)		Style	Cap. length (m)	Bulb size (mm)	Switch 5A Auto recycle	Additional features NEMA 1 Enclosure
		Stage	Betw					
IP30								
A28AA-9006	-35 to 10	2	1 to 4	1b	2	110	SPDT Open Low	General purpose
A28AA-9007	-5 to 28	1.5	1 to 4	1b	2	135	SPDT Open Low	General purpose
A28AA-9106	-5 to 28	1.5	1 to 4	1b	5	135	SPDT Open Low	General purpose
A28AA-9113	0 to 43	1.5	1 to 4	3	---	---	SPDT Open High	Bulb stainless steel, general purpose
A28AA-9118	1 to 60	2	1 to 4	1b	3	115	SPDT Open High	Max. bulb temp. 85 °C, general purpose
IP65								
A28QA-9101	5 to 50	2	4	1b	2	110	SPDT Open Low	Concealed scale, screwdriver adjustment
A28QA-9111	-5 to 28	1.5	1 to 4	1b	2	135	SPDT Open Low	---
A28QA-9113	0 to 43	1.5	1 to 4	3	---	---	SPDT Open High	Bulb stainless steel
A28QA-9115	1 to 60	2	1 to 4	1b	3	115	SPDT Open High	---
A28QA-9117	20 to 40	1.5	1 to 4	3	---	---	SPDT Open High	Bulb stainless steel







# A25

## Rod and tube sensing element

A rod and tube type sensing element actuate the switch contacts. Main contacts (1 - 2) are normally closed, and open when the temperature at the element rises to the dial setpoint.

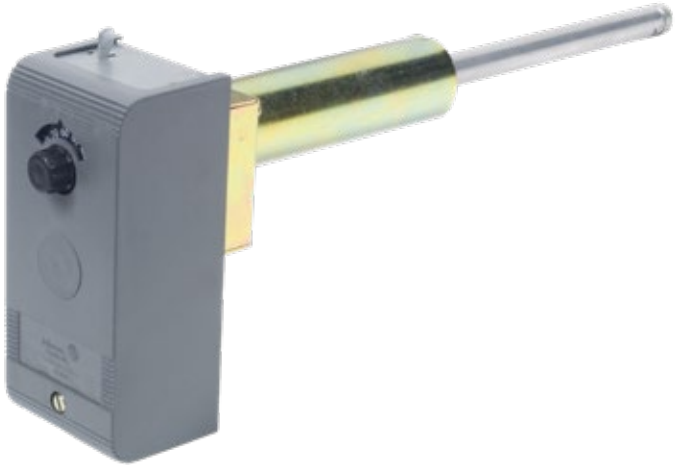
Contacts are re-closed only by operation of the reset lever. The reset lever is "trip-free" and cannot be used to block contacts in a closed position.

### Application

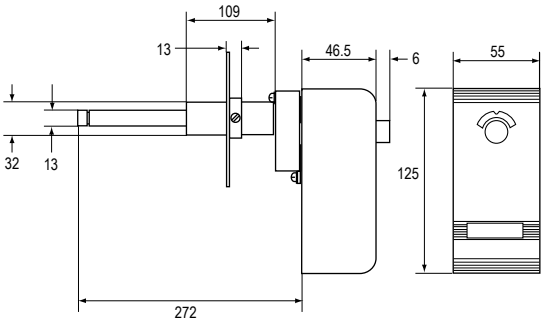
These warm air limit controls "lock out" on a temperature increase to the control setpoint. Manual reset is required to re-close the electrical contacts. A typical application is to stop air-conditioning or ventilating fans in the event of excessive return air temperature, as from a fire.

### Features

- Rod and tube type of element
- Adjustable duct mounting flange
- Trip-free manual reset
- Dust-tight Penn switch
- Suited to be used in the presence of A2L refrigerants



Dimensions (in mm)



## Ordering information

Codes	Range (°C)	Switch 8A manual reset	Additional features
A25CN-9001	0 to 100	SPDT open high	Visible scale, Knob adjustment, NEMA 1 enclosure, with flange for duct mounting




# Accessories

## Ordering information

Codes	Description	Primary usage	Inner Ø x tube length bulb well (mm)	Inside and outside connector (NPT)	Material connector pocket
<b>FTG13A-600R</b>	Closed tank connector Style 1b elements, Max. 10 bar, 120 °C, Min. -40 °C	A19/28/36	---	---	---
<b>KIT012N600</b>	Capillary brackets (6 pieces)	270XT	---	---	---
<b>WEL003N602R</b>	Bulb well, Max. pressure 70 bar, Temp. 370 °C	---	9.8 x 125	1/2 - 14	Stainless steel
<b>WEL11A601R</b>	Bulb well, Max. pressure 20 bar, Temp. 120 °C, USA item	A19	7.3 x 60	1/2 - 14	Brass/Copper
<b>WEL14A602R</b>	Bulb well, Max. pressure 20 bar, Temp. 120 °C, USA item	A19/28/36	9.8 x 125	1/2 - 14	Brass/Copper
<b>WEL14A603R</b>	Bulb well, Max. pressure 20 bar, Temp. 120 °C, USA item	A19/28/36	9.8 x 147	1/2 - 14	Brass/Copper
<b>WEL16A-601R</b>	Bulb well, Max. pressure 20 bar, Temp. 120 °C, USA item	A19/28/36	9.5 x 71	1/2 - 14	Brass/Copper







# Float and flow controls





# F61

## Flow switch for liquid

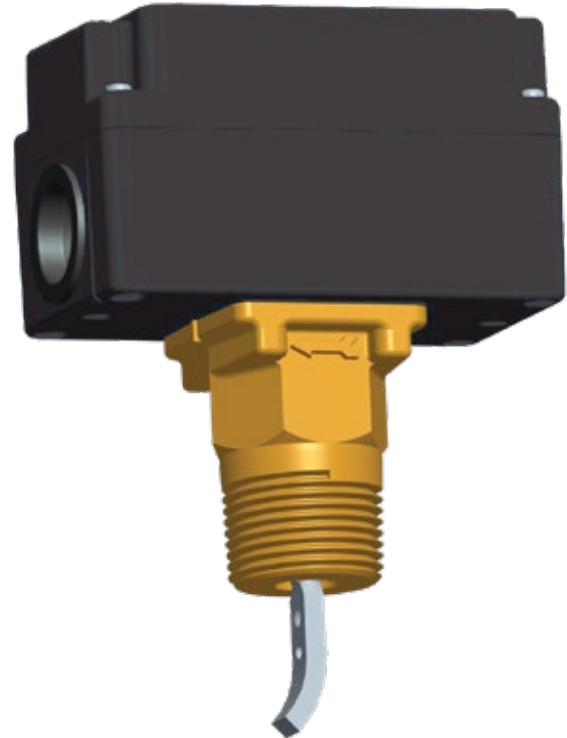
The F61 liquid flow switches can be used in liquid lines carrying water, sea water, swimming pool water, ethylene glycol or other liquids not harmful to the specified materials.

The switches have SPDT contacts and can be wired to energise one device and de-energise another when liquid flow either exceeds or drops below the set flow rate. Pipe insert models and the T-body types for low-flow applications are available.

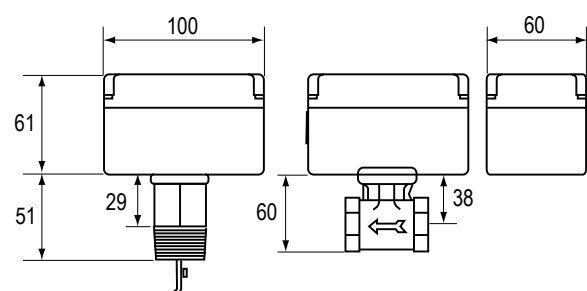
The IP43 versions can be used for liquid temperatures above dewpoint (for use in other environments see the Product Data Sheet). Typical applications are to shut down the compressor on liquid chiller systems, to prove flow on electric immersion heaters and to give a signal or alarm when the pump on condenser cooling system shuts down.

## Features

- T-body and pipe-insert types available
- Polycarbonate IP43 enclosure
- Vapour tight IP67 enclosure
- Stainless steel pipe-insert type
- Large wiring space
- Range screw easy accessible
- Suited to be used in the presence of A2L refrigerants



## Dimensions (in mm)



# F61

Flow switch for liquid

## Ordering information

### IP43

Codes	Range	Connection		Switch action	Additional features
F61SB-9100	0,15 dm <sup>3</sup> /s - 46 dm <sup>3</sup> /s	R1" DIN2999	(ISO R7)	SPDT contacts, 15(8) Amp 230 V~	4 paddles 1", 2", 3", 6" St.St. AISI 301
F61SD-9150	0,04 dm <sup>3</sup> /s - 0,07 dm <sup>3</sup> /s	1/2 -14 NPTF	T-body	SPDT contacts, 15(8) Amp 230 V~	---
F61SD-9175	0,04 dm <sup>3</sup> /s - 0,07 dm <sup>3</sup> /s	3/4 -14 NPTF	T-body	SPDT contacts, 15(8) Amp 230 V~	---

### IP67

Codes	Range	Connection		Switch action	Additional features
F61TB-9100	0,15 dm <sup>3</sup> /s - 46 dm <sup>3</sup> /s	R1" DIN2999	(ISO R7)	SPDT contacts, 15(8) amp 220 V~	4 paddles, 1", 2", 3" and 6" St.St. AISI 301
F61TB-9104	0,15 dm <sup>3</sup> /s - 46 dm <sup>3</sup> /s	R1" DIN2999	(ISO R7)	SPDT contacts, 0,4 Amp 15 V~	Lowenergy gold flashcontacts 4 paddles, 1", 2", 3" and 6" St.St. AISI 301
F61TB-9200	0,15 dm <sup>3</sup> /s - 46 dm <sup>3</sup> /s	R1" DIN2999	(ISO R7)	SPDT contacts, 15(8) Amp 220 V~	Stainless steel body assembly 3 paddles 1", 2", 3" St.St. AISI 316L

## Accessories for flow switches

Codes	Description
PLT69-11R	F61 - 6" stainless steel AISI 301 paddle
KIT21A-602	F61 - 4 paddles 1", 2", 3" and 6" St.St. AISI 301





# F261

## Flow switch for liquid

The F261 series flow switches respond to fluid flow in lines carrying water, ethylene glycol, or other nonhazardous fluids. These models also work in applications with swimming pool water and lubricating oils.

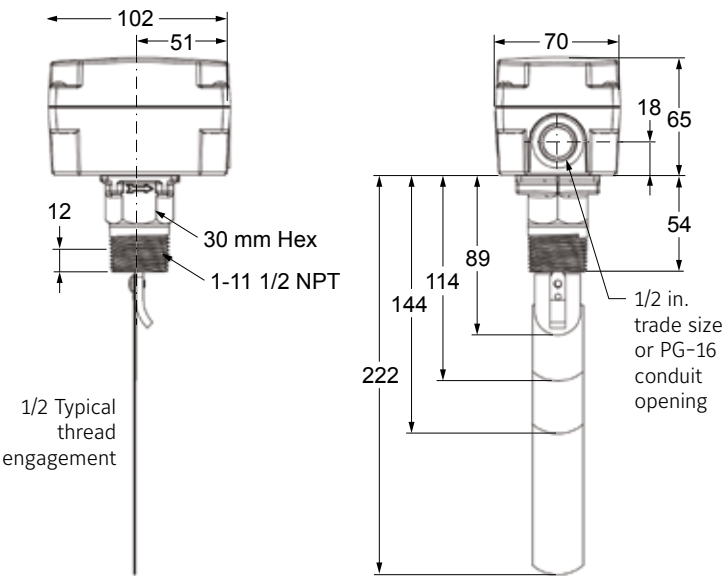
F261 series standard flow switches use a variety of paddle sizes to respond to fluid flow rates in applications with 1 inch trade size (or greater) pipe.

### Features

- Type 3R (NEMA) or type 4 (NEMA) polycarbonate enclosure
- Viton® diaphragm
- Gold-plated contacts on selected models
- Maximum fluid pressure of 290 psig (20 bar)
- Suited to be used in the presence of A2L refrigerants



### Dimensions (in mm)



## Ordering information

### Standard model flow switches

Codes	Description
F261KAH-V01C	Standard model flow switch with type 3R (NEMA) enclosure; 1 in., 2 in., 3 in., and 6 in. stainless steel paddles, lock-tooth washer, and stainless steel paddle screw supplied uninstalled
F261MAH-V01C	Standard model flow switch with type 4 (NEMA) enclosure; 1 in., 2 in., 3 in., and 6 in. stainless steel paddles, lock-tooth washer, and stainless steel paddle screw supplied uninstalled

### Replacement paddle parts

Codes	Description
KIT21A-602	Stainless Steel paddles 1", 2", 3" and 6"
PLT69-11R	Stainless steel 6 in. paddle





# F262

## Air flow switch

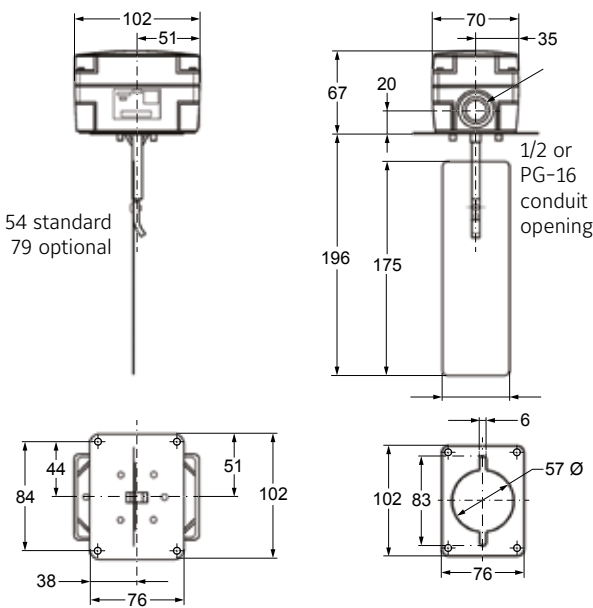
The F262 series airflow switches detect airflow or the absence of airflow by responding only to the velocity of air movement within a duct. The single-pole, doublethrow (SPDT) switch can be wired to open one circuit and close a second circuit for either signaling or interlock purposes. Airflow failure during the normal operation of air handling systems may cause overheating, coil icing, or other conditions that may be detrimental to the equipment.

### Features

- Type 3R (NEMA) polycarbonate enclosure
- Dependable dust-protected SPDT snap-acting PENN switch
- Large wiring space
- Easily accessible range adjustment screw
- Suited to be used in the presence of A2L refrigerants



### Dimensions (in mm)



### Ordering information

Code	Description
F262KDH-01C	Airflow switch with a 54 mm wide x 175 mm long paddle installed and a 79 mm wide x 175 mm long paddle supplied with the control







# F263

## Liquid level float switch

The F263 series liquid level float switches are designed to maintain a liquid level in indoor or outdoor closed tanks that hold water or other nonhazardous liquids.

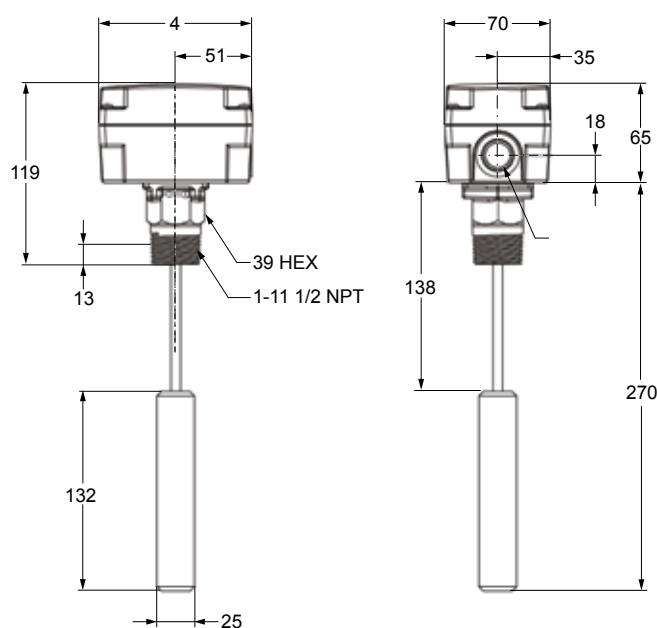
When the liquid level in the tank rises above or falls below the required level, the single-pole, double-throw (SPDT) switch closes one circuit and opens a second circuit.

### Features

- Viton® diaphragms
- Single-pole, double-throw switch
- Sturdy type 4 (NEMA) enclosure
- Solid polycarbonate float
- Suited to be used in the presence of A2L refrigerants



### Dimensions (in mm)



## Ordering information

Code	Description
F263MAP-V01C	SPDT float switch with Type 4 (NEMA) enclosure and polycarbonate float for liquid temperatures -29 to 100 °C; maximum liquid pressure 150 psig (1,035 kPa)









# Pressure controls





# P232

## Sensitive differential pressure switch for Air Flow

This switch senses a change in the differential pressure (either velocity pressure or pressure drop across a restriction) as the air flow changes.

The pressure, as sensed by two sensing ports, is applied to the two sides of a diaphragm in the control. The spring loaded diaphragm moves and actuates the switch.

The series P232 can also be used to detect small positive gauge pressure by using only the high pressure connection and leaving the low pressure connector open, or to detect a vacuum by using only the low pressure connection and leaving the high pressure connector open to ambient pressure.



## Application

This (differential) pressure switch is used to sense flow of air, single or differential air pressure

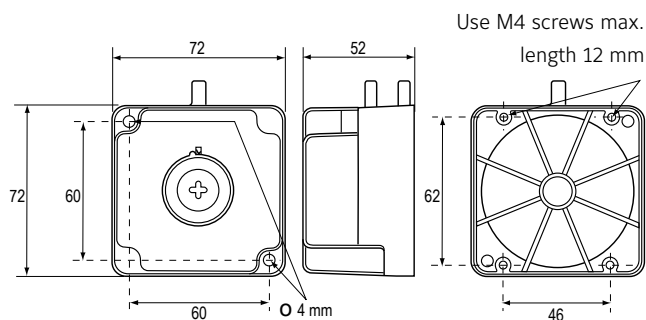
### Typical applications include:

- Clogged filter detection
- Detection of frost on air conditioning coils and initiation of defrost cycle
- Air proving in heating or ventilation ducts
- Maximum air flow controller for variable air volume system

## Features

- Easy to read setpoint scale
- Large wiring space
- Versatile mounting options

## Dimensions (in mm)



## Ordering information

Code	Switch point range (in Wc)	Switching differential (in Wc)	Pack
P232A-B-AAC	0,2 to 1,6	<0.1	Ind.

### Note

Other models on request, range up to 20 inWC





# P233

## Sensitive differential

This switch senses a change in the (differential) pressure as the airflow changes. The (differential) pressure is applied to the two sides of a diaphragm in the control.

The spring-loaded diaphragm moves and actuates the switch. The series P233A/F can also be used to detect small positive gauge pressure or to detect a vacuum.

### Application

This (differential) pressure switch is used to sense flow of air, single or differential air pressure

#### Typical applications include:

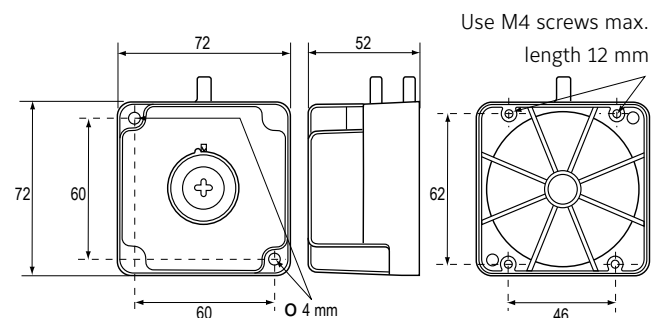
- Detect clogged filter
- Detect frost or ice build-up on air conditioning coils
- Air proving in heating or ventilation ducts
- Maximum airflow controller for variable air volume system
- Detect blocked flue or vent
- Monitor fan operation

### Features

- One switch to measure relative pressure, vacuum or differential pressure
- Various accessories available
- Compact and durable construction
- Easy mounting and wiring, various mounting possibilities
- Standard PG 11 cable gland and optional DIN 43650 connector
- Accurate and stable switch point
- SPDT contact standard



### Dimensions (in mm)



# P233

Sensitive differential

## Ordering information

SPDT contacts, Contact rating 5(2) A 250 VAC

Codes	Switch point range (mbar)	Switching differential (mbar) <sup>2</sup>	Pack	Additional features
P233F-P3-AAC	0,3 fixed	< 0.3	Ind.	---
P233A-4-AAC	0,5 to 4	< 0.3	Ind.	---
P233A-4-AAD <sup>1</sup>	0,5 to 4	< 0.3	Bulk	---
P233A-4-AHC	0,5 to 4	< 0.3	Ind.	GMT008N600R + BKT024N002R
P233A-4-PAD <sup>1</sup>	50 to 400 Pa	< 0.3	Bulk	Scale in Pa
P233A-4-PAC	50 to 400 Pa	< 0.3	Ind.	---
P233A-4-PHC	50 to 400 Pa	< 0.3	Ind.	Scale in Pa, GMT008N600R + BKT024N002R
P233A-4-PKC	50 to 400 Pa	< 0.3	Ind.	Scale in Pa, FTG015N602R (2x) + 2 m tube 4/7 mm
P233A-4-AKC	0,5 to 4	< 0.3	Ind.	FTG015N602R (2x) + 2 m tube 4/7 mm
P233A-6-AAC	0,5 to 6	< 0.3	Ind.	---
P233A-6-AAD <sup>1</sup>	0,5 to 6	< 0.3	Bulk	---
P233A-10-AAC	1,4 to 10	< 0.5	Ind.	---
P233A-10-AHC	1,4 to 10	< 0.5	Ind.	GMT008N600R + BKT024N002R
P233A-10-PAC	140 to 1000 Pa	< 0.5	Ind.	---
P233A-10-PKC	140 to 1000 Pa	< 0.5	Ind.	Scale in Pa, FTG015N602R (2x) + 2 m tube 4/7 mm
P233A-10-AKC	1,4 to 10	< 0.5	Ind.	FTG015N602R (2x) + 2 m tube 4/7 mm
P233A-50-AAC	6 to 50	< 1	Ind.	FTG015N602R (2x) + 2 m tube 4/7 mm
P233A-10-PHC	140 to 1000 Pa	< 0,5	Ind.	Scale in Pa, GMT008N600R + BKT024N002R

### Notes

<sup>1</sup> Quantity orders only<sup>2</sup> Switching differential is maximum value mid-range



# P74

## Differential pressure

The P74 series of differential pressure switches incorporate two opposing pressure elements and an adjustable range setpoint spring with a calibrated scale.

The control switches at the indicated setpoint on an increase in differential pressure and switches back to the normal position when the different pressure decreases to the setpoint less the mechanical switching differential.

### Application

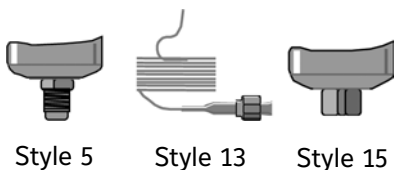
These controls are designed to sense pressure differences between two points and may be used as operating or limit controls.

Typical applications are to detect flow across a chiller or water cooled condenser, to detect flow in a heating system and sensing lube oil pressure differential on refrigeration compressors.

### Features

- Heavy duty pressure elements
- These controls may be used in combination with series P28 lube oil protection control on two compressor, single motor units
- Suited to be used with A2L refrigerants

### Ordering information

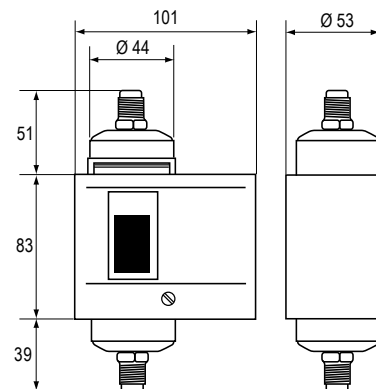


Style 5

Style 13

Style 15

### Dimensions (in mm)



Codes	Range (bar)	Mech. differential (bar)	Style	Switch action	Additional features
P74DA-9300	0.6 to 4.8	0.7 to 2 adj.	5	DPST, 10A, contacts open low	---
P74DA-9600	0.6 to 4.8	0.7 to 2 adj.	13	DPST, 10A, contacts open low	---
P74EA-9300	0.6 to 4.8	0.3 fix.	5	SPDT, 5 A, contact open high	---
P74EA-9700	0.6 to 4.8	0.3 fix.	15	SPDT, 8 A, contact open high	For NH3
P74EA-9701	0.6 to 4.8	0.3 fix.	15	SPDT, 8 A, contact open high	Set 1 bar, concealed adjustment, for NH3
P74FA-9700	0 to 1	0.1 fix.	15	SPDT, 3 A, contact open high	For water
P74FA-9701	2 to 8	0.7 fix.	15	SPDT, 3 A, contact open high	For NH3



# P735

## Single pressure

The P735 series pressure controls may be used for control functions or limit functions, depending on model number.

All models are provided with alarm contacts.

All standard models have phosphor bronze bellows and brass pressure connections. Models for use with ammonia are provided with stainless steel bellows and connectors.

### Application

These pressure controls are designed for use in a variety of applications involving refrigeration high or low pressure. Models supplied have a "whole range" design, enabling them to be used with all non-corrosive refrigerants which are within the operating range of the control. They may also be used for other high or low pressure applications such as air, water etc. Models which can be used with ammonia are included in the program.

### Features

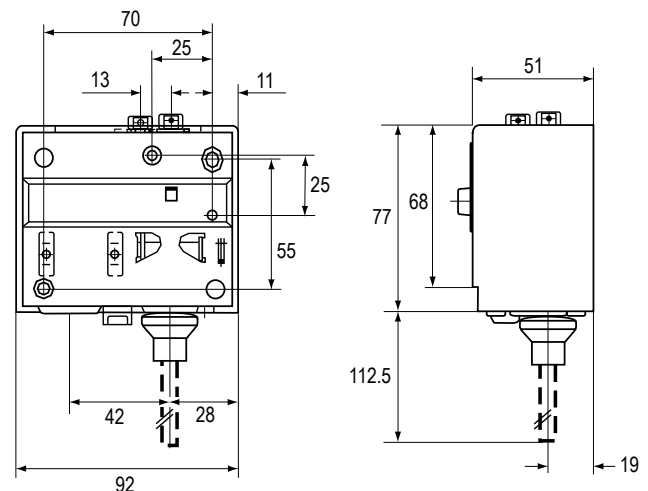
- Generous wiring space
- SPDT contacts are provided as standard on single pressure controls
- Trip-free manual reset

### Note

For refrigerant compatibility see the "Refrigerants and product material compatibility" table on page 1 and 2.



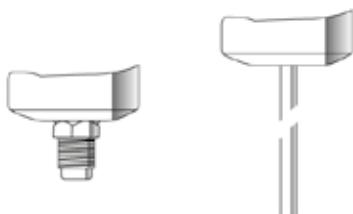
Dimensions (in mm)



# P735

Single pressure

## Ordering information



Style 5

Style 28

### For water

Code	Special pressure Connection G1/4" female	Range (bar)	Differential (bar)	Switch action (wire diag.)	Max. bellows pressure
	Ind. pack.				
P735AAA	-9200	-0,2 to 10	1 to 4,5	1	15
	-9201	-0,5 to 7	0,6 to 3	1	22

### For non-corrosive refrigerants

Code	Style 5		Range (bar)	Differential (bar)	Switch action (wire diag.)	Max. bellows pressure
	Ind. pack.	Bulkpack				
P735AAA	-9300	-9320	-0.5 to 7	0.6 to 3	1	22
	-9350	-9370	3 to 30	3 to 12	2	33
	-9351	---	3.5 to 21	2.1 to 5.5	2	30

### For non-corrosive refrigerants type approved pressure limiter/pressure cut out

Codes	Style 5		Range (bar)	Differential (bar)	Switch action (wire diag.)	Max. bellows pressure	PED Approval
	Ind. pack.	Bulkpack					
P735AAW	-9300	-9320	-0.5 to 7	0.6 to 3	1	22	---
	-9350	-9370	3 to 30	3.5 to 12	2	33	■
P735BEB	---	-9370	3 to 30	Man. res. <sup>1</sup>	3	33	

#### Note

<sup>1</sup> Resettable at 3.5 bar below cut-out point







# P736

## Dual pressure

The P736 series pressure controls may be used for control functions or limit functions, depending on model number. All models are provided with alarm contacts (except P736ALA). All standard models have phosphor bronze bellows and brass pressure connections.

Models for use with ammonia are provided with stainless steel bellows and connectors.

## Application

These dual pressure controls are designed for use in a variety of applications involving refrigeration high or low pressure.

Models supplied have a "whole range" design, enabling them to be used all non-corrosive refrigerants which are within the operating range of the control. They may also be used for other high or low pressure applications such as air, water etc. Models which can be used with ammonia are included in the program.

## Features

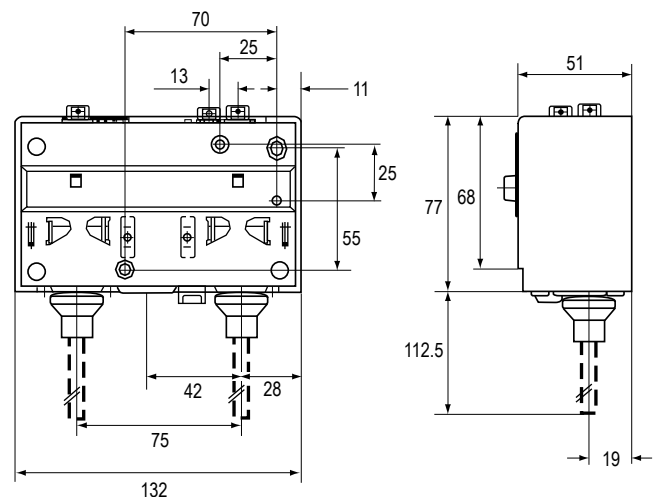
- Generous wiring space
- Trip-free manual reset
- Separate alarm contacts for both low pressure and high pressure cut-out

### Note

For refrigerant compatibility see the "Refrigerants and product material compatibility" table on page 1 and 2.



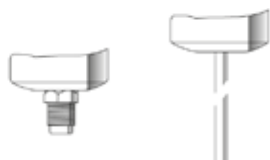
## Dimensions (in mm)



# P736

Dual pressure

## Ordering information



Style 5

Style 28

### For non-corrosive refrigerants

Family Codes	Pressure connection		Left side		Right side		Contruction LP/HP (max. press.)
	Style 5		Range (bar)	Diff. (bar)	Range (bar)	Diff. (bar)	
	Ind. pack.	Bulk pack					
P736LCA	-9300	-9320	-0.5 to 7	0.6 to 3	3 to 30	3 (fixed)	LP: 22 bar / HP: 33 bar
P736MCA	---	-9320	-0.5 to 7	0.6 to 3	3 to 30	Man. Res. <sup>2</sup>	LP: 22 bar / HP: 33 bar

### For non-corrosive refrigerants type approved pressure limiter/pressure cut out

Codes	Pressure connection			Left side		Right side		Contruccion LP/HP (max. press.)	PED approval
	Style 5		Style 28	Range (bar)	Diff. (bar)	Range (bar)	Diff. (bar)		
	Ind. pack.	Bulk pack	Ind. pack.						
P736LCW	-9300	-9320	-9800	-0.5 to 7	0.6 to 3	3 to 30	3 (fixed)	LP: 22 bar / HP: 33 bar	■
P736MCB	-9300	---	---	-0.5 to 7	0.6 to 3	3 to 30	Man. Res. <sup>1</sup>	LP: 22 bar / HP: 33 bar	■

#### Notes

- <sup>1</sup> Resettable at 0.5 bar above cut-out point
  - <sup>2</sup> Resettable at 3 bar below cut-out point
- 100 kPa = 1 bar ≈ 14.5 psi





# P77

## Single pressure, IP54

The P77 series pressure controls may be used for control functions or limit functions, depending on model number. All models are provided with alarm contacts. All standard models have phosphor bronze bellows and brass pressure connections.

Models for use with ammonia are provided with stainless steel bellows and connectors. Devices conforming to PED 2014/68/EU Cat. IV (HP models) have the fail-safe function with double bellows.

Their IP54 classification means that these pressure controls are suitable for almost all applications.

## Application

These pressure controls are designed for use in a variety of applications involving refrigeration high or low pressure. Models supplied have a "whole range" design, enabling them to be used with refrigerants R22, R134A, R404A, R410A, R290 and CO<sub>2</sub> sub-critical and all other non-corrosive refrigerants which are within the operating range of the control. They may also be used for other high or low pressure applications such as air, water etc.

Models which can be used with ammonia are included in the program. Also models tested and approved to PED 2014/68/EU Cat. IV (supersedes DIN and TUV approval) are included in the program.

## Features

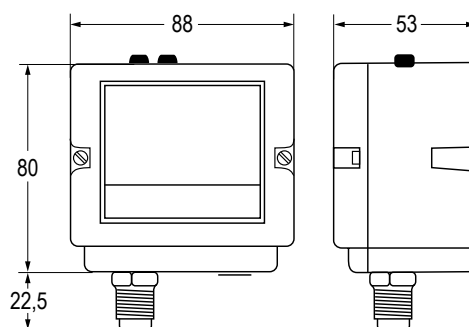
- Generous wiring space
- Splash-proof enclosure (IP54)
- SPDT contacts are provided as standard on single pressure controls.
- Trip-free manual reset
- High refrigerant pressure. Suitable for R410A and CO<sub>2</sub> subcritical applications.

## Note

For refrigerant compatibility see the "Refrigerants and product material compatibility" table on page 1 and 2.



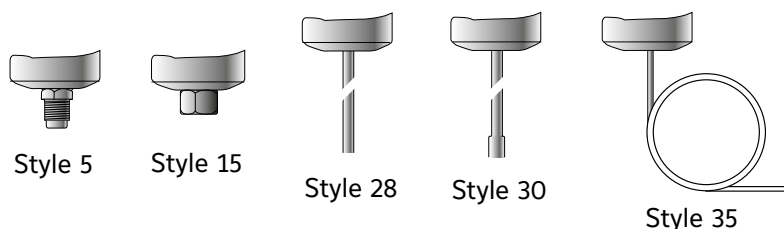
## Dimensions (in mm)



# P77

Single pressure, IP54

## Ordering information



### For non-corrosive refrigerants

Family codes	Style 5		Style 28	Style 30	Style 35	Range (bar)	Diff. (bar)	Max bellows pressure
	Ind. pack.	Bulk pack	Ind. pack.	Ind. pack.	Ind. pack.			
P77AAA	-9300	-9320	-9800	-9400	-9500	-0.5 to 7	0.6 to 3	22
	-9301	---	---	---	---	-0.2 to 10	1 to 4.5	15
	-9302	---	---	---	---	-0.3 to 2	0.4 to 1.5	4
	-9350	-9370	-9850	-9450	-9550	3 to 30	3 to 12	33
	-9351	-9371	---	-9451	---	3.5 to 21	2.1 to 5.5	30
P77BCA	-9300	---	---	---	---	-0.5 to 7	Man. res. <sup>1</sup>	22
P77BEA	-9350	---	---	-9450	---	3 to 30	Man. res. <sup>2</sup>	33

### For ammonia and non-corrosive refrigerants

Family codes	Style 15		Range (bar)	Diff. (bar)	Max bellows pressure
	Ind. pack.	Bulk pack			
P77AAA	-9700	---	-0.5 to 7	0.6 to 3	14
	-9750	---	3 to 30	3.5 to 12	33
P77BCA	-9700	---	-0.5 to 7	Man res. <sup>1</sup>	14
P77BEA	-9750	---	3 to 30	Man. res. <sup>2</sup>	33

#### Notes

- <sup>1</sup> Resettable at 0.5 bar above cut-out point
  - <sup>2</sup> Resettable at 3 bar below cut-out point
  - <sup>3</sup> Resettable at 3.5 bar below cut-out point
  - <sup>4</sup> Resettable at 5 bar below cut-out point
- 100 kPa = 1 bar ≈ 14.5 psi



# P77

Single pressure, IP54

## Ordering information

For non-corrosive refrigerants

(Pressure limiter, pressure cut-out, safety pressure cut-out, including lockplate assy)

Family codes	Style 5		Style 28	Range (bar)	Diff. (bar)	Max bellows pressure	Approved according to PED 2014/68/EU Cat. IV
	Ind. pack.	Bulkpack	Ind. pack.				
P77AAW	-9300	---	-9800	-0.5 to 7	0.6 to 3	22	---
	-9350	-9370	-9850	3 to 30	3.5 to 12	33	■
	-9355	---	-9855	3 to 42	5 to 15	47.6	
P77BCB	-9300	---	-9800	-0.5 to 7	Man. res. <sup>1</sup>	22	---
P77BEB	-9350	-9370	-9850	3 to 30	Man. res. <sup>3</sup>	33	■
	-9355	---	-9855	3 to 42	Man. res. <sup>4</sup>	47.6	
P77BES	-9350	---	-9850	3 to 30	Man. res. <sup>3</sup>	33	

For ammonia and non-corrosive refrigerants

(Pressure limiter, pressure cut-out, safety pressure cut-out, including lockplate assy)

Family codes	Style 15		Range (bar)	Diff. (bar)	Max bellows pressure	Approved according to PED 2014/68/EU Cat. IV
	Ind. pack.	Bulk pack				
P77AAW	-9700	---	-0.5 to 7	0.6 to 3	14	---
	-9750	---	3 to 30	3.5 to 12	33	■
P77BEB	-9750	---	3 to 30	Man. res. <sup>3</sup>	33	
P77BES	-9750	---	3 to 30	Man. res. <sup>3</sup>	33	

For hazardous location application and non-corrosive refrigerants

(Pressure limiter, including lockplate assy) – Atex certified

Family codes	Style 28		Range (bar)	Diff. (bar)	Pressure connection	Max bellows pressure	Approved according to PED 2014/68/EU Cat. IV
	Ind. pack.	Bulk pack					
P77XAAW	-18000C	---	-0.5 to 7	0.6 to 3	6 mm Ø copper tube	22	---
	-18500C	---	3 to 30	3.5 to 12		33	■

### Notes

- <sup>1</sup> Resetable at 0.5 bar above cut-out point
  - <sup>2</sup> Resetable at 3 bar below cut-out point
  - <sup>3</sup> Resetable at 3.5 bar below cut-out point
  - <sup>4</sup> Resetable at 5 bar below cut-out point
- 100 kPa = 1 bar ≈ 14.5 psi







# P78

## Dual pressure, IP54

The P78 series pressure controls may be used for control functions or limit functions, depending on model number. All models are provided with alarm contacts (except P78ALA). All standard models have phosphor bronze bellows and brass pressure connections. Models for use with ammonia are provided with stainless steel bellows and connectors. Devices conforming to PED 2014/68/EU Cat. IV have a double bellows on the high pressure versions. Their IP54 classification means that these pressure controls are suitable for almost all applications.

### Application

These pressure controls are designed for use in a variety of applications involving refrigeration high or low pressure. Models supplied have a "whole range" design, enabling them to be used with refrigerants R22, R134A, R404A, R410A, CO<sub>2</sub> sub-critical and all other non-corrosive refrigerants which are within the operating range of the control. They may also be used for other high or low pressure applications such as air, water etc. Models which can be used with ammonia are included in the program. Also models tested and approved to PED 2014/68/EU Cat. IV (supersedes DIN and TUV approval) are included in the program.

### Features

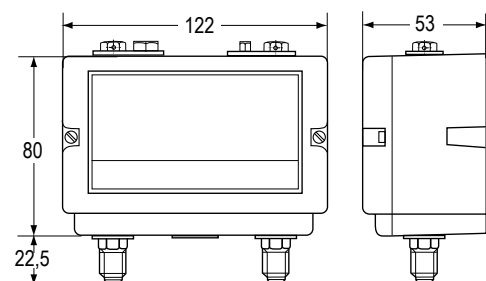
- High refrigerant pressure. Suitable for R410A and CO<sub>2</sub> subcritical applications.
- Models with gold plated contacts available
- Generous wiring space
- Splash-proof enclosure (IP54)
- Trip-free manual reset
- Patented separate alarm contacts for both low pressure and high pressure cut-out (except P78ALA)

### Note

For refrigerant compatibility see the "Refrigerants and product material compatibility" table on page 1 and 2.



### Dimensions (in mm)



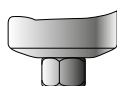
# P78

Dual pressure, IP54

## Ordering information



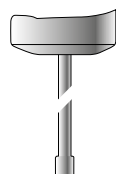
Style 5



Style 15



Style 28



Style 30

### Dual pressure controls for non-corrosive refrigerants

Family codes	Pressure connection		Left side		Right side		Construction LP/HP (max. press.)	
	Style 5		Style 30	Range (bar)	Diff. (bar)	Range (bar)		Diff. (bar)
	Ind. Pack.	Bulk pack						
P78LCA	-9300	-9320	-9400	-0.5 to 7	0.6 to 3	3 to 30	3 (fixed)	LP: 22 bar / HP: 33 bar
P78MCA	-9300	---	-9400	-0.5 to 7	0.6 to 3	3 to 30	Man. Res. <sup>3</sup>	LP: 22 bar / HP: 33 bar
P78PGA	-9300	<sup>1</sup>	-9400	-0.5 to 7	Man. Res. <sup>2</sup>	3 to 30	Man. Res. <sup>3</sup>	LP: 22 bar / HP: 33 bar

### For ammonia and non-corrosive refrigerants

Family codes	Pressure connection		Left side		Right side		Construction LP/HP (max. press.)	Approved according to PED 2014/68/EU Cat. IV
	Style 15 Ind. pack.	Style 15 Bulk pack	Range (bar)	Diff. (bar)	Range (bar)	Diff. (bar)		
P78LCA	-9700	<sup>1</sup>	-0.5 to 7	0.6 to 3	3 to 30	3 (fixed)	LP: 14 bar / HP: 33 bar	---
P78MCA	-9700	<sup>1</sup>	-0.5 to 7	0.6 to 3	3 to 30	Man. res. <sup>3</sup>	LP: 14 bar / HP: 33 bar	---
P78PGA	-9700	<sup>1</sup>	-0.5 to 7	Man. res. <sup>2</sup>	3 to 30	Man. res. <sup>3</sup>	LP: 14 bar / HP: 33 bar	---
P78PLM	-9750	<sup>1</sup>	3 to 30	Man. res. <sup>4</sup>	3 to 30	Man. res. <sup>4</sup>	LP: 14 bar / HP: 33 bar	■

### Fan cycling controls for air-cooled condensers (non-corrosive refrigerants)

Family codes	Pressure connection			Left side		Right side		Construction HP (max. press.)
	Style 5		Style 30	Range (bar)	Diff. (bar)	Range (bar)	Diff. (bar)	
	Ind. pack.	Bulk pack	Ind. pack.					
P78ALA	-9351	1	-9451	3.5 to 21	1.8 (fixed)	3.5 to 21	1.8 (fixed)	HP: 30 bar

#### Notes

- <sup>1</sup> Can be set-up for quantity orders
- <sup>2</sup> Resettable at 0.5 bar above cut-out point
- <sup>3</sup> Resettable at 3 bar below cut-out point
- <sup>4</sup> Resettable at 3.5 bar below cut-out point



## P78

Dual pressure, IP54

### Ordering information

For non-corrosive refrigerants, type approved pressure limiter/pressure cut out/safety pressure cut out

Family codes	Pressure connection			Left side		Right side		Construction LP/HP (max. press.)	Approved according to PED 2014/68/EU Cat. IV
	Style 5 Ind. pack.	Bulk pack	Style 28 Ind. pack.	Range (bar)	Diff. (bar)	Range (bar)	Diff. (bar)		
P78LCW	-9300	-9320	-9800	-0.5 to 7	0.6 to 3	3 to 30	3 (fixed)	LP: 22 bar / HP: 33 bar	■
P78MCB	-9300	-9320	-9800	-0.5 to 7	0.6 to 3	3 to 30	Man. res. <sup>4</sup>	LP: 22 bar / HP: 33 bar	■
P78MCS	-9300	---	---	-0.5 to 7	0.6 to 3	3 to 30	Man. res. <sup>4</sup>	LP: 22 bar / HP: 33 bar	■
P78PGB	-9300	<sup>1</sup>	-9800	-0.5 to 7	Man. res. <sup>2</sup>	3 to 30	Man. res. <sup>4</sup>	LP: 22 bar / HP: 33 bar	■
P78PLM	-9350	<sup>1</sup>	-9850	3 to 30	Man. res. <sup>4</sup>	3 to 30	Man. res. <sup>4</sup>	LP: 22 bar / HP: 33 bar	■

Dual pressure controls for non-corrosive refrigerants, type approved pressure limiter/pressure cut out/safety pressure cut out

Family codes	Pressure connection	Left side		Right side		Construction LP/HP (max. press.)	Approved according to PED 2014/68/EU Cat. IV
	Style 5 Ind. pack.	Range (bar)	Diff. (bar)	Range (bar)	Diff. (bar)		
P78LCW	-9355	-0.2 to 10	1 to 4.5	3 to 42	4 (fixed)	LP: 15 bar / HP: 47.6 bar	■
P78MCB	-9355	-0.2 to 10	1 to 4.5	3 to 42	Man. res. <sup>5</sup>		
P78PLM	-9355	3 to 42	Man. res. <sup>5</sup>	3 to 42	Man. res. <sup>5</sup>		

Dual pressure control for hazardous location application and non-corrosive refrigerants - Atex certified

Family code	Pressure connection		Left side		Right side		Approved according to PED 2014/68/EU Cat. IV
	Style 28 Ind. pack.	Bulk pack	Range (bar)	Diff. (bar)	Range (bar)	Diff. (bar)	
P78XLCW	-18000C	---	-0.5 to 7	0.6 to 3	3 to 30	3 (fixed)	■

#### Notes

- 1 Can be set-up for quantity orders
- 2 Resettable at 0.5 bar above cut-out point
- 3 Resettable at 3 bar below cut-out point
- 4 Resettable at 3.5 bar below cut-out point
- 5 Resettable at 5 bar below cut-out point





# P100

## Direct mount pressure switch

The P100 series are encapsulated, non-adjustable, direct mount pressure controls typically used for low and high-pressure cut-outs for OEM applications.

The P100 series are produced according to switchpoint requirements of customers. The small dimensions, weight and protection class makes the P100 series applicable for use without the need of additional mounting brackets.

The P100 series can be used for all non-corrosive refrigerants like R134a; R32; R404, R410A, R290 (Propane), R600, R1234, R744 (CO<sub>2</sub>) and many others.



## Application

- Computer room air conditioning
- Refrigeration/Air conditioning condensers
- Commercial refrigeration
- Ice machines
- Food service equipment

## Features

- Compact size and light weight
- Encapsulated, dust tight switch IP67
- Broad variety of electrical and pressure connections
- Manual reset models have a trip-free design
- Models with gold-plated contacts available upon request
- Approved according to PED 2014/68/EU Cat. IV
- ATEX Certified models available



## P100

Direct mount pressure switch

## Ordering information

More models are available. This is only a selection. For quantity orders customized models can be set up. Tolerances apply. For details and inquiries contact your Johnson Controls representative.

### Low pressure automatic reset models

(Function: Contact opens on pressure drop - Switch: SPST Standard Duty)

Codes	Setpoints (bar g)		Pressure port	Cable (cm)
	Open	Close		
P100AP-315D	0,3	0,7	1/4" SAE Fem. Flare	200
P100AP-85D	0,3	1,4	1/4" SAE Fem. Flare	122
P100AP-50D	0,3	2,2	1/4" SAE Fem. Flare	76
P100AP-57D	0,5	2,0	1/4" SAE Fem. Flare	200
P100AP-305D	0,5	3,0	6 mm Brazing Tube	200
P100AP-310D	0,7	2,2	1/4" SAE Fem. Flare	300
P100AP-322D	1,5	2,5	1/4" SAE Fem. Flare	200
P100AP-25D	1,5	3,0	6 mm Brazing Tube	183
P100AP-318D	2,0	3,3	1/4" SAE Fem. Flare	200
P100AP-300D	2,5	4,0	1/4" SAE Fem. Flare	200
P100AP-302D	4,0	6,0	1/4" SAE Fem. Flare	200
P100AP-100D	7,0	10,0	1/4" SAE Fem. Flare	46
P100AP-101D	7,0	10,0	6 mm Brazing Tube	122
P100AP-311D	10,3	15,5	1/4" SAE Fem. Flare	300
P100AP-323D	14,0	19,0	1/4" SAE Fem. Flare	200





# P100

Direct mount pressure switch

## Ordering information

More models are available. This is only a selection. For quantity orders customized models can be set up. Tolerances apply. For details and inquiries contact your Johnson Controls representative.

### High pressure automatic reset models

(Function: Contact opens on pressure rise - Switch: SPST Standard Duty)

Codes	Setpoints (bar g)		Pressure port	Cable (cm)
	Open	Close		
P100CP-102D	16,0	11,0	1/4" SAE Fem. Flare	200
P100CP-77D	18,0	12,0	1/4" SAE Fem. Flare	122
P100CP-114D	24,0	18,0	6 mm Brazing Tube	100
P100CP-104D	24,0	18,0	1/4" SAE Fem. Flare	200
P100CP-111D	26,0	20,0	1/4" SAE Fem. Flare	200
P100CP-112D	26,0	20,0	6 mm Brazing Tube	200
P100CP-53D	26,9	20,0	1/4" SAE Fem. Flare	122
P100CP-73D	27,0	19,0	6 mm Brazing Tube	122
P100CP-107D	28,0	23,0	6 mm Brazing Tube	200
P100CP-106D	28,0	23,0	1/4" SAE Fem. Flare	200
P100CP-108D	38,0	28,0	1/4" SAE Fem. Flare	200
P100CP-133D	40,7	32,4	1/4" SAE Fem. Flare	122
P100CP-142D	42,0	35,0	1/4" SAE Fem. Flare	300
P100CP-170D	140,0	100,0	6 mm Brazing Tube	120



## P100

Direct mount pressure switch

## Ordering information

More models are available. This is only a selection. For quantity orders customized models can be set up. Tolerances apply. For details and inquiries contact your Johnson Controls representative.

### High pressure manual reset models

(Function: Contact opens on pressure rise - Switch: SPST Standard Duty)

Codes	Setpoints (bar g)		Pressure port	Cable (cm)
	Open	Close		
P100DA-11D	20,0	Manual Reset	1/4" SAE Fem. Flare	122
P100DA-68D	26,0	Manual Reset	1/4" SAE Fem. Flare	300
P100DA-82D	28,0	Manual Reset	1/4" SAE Fem. Flare	200
P100DA-34D	31,0	Manual Reset	1/4" SAE Fem. Flare	122
P100DA-72D	38,0	Manual Reset	1/4" SAE Fem. Flare	200
P100DA-90D	40,5	Manual Reset	1/4" SAE Fem. Flare	300
P100DA-75D	42,0	Manual Reset	1/4" SAE Fem. Flare	200
P100DA-76D	42,0	Manual Reset	6 mm Brazing Tube	200
P100DA-96D	43,5	Manual Reset	1/4" SAE Fem. Flare	200
P100DA-91D	45,0	Manual Reset	1/4" SAE Fem. Flare	300

### High pressure automatic reset models - Heavy duty

(Function: Change over contact - Switch: SPDT Heavy Duty)

Codes	Setpoints (bar g)		Pressure port	Cable (cm)
	Open	Close		
P100EE-22D	20,7	27,6	1/4" SAE Fem. Flare	200
P100EE-20D	27,6	20,7	6 mm Brazing Tube	122
P100EE-61D	28,0	21,0	6 mm Brazing Tube	200
P100EE-82D	40,7	32,4	1/4" SAE Fem. Flare	183

### High pressure automatic reset model - Atex certified

(Function: Contact opens on pressure rise - Switch: SPST Standard Duty)

Code	Setpoints (bar g)		Pressure port	Cable (cm)
	Open	Close		
P100CP-900D	18,5	13,0	6 mm Brazing Tube	129



# Pressure switches accessories

## Ordering information

Codes	Description	Minimum order quantity
BKT024N002R	Mounting bracket for P233	1
FTG015N602R	Duct mounting kit "straight"	1
FTG015N603R	Duct mounting kit "bent"	1
GMT008N600R	Duct kit for P233, self locking grommet and tubing	1
CNR003N001R	Connector 6 mm for P77/P78, P735/P736	1
CNR003N002R	Connector 8 mm for P77/P78, P735/P736	1
CNR012N001R	Adapter R3/8 female to 1/4-18 NPT male for P48	1
CNR013N001R	Adapter R 3/8 female to 1/4-18 NPT female for P48	1
KIT023N600	Locking kit for P48, P77/P78, P735/P736 - for field installation	1
KIT031N601	Valve depressors for conversion style 51 - style 50	100 (1 box)
271-51L	Mounting bracket for P28, P45, P48, P74, P77/P78, P735/P736	50

## Capillary kit

Codes	Length (cm)	Style	Minimum order quantity
SEC002N600	90	2x style 13	100
SEC002N602	90	Style 13 - style 45a	100
SEC002N606	200	Style 13 - style 45a	75
SEC002N607	200	2x style 13	75
SEC002N621	90	Style 34 - style 34	100
SEC002N622	90	Style 50 - style 50	100
SEC002N624	200	Style 50 - style 50	75
SEC002N626	90	Style 50 - style 51	100





# H735

## Syntetic flexible hose

The synthetic hoses consist of a seamless PA compound inner layer reinforced with a braided layer of high performance synthetic fibre.

This reinforcement is protected by an oil, weather and abrasion resistant Polyester Elastomer Compound.

The standard assembly length is 0,9 meter with one straight and one elbow 90 degree hose fitting.

The fitting connection is 1/4" metal tube with 7/16"-20 UNF swivel nut connection suitable for 1/4" SAE male flare. Other lengths and/or fitting connections configurations (Style 50, 51 straight or elbow) are available on request (quantity orders only).



### Application

These synthetic hoses are designed for pressure measuring connections. They provide, for example, a very flexible connection between a refrigerant compressor and pressure controls. The hoses can be used for all non-corrosive refrigerants including R134a, R22, R404a, R407c and R410A with pressures within the maximum pressure range of the hose. Hoses are tested with common compressor oils in combination with above mentioned refrigerants.

### Features

- Very flexible
- Low minimum bend radius (30 mm)
- One straight and one 90° elbow pressure connection
- Polyester Elastomer Compound construction
- High pressure safety ratio
- Low effusion

## Ordering information

**Fitting connection: 1/4" metal tube with 7/16"-20 UNF swivel nut connection suitable for 1/4" SAE male flare. All models bulk packed.**

Codes	Pressure connection	Length (cm)
H735AA-30C	Straight x 90° elbow	30
H735AA-50C	Straight x 90° elbow	50
H735AA-70C	Straight x 90° elbow	70
H735AA-100C	Straight x 90° elbow	100
H735AA-150C	Straight x 90° elbow	150

#### Note

Minimum shipping quantity 100 pieces





# P28

## Oil protection

These controls measure the pressure differential between the pressure generated by the oil pump and the refrigerant pressure at the crankcase.

A built-in time delay switch allows for pressure-pick up on start and avoids nuisance shutdowns on pressure drops of short duration during the running cycle.

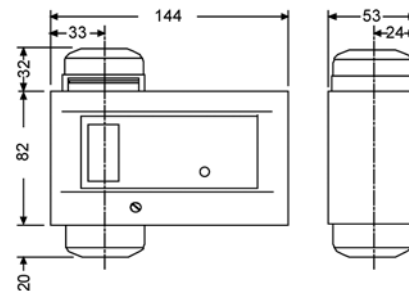
When the compressor is started, the time delay switch is energised. If the net oil pressure does not build up within the required time limit, the time delay switch trips to stop the compressor. If the net oil pressure rises within the required time after the compressor starts, the time delay switch is automatically de-energised and the compressor continues to operate normally. If the net oil pressure should drop below setting (scale pointer) during the running cycle, the time delay switch is energised and, unless the net oil pressure returns to cut-in point within the time delay period, the compressor will be shut down, and have to be manual reset.

The compressor can never run longer than the predetermined time on low oil pressure.

Controls are available only for manual reset after cut-out.



### Dimensions (in mm)



## Application

These oil protection controls are designed to give protection against low net lube oil pressure on pressure lubricated refrigeration compressors.

## Features

- Heavy duty pressure elements
- Safety lock-out with trip-free manual reset
- Ambient compensated timing
- Dust-tight Penn switch
- Suited to be used with A2L refrigerants

### Note

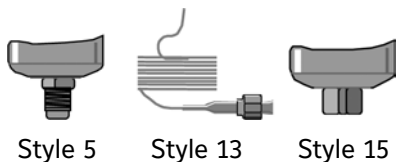
For refrigerant compatibility see the "Refrigerants and product material compatibility" table on page 1 and 2.



## P28

Oil protection

### Ordering information



**Switch action: 15(8) A, 230 VAC, open low, alarm and safe light contacts**

Codes	Range (bar)	Style	Time delay (s)	Voltage	Refrigerant	Additional features
P28DA-9660	0.6 to 4.8	13	90	115/230	non-corr.	---
P28DJ-9360	0.6 to 4.8	5	90	230	non-corr.	IP66 enclosure
P28DJ-9861	0.6 to 4.8	15	90	230	NH3	IP66 enclosure, Incl. 2 connectors CNR003N001
P28DP-9340	0.6 to 4.8	5	50	230	non-corr.	---
P28DP-9660	0.6 to 4.8	13	90	230	non-corr.	---
P28DP-9680	0.6 to 4.8		120	230	non-corr.	---



# P48

## Steam pressure

The P48 series have been developed for special applications where pressure must be controlled. All models have an adjustable differential depending on the range (see "Ordering information" table).

The P48AAA-9110 and P48AAA-9120 has the power element outside the case.

All the models have phosphor bronze bellows and brass pressure connections except the P48AAA-9150. This model has a stainless steel bellows and pressure connection and is provided with a brass adapter 1/4"-18 NPT female to R3/8 male.

## Application

The series P48 pressure controls are designed as operating or high/low cut-out control on steam, air or (hot) water applications. Also for non-combustible gases which are not harmful to the materials in contact with these mediums. On steam applications a steam trap is recommended.

## Features

- Generous wiring space provided
- Splash-proof enclosure (IP54)
- SPDT contacts are provided as standard on single pressure control
- Trip-free manual reset

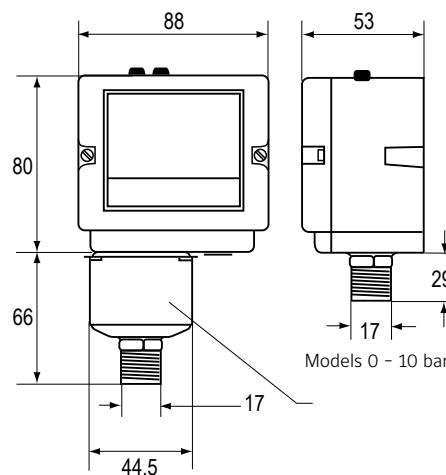
## Ordering information

Switch action: ~16(10)A; 400 V... 220 V DC, 12 W (pilot duty only) SPDT, Open High


Codes	Range (bar)	Differential (bar)	Pressure connection	Style	Additional features
P48AAA-9110	0 to 1	0.16 to 0.55	G 3/8" male	29a	Automatic reset
P48AAA-9120	0.2 to 4	0.25 to 0.8	G 3/8" male	29a	Automatic reset
P48AAA-9130	-0.2 to 10	1 to 4.5	G 3/8" male	29a	Automatic reset
P48AAA-9140	1 to 16	1.3 to 2.5	G 3/8" male	29a	Automatic reset
P48AAA-9150	3 to 30	3 to 12	G 3/8" male	29a	Automatic reset, stainless steel bellows
P48BEA-9140	4 to 16	---	G 3/8" male	29a	Manual reset



## Dimensions (in mm)







# Water regulating valves



# V46

## 2-way pressure actuated water valves commercial applications

These pressure actuated modulating valves control the quantity of water to a condenser by directly sensing pressure changes in a refrigerant circuit.

The valves can be used in non-corrosive refrigerant systems. Ammonia power elements and valves designed for salt-water applications are available.

The valves have a quick opening characteristic and open on pressure increase (direct acting). Reverse acting (close on pressure increase) is possible.

### Features

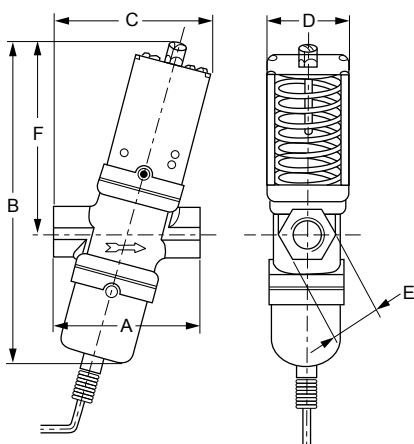
- Pressure balanced valve design
- Pressure actuated
- 3/8, 1/2, 3/4" are angled body type valves with high  $K_v$  value
- 3/8" up to 2" pressure valves "all range" types
- Quick opening valve characteristics
- No close fitting or sliding parts in water passages
- Easy to disassemble. All parts can be replaced
- Special bronze bodies and monel parts
- Power elements with stainless steel bellows available
- Wide range of pressure connection styles
- Nickel plated seats available for 3/8, 1/2, and 3/4" valves
- Direct/reverse action



### Note

For refrigerant compatibility see the "Refrigerants and product material compatibility" table on page 1 and 2.

### V46AA / VA46AB / VA46AC Dimensions (in mm)

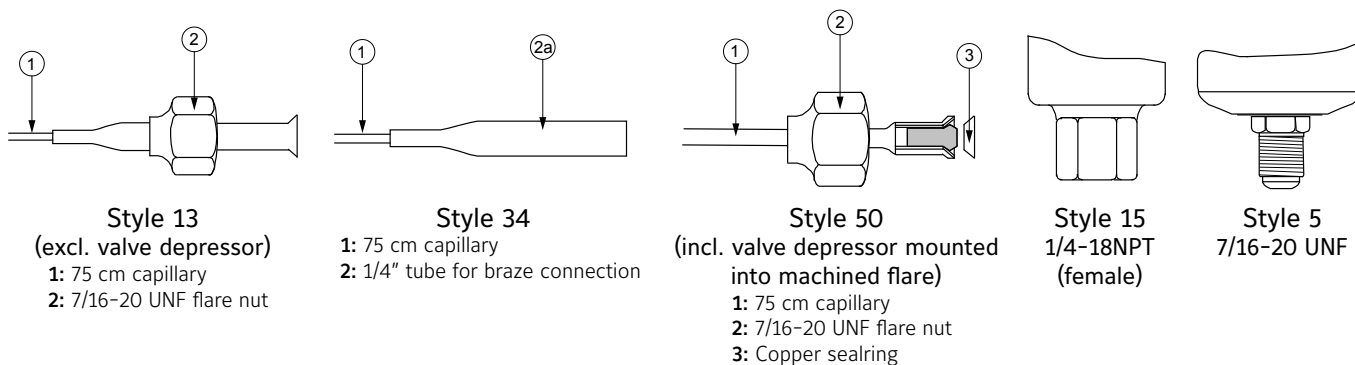


Valve size	A	B	C	D	E	F
3/8"	70	150	75	41	24	92
1/2"	80	166	86	51	27	98
3/4"	90	181	97	55	36	110

# V46

2-way pressure actuated water valves commercial applications

## Ordering information



### V46AA / VA46AB / VA46AC

Codes	Range (bar)	Body style	Size thread according to ISO 228	Style	Capillary length (cm)	Additional features (It is possible to change style 13 into style 45A by ordering KIT031N600)
V46AA-9600	5 to 18	Angled	3/8"	13	75	---
V46AA-9608	5 to 18	Angled	3/8"	13	75	With special washer to prevent waterhammer at low flow capacity
V46AA-9602	5 to 18	Angled	3/8"	13	100	Nickel plated seat/longer capillary
V46AA-9950	5 to 18	Angled	3/8"	34	75	Nickel plated seat/solder connection
V46AB-9600	5 to 18	Angled	1/2"	13	75	---
V46AB-9950	5 to 18	Angled	1/2"	34	75	1/4" braze connection
V46AC-9600	5 to 18	Angled	3/4"	13	75	---
V46AA-9300	5 to 23	Angled	3/8"	5	---	---
V46AA-9301	5 to 23	Angled	3/8"	5	75	Nickel plated seat, high range. With washer to prevent waterhammer at low flow capacity
V46AA-9606	5 to 23	Angled	3/8"	13	75	Nickel plated seat, high range
V46AA-9609	5 to 23	Angled	3/8"	13	75	Nickel plated seat, high range. With washer to prevent waterhammer at low flow capacity
V46AA-9510	5 to 23	Angled	3/8"	50	75	High range
V46AB-9300	5 to 23	Angled	1/2"	5	---	---
V46AB-9605	5 to 23	Angled	1/2"	13	75	Nickel plated seat, high range
V46AB-9951	5 to 23	Angled	1/2"	34	75	Solder connection, high range
V46AB-9510	5 to 23	Angled	1/2"	50	75	High range
V46AC-9300	5 to 23	Angled	3/4"	5	75	---
V46AC-9605	5 to 23	Angled	3/4"	13	75	Nickel plated seat, high range
V46AC-9510	5 to 23	Angled	3/4"	50	75	High range



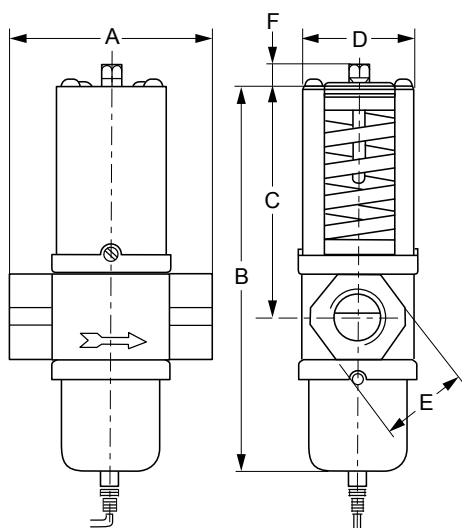


### V46

2-way pressure actuated water valves commercial applications

## Ordering information

### V46AD / VA46AE Dimensions (in mm)



Valve size	A	B	C	D	E	F
1"	124	233	138	71	48	13
1-1/4"	126	242	144	71	57	13



### V46AD / VA46AE

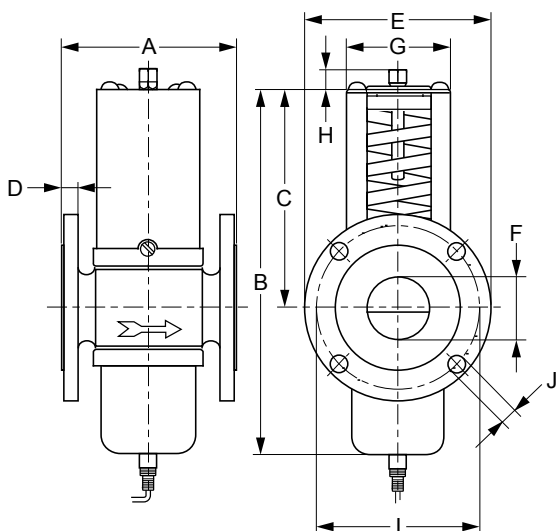
Codes	Range (bar)	Body style	Size thread according to ISO 7-Rc	Style	Capillary length (cm)	Additional features (It is possible to change style 13 into style 45A by ordering KIT031N600)
V46AD-9300	5 to 18	Straight	1"	5	---	---
V46AD-9510	5 to 18	Straight	1"	50	75	---
V46AD-9600	5 to 18	Straight	1"	13	75	---
V46AE-9300	5 to 18	Straight	1-1/4"	5	---	---
V46AE-9510	5 to 18	Straight	1-1/4"	50	75	---
V46AE-9600	5 to 18	Straight	1-1/4"	13	75	---
V46AD-9511	10 to 23	Straight	1"	50	75	High range
V46AE-9512	10 to 23	Straight	1-1/4"	50	75	High range

## V46

2-way pressure actuated water valves commercial applications

## Ordering information

### V46AR / VA46AS / VA46AT Dimensions (in mm)



Valve size	A	B	C	D	E	F	G	H	I	J
1-1/2"	137	242	144	18	150	47	67	13	110	18
2"	168	299	164	20	165	57	89	16	125	18
2-1/2"	172	299	164	20	185	70	89	16	145	18

### V46AR / VA46AS / VA46AT

Codes	Range (bar)	Body style	Size DIN2533 flange connections	Style	Capillary length (cm)	Additional features (It is possible to change Style 13 into Style 45A by ordering KIT031N600)
V46AR-9300	5 to 18	Straight	1-1/2"	5	---	---
V46AR-9600	5 to 18	Straight	1-1/2"	13	75	---
V46AS-9300	5 to 11.5	Straight	2"	5	---	---
V46AS-9301	11 to 18	Straight	2"	5	---	---
V46AT-9300	5 to 11.5	Straight	2-1/2"	5	---	---
V46AT-9301	11 to 18	Straight	2-1/2"	5	---	---

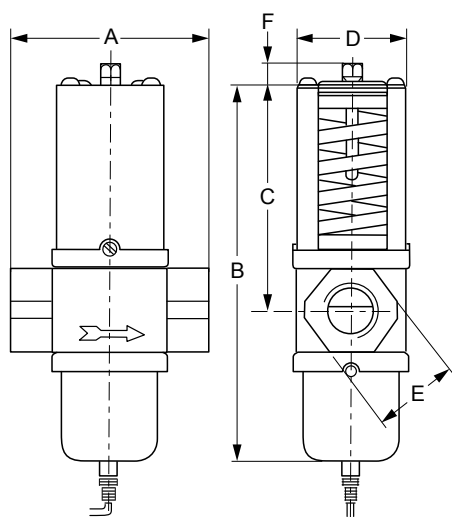


### V46

2-way pressure actuated water valves commercial applications

### Ordering information

#### V46BA / V46BB / V46BC / V46BD / V46BE Dimensions (in mm)



Valve size	A	B	C	D	E	F
3/8"	67	136	79	41	24	10
1/2"	80	153	86	51	29	10
3/4"	86	163	96	55	35	10
1"	124	233	138	71	52	13
1-1/4"	124	242	144	71	62	13



#### V46BA / V46BB / V46BC / V46BD / V46BE

Codes	Range (bar)	Body style	Size thread according to ISO 228	Style	Capillary length (cm)	Additional features (It is possible to change style 13 into style 45A by ordering KIT031N600)
V46BA-9510	5 ...23	Straight	3/8"	50	75	---
V46BB-9510	5 ...23	Straight	1/2"	50	75	---
V46BC-9510	5 ...23	Straight	3/4"	50	75	---
V46BD-9510	10...23	Straight	1"	50	75	---
V46BD-9600	5...18	Straight	1"	13	75	---
V46BE-9510	5...18	Straight	1-1/4"	50	75	---

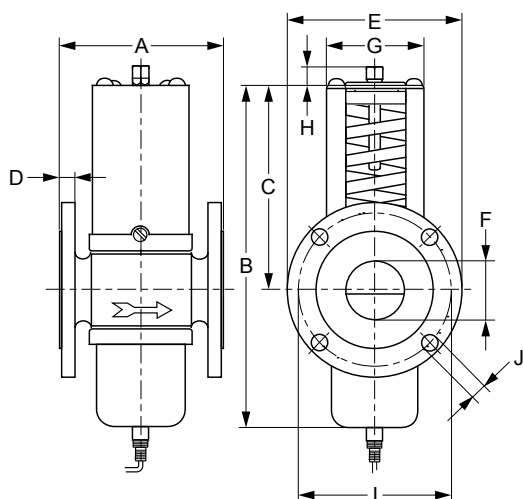


## V46

2-way pressure actuated water valves commercial applications

### Ordering information

#### V46BR / V46BS / V46BT Dimensions (in mm)



Valve size	A	B	C	D	E	F	G	H	I	J
1-1/2"	135	242	144	14	150	47	67	13	110	18
2"	162	299	164	16	165	57	89	16	125	18
2-1/2"	172	299	164	16	185	70	89	16	145	18

#### V46BR / V46BS / V46BT

Codes	Range (bar)	Body style	Size DIN 86021 flange connections	Style	Capillary length (cm)
V46BR-9510	5 to 18	Straight	1-1/2"	50	75
V46BS-9300	5 to 11.5	Straight	2"	5	---
V46BS-9301	11 to 18	Straight	2"	5	---
V46BT-9300	5 to 11.5	Straight	2-1/2"	5	---
V46BT-9301	11 to 18	Straight	2-1/2"	5	---



# V46SA

## Pressure actuated water valves, low flow

The V46SA is a direct acting, "all range", pressure actuated modulating valve, used to control the waterflow to a condenser by directly sensing pressure changes in a non-corrosive refrigerant circuit.

The V46SA is specially designed for use on equipment requiring a low condenser waterflow such as icemakers, small heatpumps and watercoolers. The springhousing and power element are rolled to the valve body.

Rubber diaphragms seal the water away from the range spring and bellows part so these are not submerged in water where they would be subject to sedimentation and corrosion.

The valve can be ordered style 5 (without capillary), style 34 and style 50 (incl. 75 cm capillary).

The capillary part will be delivered separated from the valve.



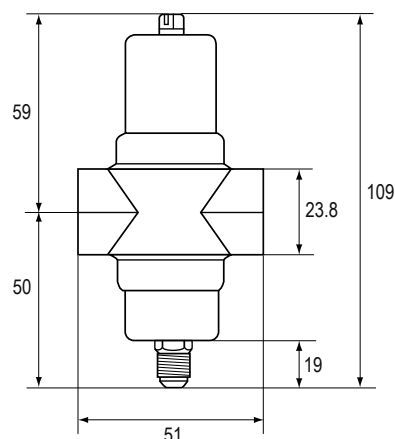
## Features

- Valve designed for low flow
- "All range" power element and spring housing
- Small dimensions
- Pressure actuated
- Various pressure connection style
- High refrigerant pressure resistant bellows

## Note

For refrigerant compatibility see the "Refrigerants and product material compatibility" table on page 1 and 2.

## Dimensions (in mm)



## Ordering information

Codes	Range (bar)	Body style	Size thread according to ISO 228	Style	Capillary length (cm)	Additional features (It is possible to change style 13 into style 45A by ordering KIT031N600)
V46SA-9101	5 to 23	Straight	3/8"	45A	75	Capillary soldered to power element
V46SA-9110	5 to 23	Straight	3/8"	50	75	Capillary separate
V46SA-9300	5 to 23	Straight	3/8"	5	---	---
V46SA-9951	5 to 23	Straight	3/8"	34	75	Capillary soldered to power element





# V48

## 3-way pressure actuated water valves

These watervalves are especially designed for condensing units cooled either by atmospheric or forced draft cooling towers. They may be used on single, or multiple condenser hook-ups to the tower.

The type V48 valve senses the compressor head pressure and allows cooling water to flow to the condenser, to by-pass the condenser, or to allow waterflow to both condenser and by-pass line in order to maintain correct refrigerant head pressure.

A further advantage of this system is that the 3-way valve permits a continuous water flow to the tower so the tower can operate efficiently with a minimum of maintenance on nozzles and wetting surfaces.

The valves can be used in non-corrosive refrigerant systems. Ammonia power elements and valves designed for salt-water applications are available.

The valves have a quick opening characteristic.



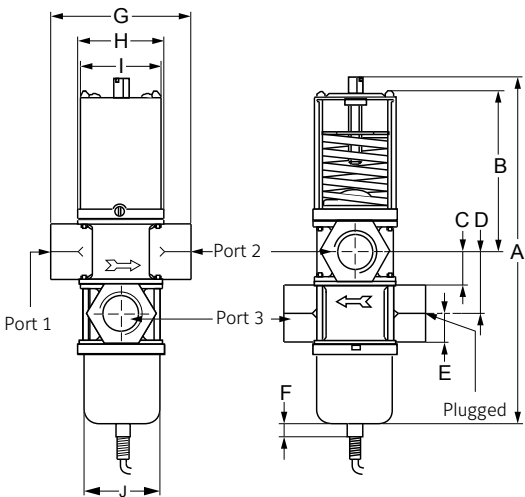
### Features

- Pressure balanced design
- Free movement of all parts
- Easy manual flushing
- High  $K_V$  values
- Pressure actuated
- Can be used as mixing or diverting valve

### Note

For refrigerant compatibility see the "Refrigerants and product material compatibility" table on page 1 and 2.

### Dimensions (in mm)



Valve size	A	B	C	D	E	F	G	H	I	J
Commercial types										
1/2"	201	86	24	38	29	8	81	51	47	45
3/4"	218	96	27	45	35	8	86	55	52	48
1"	296	138	29	51	48	8	124	71	67	59
1-1/4"	315	144	32	60	57	8	126	71	67	59
Maritime type										
3/4"	218	96	27	45	35	8	86	55	52	48





# V48

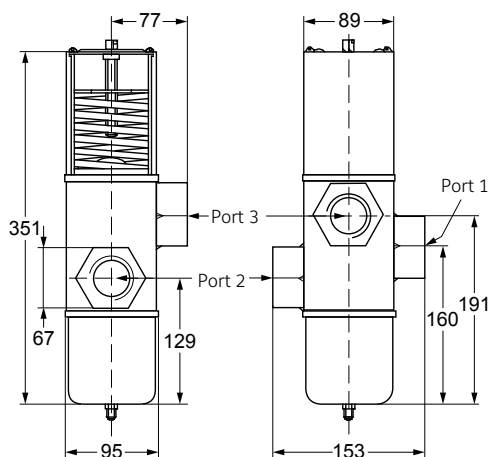
3-way pressure actuated water valves

## Ordering information

Codes	Range (bar)	Body style	Size thread according to ISO 7-Rc	Style	Capillary length (cm)	Additional features (It is possible to change Style 13 into Style 45A by ordering KIT031N600)
Commercial types						
V48AB-9510	4 to 20	Straight	1/2"	50	75	---
V48AB-9600	4 to 16	Straight	1/2"	13	75	---
V48AC-9510	4 to 20	Straight	3/4"	50	75	---
V48AD-9510	6 to 20	Straight	1"	50	75	---
V48AD-9600	4 to 16	Straight	1"	13	75	---
V48AE-9510	6 to 20	Straight	1-1/4"	50	75	---
Maritime type						
V48BC-9600	4 to 16	Straight	3/4"	13	75	Seawater resistant

## V48AF commercial type

### Dimensions (in mm)



Code	Range (bar)	Body style	Size thread according to ISO 7-Rc	Style	Additional features (It is possible to change style 13 into style 45A by ordering KIT031N600)
V48AF-9300	6 to 14	Straight	1-1/2"	5	---



# V246 / V248

## Water regulating valves for high pressure refrigerants

The V246 / V248 series 2-way and 3-way pressure actuated water regulating valves for high-pressure refrigerants regulate water flow and control refrigerant head pressure in systems with single or multiple watercooled condensers. These valves have an adjustable opening point in a refrigerant pressure range of 200 to 400 psig (13.8 to 27.6 bar).

These series valves are designed specifically for condensing units cooled either by atmospheric or forced draft cooling towers. They are used on single or multiple condenser hook-ups to the tower to provide the most economical and efficient use of the tower.

V246 / V248 valves may be used with standard non-corrosive refrigerants.

For applications where the coolant may be corrosive to the internal parts, maritime models are available, which have nickel copper (Monel®) internal parts.



### Features

- No close fitting or sliding parts in water passages
- Accessible range spring
- Take-apart construction
- Pressure-balanced design
- Corrosion-resistant material for internal parts

### Note

For refrigerant compatibility see the "Refrigerants and product material compatibility" table on page 1 and 2.



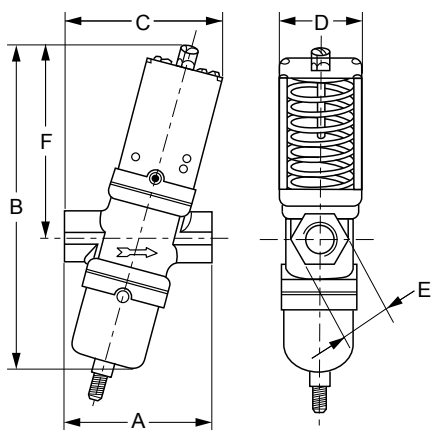
# V246 / V248

Water regulating valves for high pressure refrigerants

## Ordering information

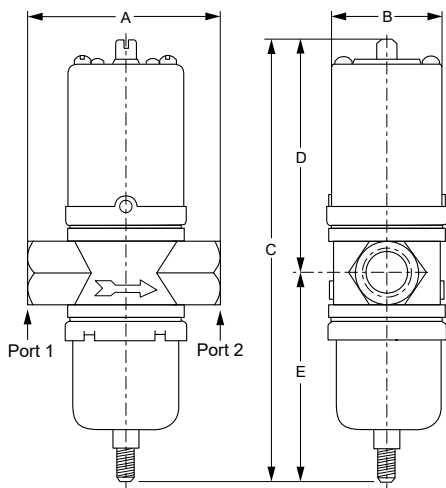
### Dimensions (in mm)

Standard production models Range 13.8 to 27.6 bar V246 screw connection valves



#### Commercial service

Valve size	A	B	C	D	E	F
3/8"	70	176	75	41	24	92
1/2"	80	191	86	51	27	98
3/4"	90	217	97	55	36	110



#### Commercial service

Valve size	A	B	C	D	E
1"	124	71	267	151	116
1-1/4"	126	71	276	156	121

#### Maritime service

Valve size	A	B	C	D	E
3/8"	67	41	166	89	77
1/2"	78	51	182	96	86
3/4"	86	55	203	106	98
1"	124	71	267	151	116
1-1/4"	126	71	276	156	121



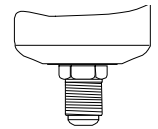
## V246 / V248

Water regulating valves for high pressure refrigerants

### Ordering information

Standard production models Range 13.8 to 27.6 bar V246 screw connection valves

Codes	Construction	Valve size and connection	Style	Shipping weight (kg)
V246GA1A001C	Direct acting, Commercial	3/8 in. BSPP Screw, ISO 228	Style 5	1.86
V246GB1A001C	Direct acting, Commercial	1/2 in. BSPP Screw, ISO 228	Style 5	1.4
V246GC1A001C	Direct acting, Commercial	3/4 in. BSPP Screw, ISO 228	Style 5	1.7
V246GD1B001C	Direct acting, Commercial	1 in. BSPT Screw, ISO 7	Style 5	4.2
V246GE1B001C	Direct acting, Commercial	1-1/4 in. BSPT Screw, ISO 7	Style 5	4.5
V246GR1B001C	Direct acting, Commercial	1-1/2 in. Flange, DIN2533	Style 5	6.2
V246HA1B001C	Direct acting, Maritime	3/8 in. BSPP Screw, ISO 228	Style 5	1.86
V246HC1B001C	Direct acting, Maritime	3/4 in. BSPP Screw, ISO 228	Style 5	2.0
V246HD1B001C	Direct acting, Maritime	1 in. BSPT Screw, ISO 228	Style 5	4.3
V246HE1B001C	Direct acting, Maritime	1-1/4 in. BSPT Screw, ISO 228	Style 5	4.7
V246HR1B001C	Direct acting, Maritime	1-1/2 in. Flange, DIN86021	Style 5	6.2
V246HS1B001C	Direct acting, Maritime	2 in. Flange, DIN86021	Style 5	12.3



Style 5  
7/16-20 UNF



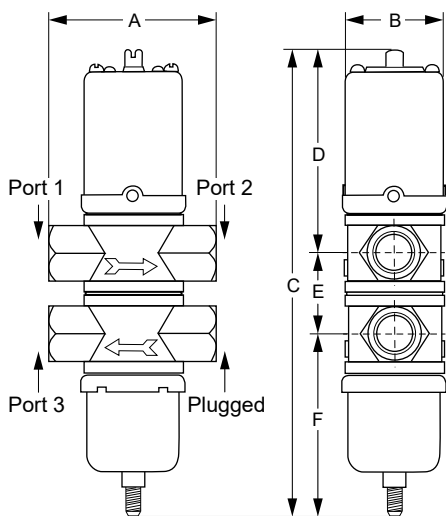
# V246 / V248

Water regulating valves for high pressure refrigerants

## Ordering information

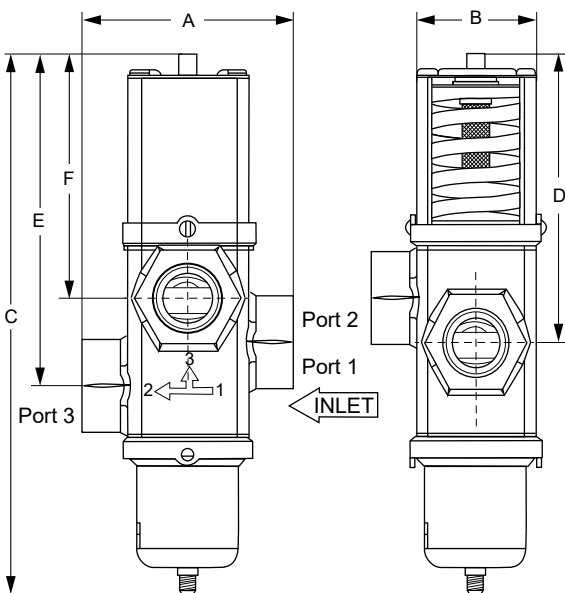
### Dimensions (in mm)

Standard production models Range 13.8 to 27.8 bar



3/4 in. through 1-1/4 in.

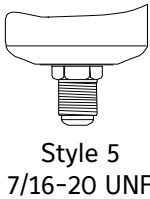
Valve size	A	B	C	D	E	F
3/4 in.	86	55	248	106	45	98
1-1/4 in.	126	71	336	156	60	121



1-1/2 in.

Valve size	A	B	C	D	E	F
1-1/2 in.	152	89	387	206	237	175

Codes	Construction	Valve size and connection	Element style	Shipping weight (kg)
V248GE1B001C	Direct acting, Commercial	1-1/4 in. BSPT Screw, ISO 7	Style 5	5.0
V248GF1B001C	Direct acting, Commercial	1-1/2 in. BSPT Screw, ISO 7	Style 5	11.3
V248HC1B001C	Direct acting, Maritime	3/4 in. BSPP Screw, ISO 228	Style 5	3.0





# V47

## Temperature actuated modulating valves

These modulating water valves can be used for heating applications.

It does have an heating element which means that the bulb temperature always must be higher than the valve body (power element).

The valve opens at increasing bulb temperature.

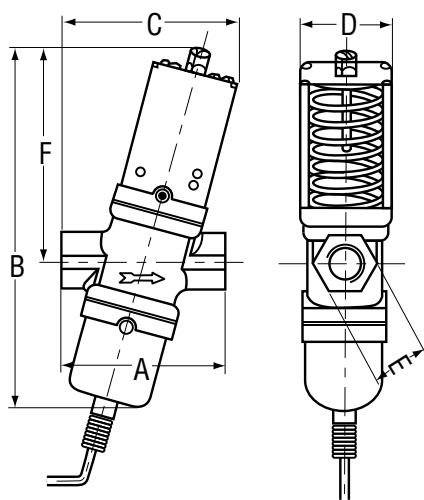
The bulb must be mounted pointing downwards up to horizontal.

### Features

- Pressure balanced valve design
- 3/4" are angled body type valves with high  $K_v$  value
- Quick opening valve characteristics
- No close fitting or sliding parts in water passages
- Easy to disassemble. All parts can be replaced



### Dimension (in mm)



Valve size	A	B	C	D	E	F
3/4"	90	181	97	55	36	110

## Ordering information

Code	Range (°C)	Body style	Size thread according to ISO 228	Capillary length	Bulb style 4 length (mm)
V47AC-9160	24...57	Angled	3/4"	1.8 m plain	82





## Water regulating valves

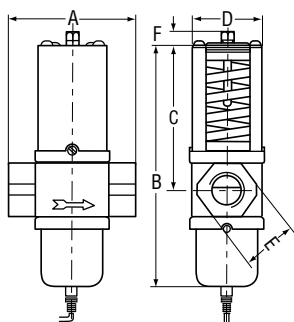
Temperature actuated water valves

### V47

Temperature actuated modulating valves

## Ordering information

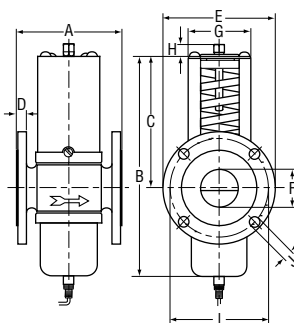
### Dimension (in mm)



Valve size	A	B	C	D	E	F
1"	124	233	138	72	48	13
1-1/4"	125	243	144	72	57	13

Codes	Range (°C)	Body style	Size thread according to ISO 7-Rc	Capillary length	Bulb style 4 length (mm)
V47AD-9160	24...57	Straight	1"	1.8 m arm.	152
V47AD-9161	46...82	Straight	1"	1.8 m arm.	152
V47AE-9161	46...82	Straight	1-1/4"	1.8 m arm.	152

### Dimension (in mm)



Valve size	A	B	C	D	E	F	G	H	I	J
1-1/2"	137	244	144	18	150	47	67	13	110	18

Code	Range (°C)	Body style	Size DIN 2533 flange connections	Capillary length	Bulb style 4 length (mm)
V47AR-9161	46...82	Straight	1-1/2"	1.8 m arm.	152







# Humidity controls





# W43

## Room humidistats

These room humidistats are designed to control humidification or dehumidification equipment. It provides SPDT control.

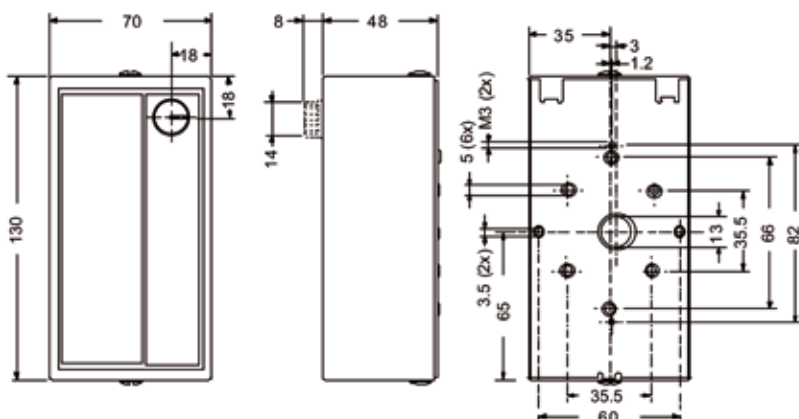
The sensing element consists of carefully selected and processed human hair, proven to be the most sensitive and stable material known for this application. Under normal conditions these controls retain their sensitivity and accuracy for many years.

### Features

- Wide range 0 to 90% R.H.
- Dust tight Penn switch
- SPDT Contacts
- Field adjustable high and low limit stops
- Separate mounting plate
- Suited to be used in the presence of A2L refrigerants



### Dimensions (in mm)



### Ordering information

Code	Description
W43C-9100	Room humidistat







# Condenser fan speed controllers





# P215PR

## Direct-mount single phase controller

These direct mount pressure actuated condenser fan speed controllers are designed for speed variation of single-phase motors.

Head pressure control of a refrigeration system, through speed variation of the fan on an air-cooled condenser, results in optimum performance throughout the year.

A pressure actuated device, gives the most direct and fastest response to pressure variations in the refrigerant system. The controller varies the supply voltage to the motor from 30% to at least 95% over the proportional band using the phase cutting principle.

This provides speed variation of permanent split capacitor or shaded pole motors that do not draw more than 4 A (rms) full load current.

Cut-off models (fan stops at low pressure) as well as minimum speed models (fan keeps running at 30%) are available.

The controllers can be used in non-corrosive refrigerant systems.



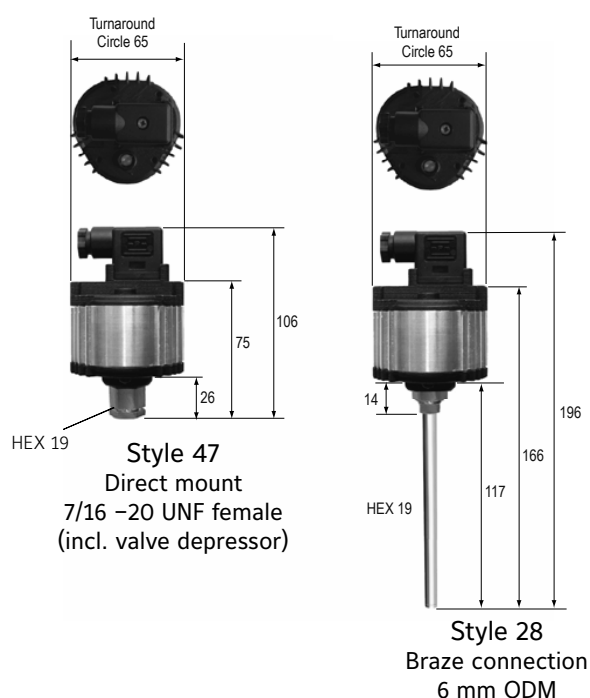
## Features

- Condenser pressure control by fan speed variation
- Pressure input
- Direct mount
- Setpoint screw on top
- Built-in suppression filter
- IP65
- Compact design
- Attractive styling
- Quick connector plug included
- CE

### Note

For refrigerant compatibility see the "Refrigerants and product material compatibility" table on page 1 and 2.

## Dimensions (in mm)



# P215PR

Direct-mount single phase controller

## Ordering information

Codes	Range (bar)	Element style	Setpoint (bar)	Prop. band (bar)	Supply voltage 50/60 Hz	Rating	Controller mode	Extra features
P215PR-9200	10 to 25	47	19	4.5	230 VAC	4 Amp	Cut-off	---
P215PR-9202	22 to 42	47	26	5.5	230 VAC	4 Amp	Cut-off	---
P215PR-9203	5 to 15	47	9	2.5	230 VAC	4 Amp	Cut-off	---
P215PR-9800	10 to 25	28	19	4.5	230 VAC	4 Amp	Cut-off	---
P215PR-9230	10 to 25	47	19	4.5	230 VAC	4 Amp	Cut-off	Bulk Pack
P215PR-9232	22 to 42	47	26	5.5	230 VAC	4 Amp	Cut-off	Bulk Pack
P215PR-9250	10 to 25	47	19	4.5	230 VAC	4 Amp	Cut-off	Bulk Pack, 2 m cable connector incl.

### Note

For a 4 Amp rating and UL approval please contact your sales representative.





# P215RM

## Remote-mount single phase controller

The new P215RM (Remote Mount) is an addition model to our very successful P215PR Direct Mount FSC which is in program since 2004.

We have designed the P215RM for situations where mounting space is limited or if the refrigeration line is too thin so it cannot carry the weight off the P215PR.

Also new on this product is the all-in bracket design which is part of the complete Aluminium housing.

The P215RM can be screwed to a side panel and connected to the refrigeration line by using a flexible hose or a copper capillary.

### Features

- Quick and easy to install due to integral mounting bracket
- Easy mounting with style 5 pressure connection
- No need to use a male / male adaptor between P215RM and flex hose
- Three ranges available 5 - 15 bar, 10 - 25 bar, 22 - 42 bar
- Output current maximum 4A at 55°C operating ambient temperature
- Global design CE approval

### Note

For refrigerant compatibility see the "Refrigerants and product material compatibility" table on page 1 and 2.



### Dimensions (in mm)



## Ordering information

Codes	Range (bar)	Element style	Setpoint (bar)	Prop. band (bar)	Supply voltage 50/60 Hz	Rating	Controller mode
P215RM-9700	10 to 25	5	19	4.5	230 VAC	4 Amp	Cut-off
P215RM-9702	22 to 42	5	26	5.5	230 VAC	4 Amp	Cut-off
P215RM-9703	5 to 15	5	9	2.5	230 VAC	4 Amp	Cut-off



# P216

## Condenser fan speed controller

These controllers are designed for speed variation of single phase motors, especially for fan speed control on air cooled condensers. Head pressure control of a refrigeration system, through speed variation of the fan on an air-cooled condenser, results in optimum performance throughout the year.

Using a pressure transducer as the input device to the fan speed controller, gives the most direct and fastest response to pressure variations in the refrigerant system. The controller varies the supply voltage to the motor from 45% to at least 95% over the proportional band using the phase cutting principle. If the pressure drops below the adjusted setpoint minus the proportional band, the output to the motor is zero volt or the adjusted min. speed setting. This provides speed variation of permanent split capacitor or shaded pole motors which do not draw more than 12 A (rms) full load current.

The controller used for dual pressure input varies the fan speed by directly sensing the pressure changes of two separate refrigerant circuits. The setpoint of each pressure transducer can be separately adjusted. The controller selects the input with the greatest cooling demand to control the fan speed.

The transducers can be used in non-corrosive refrigerant systems. The motor manufacturer should have approved his product for this speed control principle. It is recommended to confirm with the electric motor manufacturer, that the motor can be used with a controller, using the phase cutting principle for speed variation. You can also provide a copy of this P216 product data sheet to the motor manufacturer/supplier for review.

### Note

For refrigerant compatibility see the "Refrigerants and product material compatibility" table on page 1 and 2.



### Features

- The new benchmark in standard FSC
- Easy to Install and Easy to operate
- Output Range: 0,5 to 12 Amp (1 phase)
- Input 0-10 V DC
- Including 0-50 bar pressure transducer P499VCS-405C
- Heatpump mode
- Reverse operation mode
- Master / Slave mode
- Fixed pressure ranges for direct replacement (P215)
- Setpoint and Min speed potmeters
- Operate with High Efficiency AC-fan motors who comply to ERP 2015 directive.

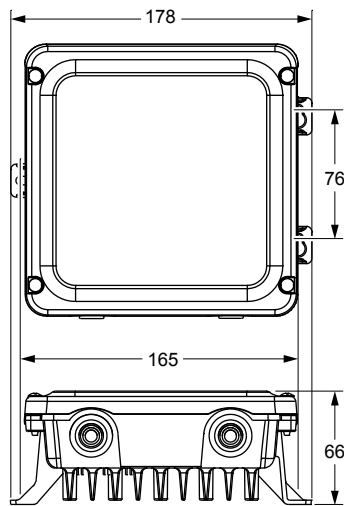


P216

Condenser fan speed controller

Ordering information

Dimensions (in mm)



Codes	Description
P216EEA-2K	Wallmount P216EEA-101C + P499VCS-405C pressure transducer
P216EEA-101C	Wallmount fan speed controller without pressure transmitter
P499VCS-405C	Pressure transmitter with range 0-50 bar, Output 0-10V. 2 meter fixed cable. Pressure connection 7/16-20UNF female thread





# P266

## Pressure actuated single phase digital controller

The P266 pressure actuated single phase digital controller is a cost-effective, weather-resistant, durable motor speed control. The P266 control is designed for approved single-phase, Permanent Split-Capacitor (PSC) motors commonly used in a wide variety of refrigeration and air conditioning condenser fan applications.

The P266 series controls are designed to replace the Johnson Controls® P66 series and P215 series fan speed controls, providing additional features and flexibility, greater energy efficiency, and longer motor life in a compact, rugged, weather-resistant package.

P266 models are available for 208 to 240 V AC and 440 to 575 V AC range applications. P266 controls have current ratings from 4 to 12 A depending on the voltage and model.

Some P266 models provide optional control of up to three auxiliary (fixed-speed) fans or fan stages.

Also, some models provide two additional high-voltage triacs, which allow you to split the source power to the main and auxiliary windings, and connect a low-speed capacitor to increase efficiency at low speed operation.

### Features

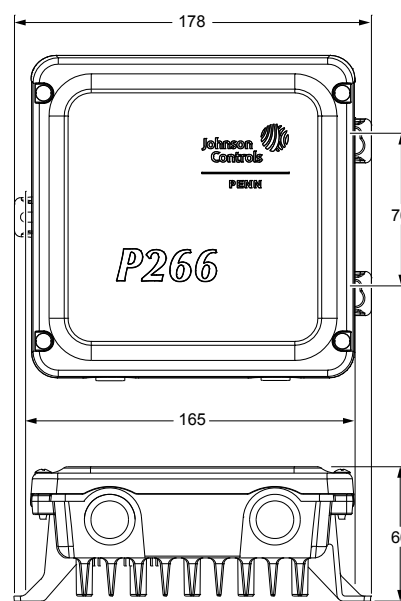
- Global design CE / UL / CSA / C-tick
- Microprocessor based
- Field programmable, digital setting
- One or two electronic pressure transducers (P266SNR)
- Pressure range 0 - 35 bar or 0 - 52 bar
- Patented design
- Output 8 or 12 Amp at 60 °C ambient temperature
- Robust aluminium IP54 enclosure with integral heatsink
- Multi triac control providing energy savings up to 25%
- Optional auxiliary (vernier) control
- Auto selection 50 / 60 Hz

### Note

For refrigerant compatibility see the "Refrigerants and product material compatibility" table on page 1 and 2.



### Dimensions (in mm)





# P266

Pressure actuated single phase digital controller

## Ordering information

**P266 fan speed control with internal transformer and one P266 pressure transducer and one 2 m cable**

Codes	Transducer model included in kit	Voltage range (VAC)	Maximum output (Ampères)	High VAC triacs	Available auxiliary fan control circuits
P266ECA-1K <sup>1</sup>	P266SNR-1C 0-35 bar (0-508 psi)	208 to 240	8	1	---
P266ECA-3K	P266SNR-2C 0-52 bar (0-754 psi)	208 to 240	8	1	---
P266EEA-1K <sup>1</sup>	P266SNR-1C 0-35 bar (0-508 psi)	208 to 240	12	1	---
P266EFA-1K <sup>1</sup>	P266SNR-1C 0-35 bar (0-508 psi)	208 to 240	12	1	3

### Note

- <sup>1</sup> Factory default settings: Start Voltage is set to 40% of the supply line-voltage. End Voltage is set to 95% of the supply line-voltage.  
Start Pressure is set to 44% of the P266 transducer's total pressure range. End Pressure is set to 51% of the P266 transducer's total pressure range.

## P266SNR electronic pressure transducers

Codes	Description
P266SNR-1C	Electronic pressure transducer: <b>0 to 35 bar</b> total range with a 1/4 in. SAE female flare connection and a 2 meter cable.
P266SNR-2C	Electronic pressure transducer: <b>0 to 52 bar</b> total range with a 1/4 in. SAE female flare connection and a 2 meter cable.
P266PRM-1K	P266 Utility Com. Tool Kit. Communication Software Package to program and monitor P266 Control parameters.





# P315PR

## Direct-mount pressure actuated for EC motors

The direct mount pressure actuated condenser fan speed controllers are designed for speed variation of electronically commutated (EC) motors. Head pressure control of a refrigeration system, through speed variation of the fan on an air-cooled condenser, results in optimum performance throughout the year. The controllers can be used in non-corrosive refrigerant systems.

A pressure actuated device provides the most direct and fastest response to pressure variations in the refrigerant system.

The controller varies the supply voltage to the motor from 5% to at least 95% over the proportional band.

### Features

- Fan speed variation condenser pressure control
- Pressure input
- Direct mount option
- Setpoint screw location on top of device
- IP65 enclosure
- Compact design
- Attractive styling
- Quick connector plug included
- Suitable to control 1 or 3 phase EC motor

### Note

For refrigerant compatibility see the "Refrigerants and product material compatibility" table on page 1 and 2.



### Dimensions (in mm)



## Condenser fan speed controllers

Condenser fan speed controllers for EC motors

# P315PR

Direct-mount pressure actuated for EC motors

## Ordering information

Codes	Range (bar) <sup>1</sup>	Element style	Setting (bar)	Prop. band (bar)	Controller mode <sup>2</sup>	Minimum shipping quantity	Additional features
P315PR-9200C	8 to 25	47	16	4	N/A	1	---
P315PR-9200D	8 to 25	47	16	4	N/A	25	Bulk Pack
P315PR-9202C	22 to 42	47	26	5	N/A	1	---
P315PR-9203C	5 to 15	47	6	4	N/A	1	---
P315PR-9203D	5 to 15	47	6	4	N/A	25	Bulk Pack

### Notes

<sup>1</sup> 1 bar = 100 kPa ≈ 14.5 psi

<sup>2</sup> Minimum speed.





# VFD68

## Variable Frequency Drives

The VFD68 Variable Frequency Drive provides three-phase motor speed control in a variety of HVAC/R applications. The VFD68 drive is designed primarily for condenser fan speed control on HVAC and refrigeration condensing units, but can also be set up to control a variety of pumps, blowers and fans.

The VFD68 drive accepts an input signal from P499 electronic pressure transducer, or other devices that provide a 0 to 5 VDC, 0 to 10 VDC, or 4 to 20 mA signal. The application-specific design of the VFD68 drive provides a simple interface, which makes the drive easy to understand and operate. You can quickly and easily reconfigure the VFD68 drive to control variable speed pumps in cooling and heating applications, or to control variable speed supply fans in VAV applications.

The VFD68 drive is an RS485, RTU-compliant ModBus® slave device and can be integrated into a ModBus network.



## Applications

The VFD68 drive accepts input signals from a variety of pressure transducers, temperature sensors, and low-voltage controllers to provide continuous response to changing condenser load conditions.

The VFD68 drive allows the system to:

- Maintain optimum condenser head pressure.
- Operate in low ambient temperature conditions down to -40 °C.
- Reduce short-cycling, which occurs when using.
- Use on/off fan controls.
- Maintain a more stable evaporator temperature.
- Operate more efficiently, reducing electricity cost.

The VFD68 drive can also:

- Help optimize compressor operation, reduce wear, and extend compressor life by stabilizing the condenser head pressures.
- Reduce motor repair and replacement costs by eliminating the condenser fan short-cycling.
- Extend refrigerated product life and provide more consistent comfort cooling by stabilizing evaporator temperatures.

## Features

- Selectable input types allows use with 0 to 5 V DC (ratiometric), 0 to 10 V DC, or 4 to 20 mA input signals from transducers, sensors, and controllers.
- High input signal selection of two similar inputs provides fan speed control of dual circuit condensing units, based on the highest pressure circuit.
- Compact design provides for easy and flexible installation.
- Three-phase 400V 50Hz models can control a wide variety of three-phase motors ranging up to 3hp.
- Simple and advanced end-user settings provide quick and simple application setup and operation, as well as advanced setup parameters for custom applications.

# VFD68

## Variable Frequency Drives

## Ordering information

### 400V 50Hz (460V 60Hz) Production models

Codes	Description
VFD68CFF-2C	VFD68 Drive; 0.75 kW (1 hp); max. 2,2 A; 128 x 108 x 130 mm
VFD68CGG-2C	VFD68 Drive; 1.5 kw (2 hp); max. 3,6 A; 128 x 108 x 136 mm
VFD68CHH-2C	VFD68 Drive; 2.2 kw (3 hp); max 5.0 A; 128 x 108 x 156 mm

#### Note

The Variable Frequency Drives are delivered without EMC-filter. This has to be ordered separately (not available from Johnson Controls). See the Technical Bulletin for more information.











Field and cold  
room controllers



# System 450™

## Modular electronic controls

System 450™ is a family of modular, digital electronic controls that is easily assembled and set up to provide reliable temperature, pressure, and humidity control for a wide variety of Heating, Ventilating, Air Conditioning and Refrigeration (HVACR) and commercial/industrial process applications.

The System 450 control system is designed to replace System 350™ control system and System 27, and provide many additional features and benefits with less than a dozen model variations.

All System 450 control modules are multipurpose and field configurable out-of-the-box; each module is designed for use in temperature, pressure, and humidity systems. A System 450 control system can be easily assembled and configured to monitor and control temperature, pressure, and humidity simultaneously.

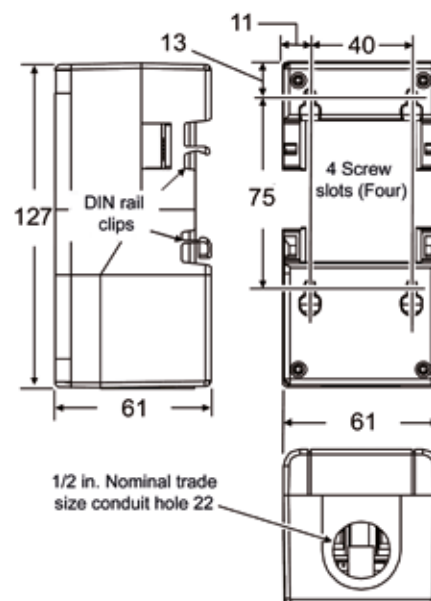
A single C450 control module can be set up as a stand-alone control or connected to expansion modules to control up to ten outputs based on any of the three available inputs. A control system may consist of relay outputs (Single-Pole, Double-Throw [SPDT]), analog outputs (0–10 VDC or 4–20 mA), or any combination of relay and analog outputs.

## Features

- Durable, compact modular design with plug-together connectors and DIN rail or direct wall mount capability
- Multipurpose, field-configurable modules designed for global use
- Backlit Liquid Crystal Display (LCD) and four-button touchpad user interface
- Up to three inputs and up to ten outputs (relay or analog)
- Versatile, all-in-one, stand-alone control modules
- An extensive suite of compatible temperature and humidity sensors as well as pressure transducers
- High input signal selection
- Differential control
- Adjustable user-defined reset setpoint (C450R Only)
- Adjustable minimum and maximum setpoint temperature (C450R only)
- Selectable warm weather shutdown temperature (C450R only)
- Adjustable setback temperature (C450R only)



## Dimensions (in mm)



# System 450™

Modular electronic controls

## Ordering information

System 450 control modules are capable of monitoring up to three input sensors and controlling up to ten outputs that can be any combination of relay and analogue outputs (provided by expansion modules).

### C450 control module types

Codes	Description
C450CBN-4C	Control module 1 stage
C450CCN-4C	Control module 2 stage
C450CEN-1C	Control module with Ethernet communications, LCD, and four-button touchpad UI. (No onboard outputs available on control modules with network communications capabilities.)
C450CRN-1C	Control module with RS485 Modbus communications, LCD, and four-button touchpad UI. (No onboard outputs available on control modules with network communications capabilities.)
C450CPN-4C	Control module - 1 analog output (PI)
C450CQN-4C	Control module - 2 analog Output (PI)
C450RBN-3C	Reset control module with LCD, four-button touchpad UI, and SPDT relay output; provides one SPDT output relay. One A99BC-25C temperature sensor with 0.25 m silicon leads and one A99BC-300C temperature sensor with 3 m silicon leads are included in the box with the reset control module.
C450RCN-3C	Reset control module with LCD, four-button touchpad UI, and SPDT relay output; provides two SPDT output relays. One A99BC-25C temperature sensor with 0.25 m silicon leads and one A99BC-300C temperature sensor with 3 m silicon leads are included in the box with the reset control module.

### C450 expansion module types

Codes	Description
C450SBN-4C	Expansion module 1 relay stage
C450SCN-4C	Expansion module 2 relay stage
C450SPN-4C	Expansion module - 1 analog output (PI)
C450SQN-4C	Expansion module - 2 analog output (PI)

### C450 power module

Codes	Description
C450YNN-1C	Power module 230/24 VAC - 50/60 Hz

### C450 sensor types

Codes	Description
A99	Temperature sensors, all models, Range -40 / 120 °C
P499RCP-401C	Pressure transmitter - Range -1 / 8 bar
P499RCP-402C	Pressure transmitter - Range -1 / 15 bar
P499RCP-404C	Pressure transmitter - Range 0 / 30 bar
P499RCP-405C	Pressure transmitter - Range 0 / 50 bar





# TC series

## Refrigeration and defrost controllers

The TC series controllers are a range of energy-efficient, microprocessor-based, multifunctional, programmable temperature controls for self-contained refrigeration systems.

Depending on the model you choose, TC series controllers can also manage alarms, active or passive defrost cycles, evaporator fan functions, and case lighting.

A large, red LED display is standard for all TC series controllers. The TC Series are panel-mount controllers.

They use EVTPN temperature sensors so that you can remotely mount the display unit.

All TC series controllers have a variety of optional inputs and output relays to perform compressor, defrost, evaporator fan, lighting control and alarm management control.

TC series controllers consist of three groups of controllers: TC3B, TC3, and TC3X.



### Application features

- Positive and/or Negative temperature applications
- Adaptive Defrost
- Compressor protection
- Energy Saving Strategies
- Evaporator and Condenser Control
- Configurable inputs and outputs

### Hardware features

- Capacitive touch keys
- IP65 rating front
- Reduced depth option
- Modbus communication TTL/RS485
- Optional Real Time Clock



## Application

Model number	Application
TC3201N7	Upright commercial refrigerators, food prep-tables, under-counter refrigerators
TC3203N7	Upright commercial freezers, ice-cream freezers, bottle coolers, c-store coolers, and freezers
TC3221N7	Upright commercial refrigerators, food prep-tables, under-counter refrigerators
TC3222N7	Commercial refrigerators, saladettes, back-bar units, glass-door display cases
TC3223N7	Upright commercial freezers, ice cream freezers, bottle coolers, c-store coolers and freezers
TC3224N9	Glass-door upright freezers, refrigerated display cases, walk-in coolers and freezers, c-store coolers, and freezers
TC3B21N7	Upright commercial refrigerators, food prep-tables, under-counter refrigerators
TC3B22N7	Commercial refrigerators, back-bar units, glass-door display cases
TC3B23N7	Upright commercial freezers, ice cream freezers, bottle coolers
TC3X21N7	Upright commercial refrigerators, food prep-tables, under-counter refrigerators



# TC series

## Refrigeration and defrost controllers

### TC controller feature matrix

Information		Product code									
		TC3201N7	TC3203N7	TC3221N7	TC3222N7	TC3223N7	TC3224N9	TC3B21N7	TC3B22N7	TC3B23N7	TC3X21N7
Temperature											
	Negative temperature		■		■	■	■		■	■	
	Positive temperature	■		■	■			■	■		■
Power											
	230 VAC	■	■	■	■	■		■	■	■	■
	Universal 115 VAC to 230 VAC						■				
Terminals											
	Screw down	■	■	■	■	■		■	■	■	■
	Plug-in screw						■				
Inputs											
	Room/case temperature	■	■	■	■	■	■	■	■	■	■
	Evaporator temperature						■				
	Configurable temperature input		■		■	■			■	■	
	Configurable temperature or switch input	■		■			■	■			■
	Door switch						■				
	Configurable switch input		■		■	■			■	■	
Outputs											
K1 relay	Compressor	12A	12A	12A	12A	12A	12A	10A	10A	10A	10A
K2 relay	Defrost		5A			5A	5A			5A	
	Evaporator fan, defrost, or configurable				5A				5A		
K3 relay	Evaporator fan		5A			5A	5A			5A	
K4 relay	Cabinet light or configurable						5A				
Alarm buzzer				■	■	■	■				
Communications											
	TTL Modbus			■	■	■					
	RS485 Modbus			1	1	1	■				
	Real-time clock and HACCP and RS485 Modbus			2	2	2	■				
Packaging											
	Individual	■	■	■	■	■	■				
	Bulk							■	■	■	■

#### Notes

Relay ratings at 240 Vac 50/60 Hz, resistive

1 Through optional TCIF22 Adapter

2 Through optional TCIF23 Adapter



# TC series

Refrigeration and defrost controllers

## Ordering information

### Bulk pack models

Codes	Description
TC3B21N7-100D	Two inputs, one output, power supply 230 VAC, no communication. Bulk pack, quantity of 20. Temperature sensors not included.
TC3B22N7-100D	Two inputs, two outputs, power supply 230 VAC, no communication. Bulk pack, quantity of 20. Temperature sensors not included.
TC3B23N7-100D	Two inputs, three outputs, power supply 230 VAC, no communication. Bulk pack, quantity of 20. Temperature sensors not included.
TC3X21N7-100D	Two inputs, one output, power supply 230 VAC, compact size, no communication. Bulk pack, quantity of 50. Temperature sensors not included.

### Single pack models

Codes	Description
TC3201N7-100C	Two inputs, one output, power supply 230 VAC. Temperature sensors not included.
TC3203N7-100C	Two inputs, three outputs, power supply 230 VAC. Temperature sensors not included.
TC3221N7-100C	Two inputs, one output, power supply 230 VAC, TTL Modbus. Temperature sensors not included.
TC3222N7-100C	Two inputs, two outputs, power supply 230 VAC, TTL Modbus. Temperature sensors not included.
TC3223N7-100C	Two inputs, three outputs, power supply 230 VAC, TTL Modbus. Temperature sensors not included.
TC3224N9-100C	Two inputs, four outputs, universal power supply 115 VAC to 230 VAC, built-in RS485 Modbus. Temperature sensors not included.

### Accessories

Codes	Description
TC3KEY	Programming KEY: A cloning tool to download configuration settings from a controller and upload the settings to other identical controllers.
TCCBL100	USB power cable for the TC3KEY cloning tool. Length: 1m.
TCIF22TSX	TTL to RS485 Modbus serial communications interface: Connects to an RS485 Modbus network.
TCIF23TSX	TTL to RS485 Modbus serial communications interface and real-time clock: Connects to an RS485 Modbus network. Adds a real-time clock to the controller for scheduled defrost and HACCP data reporting.


### Temperature sensors

Codes	Description
EVTPN615F200-1D	10K ohm NTC sensor. IP67 protection level, overmolded thermoplastic material, 1.5 m cable length.
EVTPN630F200-1D	10K ohm NTC sensor. IP67 protection level, overmolded thermoplastic material, 3.0 m cable length.
EVTPNW15F200-1D	10K ohm NTC sensor. IP68 water resistant protection level, overmolded thermoplastic material, 1.5 m
EVTPNW30F200-1D	10K ohm NTC sensor. IP68 water resistant protection level, overmolded thermoplastic material, 3.0 m cable length.









# Transducers and sensors



# P499

## Electronic pressure transducer

The P499 series is a global pressure transducer with an excellent price performance ratio.

The P499 exceeds the latest industrial CE/UL requirements including surge protection, and is over voltage protected in both positive and reverse polarity.

The P499 is designed to produce a linear analogue signal based on the sensed pressure.

The pressure port is machined from a solid piece of 17-4PH stainless steel. There are no O-rings or welds that are exposed to the pressure media. This results in a leak proof, all metal sealed pressure system which withstand more than 10 million pressure cycles without failure.



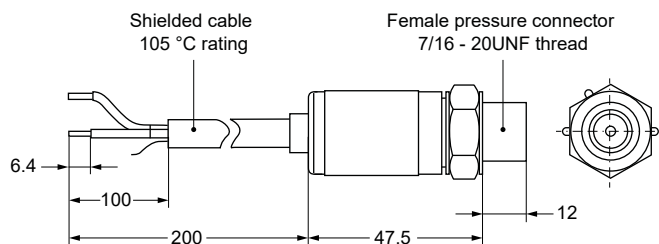
### Features

- Single-piece machined steel pressure port
- Environmentally sealed electronics
- Reliable, repeatable performance and long operating life
- Slender body design
- Available in several pressure ranges up to 50 bar.

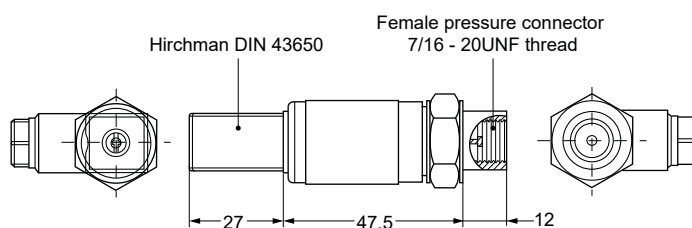
### Note

For refrigerant compatibility see the "Refrigerants and product material compatibility" table on page 1 and 2.

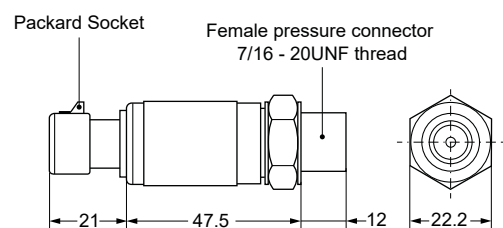
### Dimensions (in mm)



Shielded cable female



Hirschman female



Packard female



# P499

Electronic pressure transducer

## Ordering information

### 2 meter cable connections models

Codes	Pressure range		Pressure port	Output
	Minimum Pressure (Pmin)	Maximum Pressure (Pmax)		
P499ABS-401C	-1 bar	8 bar	1/4" SAE Male	4 to 20 mA
P499ABS-404C	0 bar	30 bar	1/4" SAE Male	4 to 20 mA
P499ACS-401C	-1 bar	8 bar	1/4" SAE Female	4 to 20 mA
P499ACS-404C	0 bar	30 bar	1/4" SAE Female	4 to 20 mA
P499ACS-405C	0 bar	50 bar	1/4" SAE Female	4 to 20 mA
P499VBS-401C	-1 bar	8 bar	1/4" SAE Male	0 - 10 V
P499VBS-402C	-1 bar	15 bar	1/4" SAE Male	0 - 10 V
P499VBS-404C	0 bar	30 bar	1/4" SAE Male	0 - 10 V
P499VCS-401C	-1 bar	8 bar	1/4" SAE Female	0 - 10 V
P499VCS-404C	0 bar	30 bar	1/4" SAE Female	0 - 10 V
P499VCS-405C	0 bar	50 bar	1/4" SAE Female	0 - 10 V

### Hirschmann Din connector

Codes	Pressure range		Pressure port	Output
	Minimum Pressure (Pmin)	Maximum Pressure (Pmax)		
P499ABH-401C	-1 bar	8 bar	1/4" SAE Male	4 to 20 mA
P499ABH-402C	-1 bar	15 bar	1/4" SAE Male	4 to 20 mA
P499ABH-404C	0 bar	30 bar	1/4" SAE Male	4 to 20 mA
P499ACH-401C	-1 bar	8 bar	1/4" SAE Female	4 to 20 mA
P499ACH-402C	-1 bar	15 bar	1/4" SAE Female	4 to 20 mA
P499ACH-404C	0 bar	30 bar	1/4" SAE Female	4 to 20 mA
P499ACH-405C	0 bar	50 bar	1/4" SAE Female	4 to 20 mA
P499RCH-401C	-1 bar	8 bar	1/4" SAE Female	0,5 - 4,5 V Ratiometric
P499RCH-404C	0 bar	30 bar	1/4" SAE Female	0,5 - 4,5 V Ratiometric
P499VBH-401C	-1 bar	8 bar	1/4" SAE Male	0 - 10 V
P499VBH-404C	0 bar	30 bar	1/4" SAE Male	0 - 10 V
P499VCH-401C	-1 bar	8 bar	1/4" SAE Female	0 - 10 V
P499VCH-402C	-1 bar	15 bar	1/4" SAE Female	0 - 10 V
P499VCH-404C	0 bar	30 bar	1/4" SAE Female	0 - 10 V
P499VCH-405C	0 bar	50 bar	1/4" SAE Female	0 - 10 V



# P499

Electronic pressure transducer

## Ordering information

### Packard connector

Codes	Pressure range		Pressure port	Output
	Minimum Pressure (Pmin)	Maximum Pressure (Pmax)		
P499ACP-401C	-1 bar	8 bar	1/4" SAE Female	4 to 20 mA
P499ACP-402C	-1 bar	15 bar	1/4" SAE Female	4 to 20 mA
P499ACP-403C	0 bar	15 bar	1/4" SAE Female	4 to 20 mA
P499ACP-404C	0 bar	30 bar	1/4" SAE Female	4 to 20 mA
P499ACP-405C	0 bar	50 bar	1/4" SAE Female	4 to 20 mA
P499RCP-401C	-1 bar	8 bar	1/4" SAE Female	0,5 - 4,5 V Ratiometric
P499RCP-402C	-1 bar	15 bar	1/4" SAE Female	0,5 - 4,5 V Ratiometric
P499RCP-404C	0 bar	30 bar	1/4" SAE Female	0,5 - 4,5 V Ratiometric
P499RCP-405C	0 bar	50 bar	1/4" SAE Female	0,5 - 4,5 V Ratiometric
P499VCP-401C	-1 bar	8 bar	1/4" SAE Female	0 - 10 V
P499VCP-404C	0 bar	30 bar	1/4" SAE Female	0 - 10 V







# P599

## Electronic pressure transducer

The P599 series electronic pressure transducers are compact, economical, rugged, direct-mount pressure transducers designed for use in commercial and industrial refrigeration and air conditioning applications. These transducers provide a proportional analog signal based on the sensed pressure.

The P599 series transducers feature environmentally protected electronics with stainless steel construction. The digitally compensated P599 transducers are highly accurate over a broad temperature range, resisting the effects of wide ambient temperature swings, high humidity, condensation and icing.

The pressure port is machined from 304L stainless steel. No o-rings or organic materials are exposed to the pressure media, allowing for a leak-proof, all-metal, sealed pressure system. The P599 series transducers operate with any corrosive or non-corrosive refrigerants that are compatible with stainless steel (304L SS), including water condensate, carbon dioxide, glycol, most refrigerants (including ammonia) and many other compatible fluids and gases. The P599 transducers also can be used with the following natural refrigerants: NH<sub>3</sub> (ammonia) and CO<sub>2</sub> (carbon dioxide) in accordance with hazardous location requirements.

The P599 series provides transducers in a variety of pressure ranges, covering most common refrigeration and air conditioning applications.



### Features

#### Industrial Duty Design

- Offers a sealed design that includes a snubber to dampen pressure pulsations and has no o-rings for reliable performance in the most harsh environments.

#### 10 Million Plus Full Scale Pressure Cycle Rated Life Span

- Provides life use with no degradation of accuracy or performance over the life of the transducer.

#### Approved for Today's Refrigerants

- Use with an extensive number of refrigerants, including HCFC, HFC, HFO and natural refrigerants, like Propane, CO<sub>2</sub> and Ammonia.

#### Environmentally Protected Electronics

- Provide high vibration tolerance and prevent ingress and egress that can occur through suction line icing and thawing.

#### ATEX certified

#### Note

For refrigerant compatibility see the "Refrigerants and product material compatibility" table on page 1 and 2.



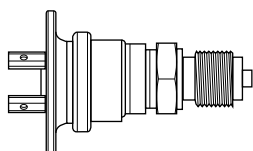


## P599

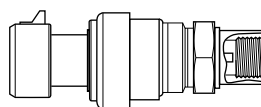
Electronic pressure transducer

## Ordering information

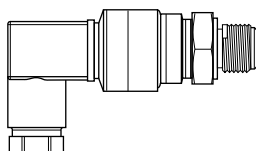
### Standard models



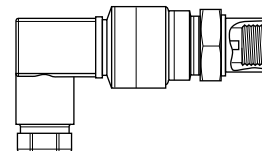
Hirshmann Form A  
G3/8 A external



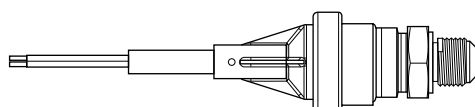
Packard connector  
1/4 in. SAE 45°  
internal flare with depressor



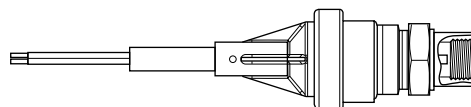
Hirshmann Form C  
1/4 in. SAE 45°  
external flare



Hirshmann Form C  
1/4 in. SAE 45° internal flare  
with depressor



2 m Shielded cable  
1/4 in. SAE 45° external flare



2 m Shielded cable  
1/4 in. SAE 45° internal flare with depressor

### 0.5 to 4.5 VDC Ratiometric for bar applications

Codes	Pressure range		Pressure port	Electrical connector
	Minimum pressure (Pmin)	Maximum pressure (Pmax)		
P599RCHS401C	-1 bar	8 bar	1/4 in. - SAE 45° internal flare with depressor	Hirschmann® Form C
P599RCPS401C	-1 bar	8 bar	1/4 in. - SAE 45° internal flare with depressor	Packard
P599RCPS402C	-1 bar	15 bar	1/4 in. - SAE 45° internal flare with depressor	Packard
P599RCHS404C	0 bar	30 bar	1/4 in. - SAE 45° internal flare with depressor	Hirschmann Form C
P599RCPS404C	0 bar	30 bar	1/4 in. - SAE 45° internal flare with depressor	Packard
P599RCPS405C	0 bar	50 bar	1/4 in. - SAE 45° internal flare with depressor	Packard
P599RJJJS412C	-1 bar	59 bar	G3/8 A external	Hirschmann Form A
P599RJJJS413C	-1 bar	159 bar	G3/8 A external	Hirschmann Form A

# P599

Electronic pressure transducer

## Ordering information

0 to 10 V DC for bar applications

Codes	Pressure range		Pressure port	Electrical connector
	Minimum pressure (Pmin)	Maximum pressure (Pmax)		
P599VBHS401C	-1 bar	8 bar	1/4 in. - SAE 45° external flare	Hirschmann Form C
P599VCHS401C	-1 bar	8 bar	1/4 in. - SAE 45° internal flare with depressor	Hirschmann Form C
P599VCPS401C	-1 bar	8 bar	1/4 in. - SAE 45° internal flare with depressor	Packard
P599VBSS401C	-1 bar	8 bar	1/4 in. - SAE 45° external flare	Shielded cable
P599VCSS401C	-1 bar	8 bar	1/4 in. - SAE 45° internal flare with depressor	Shielded cable
P599VBSS402C	-1 bar	15 bar	1/4 in. - SAE 45° external flare	Shielded cable
P599VCHS402C	-1 bar	15 bar	1/4 in. - SAE 45° internal flare with depressor	Hirschmann Form C
P599VCHS404C	0 bar	30 bar	1/4 in. - SAE 45° internal flare with depressor	Hirschmann Form C
P599VBSS404C	0 bar	30 bar	1/4 in. - SAE 45° external flare	Shielded cable
P599VCSS404C	0 bar	30 bar	1/4 in. - SAE 45° internal flare with depressor	Shielded cable
P599VCHS405C	0 bar	50 bar	1/4 in. - SAE 45° internal flare with depressor	Hirschmann Form C
P599VCSS405C	0 bar	50 bar	1/4 in. - SAE 45° internal flare with depressor	Shielded cable



# P599

Electronic pressure transducer

## Ordering information

4 to 20 mA for bar applications

Codes	Pressure range		Pressure port	Electrical connector
	Minimum pressure (Pmin)	Maximum pressure (Pmax)		
P599ABHS401C	-1 bar	8 bar	1/4 in. - SAE 45° external flare	Hirschmann Form C
P599ACHS401C	-1 bar	8 bar	1/4 in. - SAE 45° internal flare with depressor	Hirschmann Form C
P599ACPS401C	-1 bar	8 bar	1/4 in. - SAE 45° internal flare with depressor	Packard
P599ABSS401C	-1 bar	8 bar	1/4 in. - SAE 45° external flare	Shielded cable
P599ACSS401C	-1 bar	8 bar	1/4 in. - SAE 45° internal flare with depressor	Shielded cable
P599ABHS402C	-1 bar	15 bar	1/4 in. - SAE 45° external flare	Hirschmann Form C
P599ACHS402C	-1 bar	15 bar	1/4 in. - SAE 45° internal flare with depressor	Hirschmann Form C
P599ACPS402C	-1 bar	15 bar	1/4 in. - SAE 45° internal flare with depressor	Packard
P599ACPS403C	0 bar	15 bar	1/4 in. - SAE 45° internal flare with depressor	Packard
P599ABHS404C	0 bar	30 bar	1/4 in. - SAE 45° external flare	Hirschmann Form C
P599ACHS404C	0 bar	30 bar	1/4 in. - SAE 45° internal flare with depressor	Hirschmann Form C
P599ACPS404C	0 bar	30 bar	1/4 in. - SAE 45° internal flare with depressor	Packard
P599ABSS404C	0 bar	30 bar	1/4 in. - SAE 45° external flare	Shielded cable
P599ACSS404C	0 bar	30 bar	1/4 in. - SAE 45° internal flare with depressor	Shielded cable
P599ACHS405C	0 bar	50 bar	1/4 in. - SAE 45° internal flare with depressor	Hirschmann Form C
P599ACPS405C	0 bar	50 bar	1/4 in. - SAE 45° internal flare with depressor	Packard
P599ACSS405C	0 bar	50 bar	1/4 in. - SAE 45° internal flare with depressor	Shielded cable

## Accessory

Wire harnesses for use with Packard connectors

Code	Length (m)
WHA-PKD3-200C	2.0



# Electronic pressure transducer for OEM applications

The P597 Series transducers feature environmentally protected electronics with stainless steel construction and a Packard™ electrical connector. The digitally compensated P597 transducers are highly accurate over a broad temperature range, and can resist the effects of wide ambient temperature swings, high humidity, condensation, and ice. No o-rings or organic materials are exposed to the pressure media, for a leak-proof, all-metal, sealed pressure system. The P597 Series provides transducers in a variety of pressure ranges, and covers most common refrigeration and air conditioning applications. The P597 Electronic Pressure Transducers are meant for OEM applications and are only available in bulk pack quantities of 50 pieces.



## Industrial duty design

- Offers a sealed design that includes a snubber to dampen pressure pulsations and no o-rings for reliable performance in harsh environments.

- Provides life use with no degradation of accuracy or performance over the life of the transducer.

- Use with an extensive number of refrigerants including HCFC, HFC, HFO, and HC refrigerants.

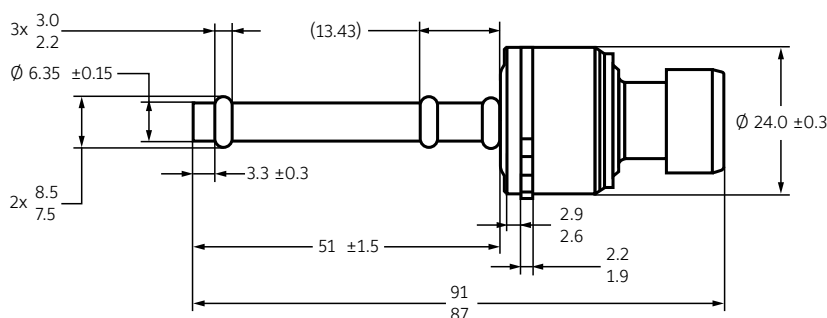
- Provides high vibration tolerance and prevents ingress and egress that can occur through suction line icing and thawing.

ATEX certified

Technical drawing of a shaft with the following dimensions:

- Top diameter: 3.77
- Bottom diameter: 3.17
- Length: 55.9
- Inner diameter:  $\varnothing 24.0 \pm 0.3$
- Inner diameter tolerance:  $\pm 0.3$

Packard connector,  
1/4" SAE 45° internal flare with  
Schröder depressor



Packard connector,  
6.35 mm diameter, 3.3 mm insert-length straight copper braze tube

## P597

Electronic pressure transducer for OEM applications

## Ordering information

Packard Connector and 0,5 to 4,5 Ratiometric analog output

Codes	Pressure range		Type	Pressure Port
	Minimum pressure (Pmin)	Maximum pressure (Pmax)		
P597RCPA405D	0 bar	50 bar	Absolute	1/4" SAE 45° internal flare with depressor
P597RCPA416D	0 bar	16 bar	Absolute	1/4" SAE 45° internal flare with depressor
P597RCPS401D	-1 bar	8 bar	Sealed	1/4" SAE 45° internal flare with depressor
P597RCPS402D	-1 bar	15 bar	Sealed	1/4" SAE 45° internal flare with depressor
P597RCPS404D	0 bar	30 bar	Sealed	1/4" SAE 45° internal flare with depressor
P597RCPS405D	0 bar	50 bar	Sealed	1/4" SAE 45° internal flare with depressor
P597RKPS401D	-1 bar	8 bar	Sealed	6.35 mm diameter straight copper braze tube
P597RKPS402D	-1 bar	15 bar	Sealed	6.35 mm diameter straight copper braze tube
P597RKPS404D	0 bar	30 bar	Sealed	6.35 mm diameter straight copper braze tube
P597RKPS405D	0 bar	50 bar	Sealed	6.35 mm diameter straight copper braze tube





# Refrigerant detectors

## Leak detectors for stationary use

The JCI product range offers Leak detectors (in order to comply to the EU F-gas Directive) for the following gases:

- Ammonia (NH<sub>3</sub>)
- Synthetic refrigerants HFC, CFC, HCFC, HFO
- Carbon dioxide (CO<sub>2</sub>)
- Flammable/explosive gasses like Hydro Carbons

The MPU multi point units need to be used in combination with the MP series of detectors.

The G-series of detectors are standalone detectors and have 3 alarm relays that are factory calibrated depending on the gas type.



### Factory-set alarm levels (by experience appropriate alarm levels and ranges)

Detector type	Range	Alarm levels
NH <sub>3</sub> -4000	0-4000 ppm	150 / 500 / 3000 ppm
NH <sub>3</sub> -10000	0-10000 ppm	1500 / 3000 / 8000 ppm
HFC	0-4000 ppm	100 / 1000 / 2000 ppm
CO <sub>2</sub>	0-10000 ppm	2000 / 5000 / 8000 ppm
Flammable / explosive gas	0-40% LEL	5 / 10 / 20% LEL

The HFC detector alarm levels are set for R134a. But they also indicate for CFC, HCFC and HFO although at slightly different levels. Detectors can be adjusted for other gases and customized alarm levels. In this case contact your Johnson Controls representative for information.

## Notes

Sensors are a consumable part.

Expected sensor lifetime ≈ 5 years. Except CO<sub>2</sub> sensors (10 years).

Sensors can be easily replaced and are available as a spare part.

Maintenance: at least once a year (normal operation/environment).

For details or questions contact your Johnson Controls representative.





# Refrigerant detectors

Leak detectors for stationary use

## G-series – Standalone detectors with relay output

### Features

- The detector is microprocessor controlled and displays the current operating status via LED's
- Three adjustable alarm levels with relay output (230 V / 5A)
- Alarm delay, selectable in four steps
- Manual or automatic reset on alarm
- Fail-safe function with built-in monitoring and power failure alarm
- Built-in self-test and service function
- Test terminal for service tools
- Robust non-corrosive PC enclosure for installation also in aggressive environments
- Ambient temperature: -40 to 50 °C
- Humidity: 0...95% RH (non-condensing)
- For standalone operation

## Ordering information

### Splash proof detector for room mounting - IP54

Codes	Refrigerants	Range	Power Supply
GS230-HFC-4000	HFC, HCFC, CFC, HFO	0-4000 ppm	230 V AC
GS24-HFC-4000	HFC, HCFC, CFC, HFO	0-4000 ppm	12...24 V AC/DC
GS230-HC	Hydrocarbons	0-50% LEL	230 V AC
GS24-HC	Hydrocarbons	0-50% LEL	12...24 V AC/DC



### Splash proof detector for room mounting with remote sensor, 5 m sensor cable The sensor can hang freely, while the detector is wall mounted - IP54

Codes	Refrigerants	Range	Power Supply
GSR230-HFC-4000	HFC, HCFC, CFC, HFO	0-4000 ppm	230 V AC
GSR24-HFC-4000	HFC, HCFC, CFC, HFO	0-4000 ppm	12...24 V AC/DC
GSR230-HC	Hydrocarbons	0-50% LEL	230 V AC
GSR24-HC	Hydrocarbons	0-50% LEL	12...24 V AC/DC

### Detector for vent lines from pressure relief valves, 1,5 m sensor cable - IP54

Codes	Refrigerants	Range	Power Supply
GR230-HFC-4000	HFC, HCFC, CFC, HFO	0-4000 ppm	230 V AC
GR24-HFC-4000	HFC, HCFC, CFC, HFO	0-4000 ppm	12...24 V AC/DC

### Splash proof, room mounting detector with built-in heater - IP67

Codes	Refrigerants	Range	Power Supply
GSH230CO2-10000	CO <sub>2</sub>	0-10000 ppm	85...230 V AC
GSH24-CO2-10000	CO <sub>2</sub>	0-10000 ppm	12...24 V AC/DC



# Refrigerant detectors

Leak detectors for stationary use

## MP-series – Detectors for connection to MPU monitoring units

### Features

- Requires connection to a monitoring unit e.g. MPU2C, MPU4C, MPU6C
- Power supply from monitoring unit
- Robust non-corrosive PC enclosure for installation also in aggressive environments
- Alarm levels to be set on the monitoring unit
- Ambient temperature: -40 to 50 °C
- Humidity: 0...95% RH (non-condensing)



## Ordering information

### Splash proof detector for room mounting - IP54

Codes	Refrigerants	Range
MP-DS-HFC-4000	HFC, HCFC, CFC, HFO	0-4000 ppm
MP-DS-HC	Hydrocarbons	0-50% LEL

### Splash proof detector for room mounting with built-in heater - IP67

Codes	Refrigerants	Range
MPS-CO2-10000	CO <sub>2</sub>	0-10000 ppm



# Refrigerant detectors

Leak detectors for stationary use

## MPU – Multi point monitoring units with 2, 4 or 6 channels

### Features

- Microprocessor controlled unit for two, four and six detectors
- LED operation indicator per individual channel
- Three adjustable alarm thresholds for each individual channel
- Alarm delay, selectable in four steps
- Relay outputs for A, B, C and fault alarm, 230 V / 5A
- Manual or automatic alarm reset
- Test terminal for service tools
- Service mode for temporary blocking of alarm
- Built-in self-Test feature
- Built-in buzzer
- Fail-safe function with built-in monitoring and power failure alarm
- 24 VDC / 150 mA output for siren or flashing light
- Ambient temperature: -40...+50 °C
- Humidity: 0...95% RH (non-condensing)
- IP66



### Ordering information

Codes	Description	Power Supply
<b>MPU2C</b>	2 channel monitoring unit	230 V AC / 24 V DC
<b>MPU4C</b>	4 channel monitoring unit	230 V AC / 24 V DC
<b>MPU6C</b>	6 channel monitoring unit	230 V AC / 24 V DC

The MPU6C is limited to use with max four (4) MPS-CO2 detectors.

## Combined flashing light and siren

### Features

- Flashing light and siren can be activated separately.
- DIP-switches for selection of signal
- IP65 with standard high socket
- Dimensions Ø x H: 93 x 120 mm
- Ambient temperature: -40...+50 °C



### Ordering information

Codes	Description	Power Supply
<b>FL-RL-R</b>	Red, combined flashing light and siren	18...28 V DC
<b>SOCK-H-R-230</b>	Socket for 230 VAC	230 V AC



# Refrigerant detectors

Leak detectors for stationary use

## DT300 Diagnostic and calibration tool

### Features

- For control and calibration of semiconductor detectors
- For control and adjustment of alarm levels of monitoring units
- Integrated reference sensor to be ordered seperately (SM300-sensors)
- Allows calibration of the current sensor without introducing calibration gas by comparison with the reference sensor
- Power supply: 4 x AA alkaline (8h) or rechargeable Ni-Mh (10h) batteries
- LED indicator for battery level
- Dimensions W x H x D: 100 x 165 x 44 mm
- Weight: 365 g (including batteries)



### Ordering information

Codes	Description
DT300	Diagnostic tool
DT300-COVER	Protective cover for DT300
SM300-HFC	Pre calibrated sensor module for DT300 for HFC, HCFC, CFC, HFO
SM300-HC	Pre calibrated sensor module for DT300 for hydrocarbons



## About Johnson Controls

At Johnson Controls (NYSE:JCI), we transform the environments where people live, work, learn and play. As the global leader in smart, healthy and sustainable buildings, our mission is to reimagine the performance of buildings to serve people, places and the planet.

Building on a proud history of nearly 140 years of innovation, we deliver the blueprint of the future for industries such as healthcare, schools, data centers, airports, stadiums, manufacturing and beyond through OpenBlue, our comprehensive digital offering.

Today, with a global team of 100,000 experts in more than 150 countries, Johnson Controls offers the world's largest portfolio of building technology and software as well as service solutions from some of the most trusted names in the industry.

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