

## Series P215PR/RM

### Direct- and Remote-Mount Pressure-Actuated Condenser Fan Speed Controllers for Single-Phase Motors

#### Introduction

The Series P215PR/RM direct-mount and remote-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. Once the output drops below 30%, the fan is cut off. The Series P215PR/RM controllers are designed for non-corrosive refrigerant systems. See Table 1 for a list of features and benefits.

A pressure-actuated control provides 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 principle provides speed variation of a permanent split capacitor or shaded pole motors that do not draw more than 4 A (RMS) full-load current. The motor manufacturer should have approved the product for this speed control principle.

We recommend confirming 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 product data sheet to the motor manufacturer or supplier for review.



**Figure 1: P215PR Direct-Mount Pressure-Actuated Condenser Fan Speed Controller**



**Figure 2: P215RM Remote-Mount Pressure-Actuated Condenser Fan Speed Controller**

**Table 1: Features and Benefits**

Feature	Benefit
<b>Fan Speed Variation Condenser Pressure Control</b>	Creates optimum condenser pressure control all year round and reduces noise during colder periods (such as nights).
<b>Pressure Input</b>	Allows direct and fast response to pressure variations.
<b>Direct Mount Option</b>	Allows for easy installation.
<b>Remote Mount Option</b>	Creates flexibility in mounting location.
<b>Setpoint Screw Location on Top of Device</b>	Allows for easy setpoint adjustment after installation.
<b>Built-in Suppression Filter</b>	Meets electro-magnetic compatibility requirements.
<b>IP65 Enclosure</b>	Allows for controller mounting outdoors.
<b>Compact Design</b>	Fits into small units and has a small turnaround circle.
<b>Attractive Styling</b>	Upgrades your equipment.
<b>Quick Connector Plug Included</b>	Allows for easy wiring and quick replacement.
<b>Style 5 Remote Mount</b>	Enables direct connection with flexible refrigeration hose.
<b>Pressure Range 5-42 bar</b>	Allows compatibility with all HFC types from R134a to R410a.

**IMPORTANT:** Use this Series P215PR/RM Pressure Actuated Condenser Fan Speed Controller only as an operating control. Where failure or malfunction of the P215PR/RM could lead to personal injury or property damage to the controlled equipment or other property, additional precautions must be designed into the control system. Incorporate and maintain other devices, such as supervisory or alarm systems or safety or limit controls, intended to warn of or protect against failure or malfunction of the P215PR/RM Controller.

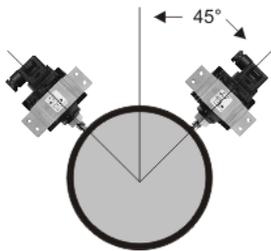
### Installation

The controller must be mounted in an upright position on the refrigerant line, preferably at the condenser outlet side, to reduce pressure pulsation as much as possible.

Mount the controller within a 45° angle on both sides of the top of the high pressure line to avoid accumulation of oil inside the controller bellows and maintain the class IP65 rating. See Figure 3.

If you are using a pump-down system, the controller connection must be made at the high-pressure side of the system and upstream from the solenoid valve to avoid low pressure during pump-down.

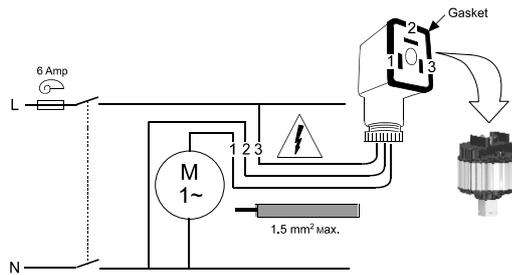
The controller (IP65) can be mounted outdoors. When mounted inside a cabinet, holes for air circulation must be provided.



**Figure 3: Mounting Position Range**

### Wiring

The built-in EMC filter is designed for a maximum distance of 2 meters between the controller and the motor. Non-shielded cable must be used. The rubber gasket must be placed between the quick connector plug and the controller terminals to keep the IP65 protection class. See Figure 4 for wiring details.



**Figure 4: Wiring Details**



#### **WARNING: Risk of Electric Shock.**

Disconnect or isolate all power supplies before making electrical connections. More than one disconnect or isolation may be required to completely de-energize equipment. Contact with components carrying hazardous voltage can cause electric shock and may result in severe personal injury or death.



#### **CAUTION: Risk of Property Damage.**

Do not apply power to the system before checking all wiring connections. Short circuited or improperly connected wires may result in permanent damage to the equipment.

### Electro-Magnetic Capability

The controller includes a built-in suppression filter and meets required (EC) directives. However, when two or more Electro-Magnetic-Compatibility (EMC) compliant components are combined, the entire system may not be compliant. It is the end user's responsibility to make the entire system compliant.

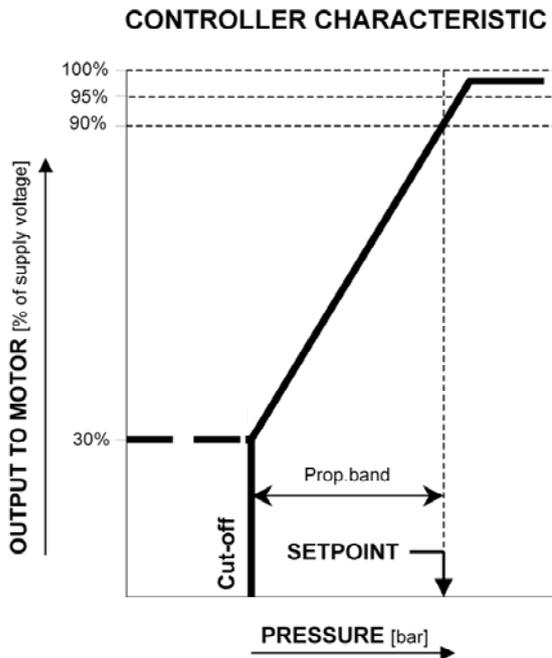
Multiple motors can be wired in parallel, provided that the total current does not exceed the maximum limit.

### Measuring

Use a True RMS meter for measuring amperes or volt values.

## Adjustments

The setpoint is defined at 90% output value. The fixed cut-off value is 30% of the supplied voltage. Both the load and the supply voltage can affect the controller characteristic.



**Figure 5: VDC Output Relative to Pressure Input**

The proportional band is fixed and defined as the pressure difference between the points where the output values are 30% and 90% of the supply voltage. See Figure 5.

	Range (bar)		
	5 to 15	10 to 25	22 to 42
Proportional Band	3.0 ± 0.7	4.5 ± 1	5.5 ± 1.5

The values indicated are shown at 50 Hz power supply. At 60 Hz power supply, the cut-off and proportional band values decrease by 15%.

A built-in (fixed) hysteresis is included in the controller. This hysteresis is not indicated in the control characteristic, but is included in the proportional band.

## Setpoint

The pressure setpoint at which your equipment operates can be adjusted by using the setpoint adjusting screw. See Figure 6.



**Figure 6: Setpoint Adjustment Screw**

The setpoint is factory set at the values shown in the following table.

Control Range	Factory Setpoint
Range 5 to 15 bar	9 bar
Range 10 to 25 bar	19 bar
Range 22 to 42 bar	26 bar

## Repair Information

If a Series P215PR/RM Condenser Fan Speed Controller fails to operate within its specifications, replace the unit. For a replacement Series P215PR/RM, contact the nearest Johnson Controls® representative. Provide the model number of the control when ordering a replacement. This number is found on the data plate. See Table 2 on page 4 for the Product Selection Chart.

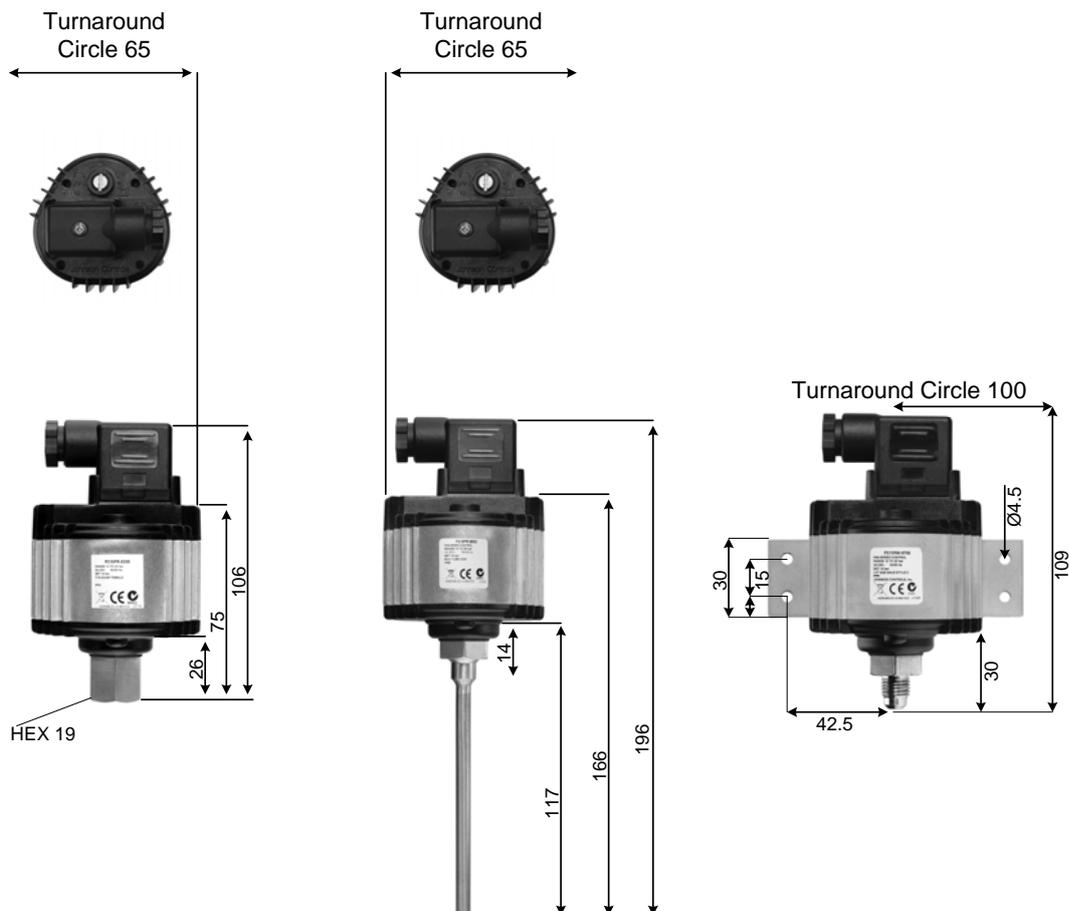
**Table 2: Product Selection Chart**

Product Code Number	Range (bar)*	Element Style	Setting (bar)	Prop. Band (bar)	Minimum Shipping Quantity	Additional Features
P215PR-9200	10 to 25	47	19	4.5	1	
P215PR-9202	22 to 42	47	26	5.5	1	
P215PR-9203	5 to 15	47	9	3.0	1	
P215PR-9800	10 to 25	28	19	4.5	1	
P215PR-9230	10 to 25	47	19	4.5	25	Bulk Pack
P215PR-9232	22 to 42	47	26	5.5	25	Bulk Pack
P215PR-9233	5 to 15	47	9	3.0	25	Bulk Pack
P215PR-9250	10 to 25	47	19	4.5	15	Bulk Pack, 2 m cable connector included
P215RM-9700	10 to 25	5	19	4.5	1	
P215RM-9702	22 to 42	5	26	5.5	1	
P215RM-9703	5 to 15	5	9	3.0	1	

\*1 bar = 100 kPa ≈ 14.5 psi

### Pressure Connections and Dimensions

There are three types of pressure connections available. See Figure 7.



**Figure 7: Pressure Connection Types: Style 47 (Left), Style 28 (Middle), Style 5 (Right), Dimensions, mm**

## Technical Specifications

### P215PR/RM Pressure Actuated Controllers

<b>Product</b>	P215PR/RM Pressure-Actuated Condenser Fan Speed Controllers	
<b>Pressure Range</b>	5 to 15 bar 10 to 25 bar 22 to 42 bar	
<b>Maximum Overrun Pressure</b>	5 to 15 bar = 25 bar 10 to 25 bar = 40 bar 22 to 42 bar = 48 bar	
<b>Pressure Connection</b>	Style 5 (7/16-20 UNF male for 1/4 in. flared tubing connection) Style 47 (7/16-20 UNF female including valve depressor) Style 28 (with 100 mm tube, 6 mm ODM)	
<b>Control Action</b>	Direct	
<b>Maximum Output Voltage</b>	≥ 95% of Supply Voltage	
<b>Maximum Current</b>	4 A RMS (at maximum voltage output)	
<b>Operating Ambient Temperature</b>	-40° to 55°C	
<b>Minimum Current</b>	≥ 200 mA	
<b>Residual Current Motor</b>	≤ 25 mA	
<b>Power Factor (cosφ) Motor</b>	≥ 0.6	
<b>Main Supply Voltage</b>	230 VAC + 8% / -15%	
<b>Main Supply Frequency</b>	50/60 Hz	
<b>Cut-off Point</b>	30% of Supply Voltage	
<b>Proportional Band (Range) at 50 Hz*</b>	5 to 15 bar = 3.0 ± 0.7 bar 10 to 25 bar = 4.5 ± 1 bar 22 to 42 bar = 5.5 ± 1.5 bar	
<b>*Approximately 15% less at 60 Hz</b>		
<b>Storage Ambient Humidity</b>	10 to 98% Relative Humidity (RH)	
<b>Storage Ambient Temperature</b>	-40 to 85°C	
<b>Enclosure</b>	IP65	
<b>Material</b>	Top/Bottom	Polycarbonate (glass filled)
	Heat Sink	Aluminium
	Pressure Connection	Brass
	Bellows	Phosphor Bronze
<b>Shipping Weight</b>	0.3 kg (Individual Pack)	
<b>Wiring Connections</b>	Screw Terminals 1-1/2 mm <sup>2</sup> maximum Quick Connector Plug PG9 (6 to 7 mm cable)	
<b>Compliance</b>		CE Mark – Johnson Controls, Inc. declares that this product is in compliance with the essential requirements and other relevant provisions of the EMC Directive 2004/108/EC and Low Voltage Directive 2006/95/EC.
		RoHS Directive 2002/95/EC; WEEE Directive 2002/96/EC.

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



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Milwaukee, WI, USA  
Westendhof 8, 45143 Essen, Germany  
Lomagna (Italy), Leeuwarden (The Netherlands) and Essen (Germany)  
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