

Series P215DP

Single/Dual Pressure Input Condenser Fan Speed Controllers For Single Phase Motors (incl. built-in RFI suppression filter)

Introduction

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 8 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.



**P215DP
Condenser Fan Speed Controller**

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 P215DP product data sheet to the motor manufacturer/supplier for review.

Feature and Benefits

<input type="checkbox"/> Condenser pressure control by fan speed variation.	Optimum condenser pressure control all the year round. Less noise during colder (night) period.
<input type="checkbox"/> Pressure input.	Direct and fast response to pressure variations. Easy to install
<input type="checkbox"/> Transducers with proven reliability.	More than half a million in use today.
<input type="checkbox"/> Easy accessible setpoint screw.	Setpoint easy adjustable. For use on various non-corrosive refrigerants.
<input type="checkbox"/> Built-in suppression filter.	The control meets the electro magnetic compatibility requirements of the 89/336/EEC directive.
<input type="checkbox"/> Adjustable minimum speed or cut-off selection.	Selection to keep the fan running on (adjusted) minimum rpm or to switch it off.
<input type="checkbox"/> Dual input possibility.	Can be used on condensers with two separate refrigerant circuits.
<input type="checkbox"/> IP54 enclosure.	Can be mounted outdoor.

Note

These controls are designed for use only as operating controls. Where an operating control failure would result in personal injury or loss of property it is the responsibility of the installer to add devices or systems that protect against, or warn of, control failure.

Caution

Because the P215DP is a single phase control, it may be used only with single-phase motors approved by the manufacturer for speed control applications.

Description

The P215DP can be used for single or dual pressure input. For single input the transducer and the electronics are built in an IP54 enclosure.

For dual input a separate P35AC pressure transducer (IP20) must be ordered (see type number selection table).

In the case of dual input the controller selects the input with the greatest cooling demand to control the fan speed.

There are two pressure ranges: 8 to 14 bar
14 to 24 bar

Pressure connections are:

style 50 - 90 cm capillary/machined flare with valve depressor

style 51 - 90 cm capillary/machined flare without valve depressor

Installation

Mount the controller in a vertical position. For proper air-circulation there should be a clearance around the controller of at least 10 mm. When mounted inside a cabinet, holes for air circulation should be provided. If the P215DP cannot be mounted vertically, additional limitations apply. The maximum allowable current will be 6A instead of 8A or the maximum allowable ambient temperature is reduced to 40 °C instead of 55 °C. For dual input the second transducer can be installed in any convenient location, provided that the ambient conditions are suitable for IP20 enclosure. Enclosed mounting bracket can be used.

Note

For style 50 and 51 pressure connections two copper sealrings (one spare) are delivered with the control. Each time the pressure connection is removed this sealing has to be replaced.

Wiring (see Fig. 1)

To meet the EMC directive shielded cable has to be used for motor wiring.

Non shielded cable may be used if the control and motor are mounted in one frame.

Both sides of the shield (motor and second pressure transducer wiring) have to be connected to earth. To prevent stray current, the earth connections of the transducer, the controller, the motor earth connection as well as the cable shield, all have to be connected to one earthing pole.

More motors can be wired in parallel, provided that the total current will not exceed 8 A rms.

Dual input connection

The second input can be connected as indicated in fig. 1.

If the distance between the transducer and the controller exceeds two metres shielded cable has to be used (The shield can be connected under the screw used to connect the transducer to the mounting bracket).

Enclosed quick connector plug can be used to connect wires to the transducer.

Caution

The enclosed quick connector plug is especially designed (special terminal numbering) for this control and should not be used for other purposes. Take care to connect the correct wires when the original connector is replaced by a non Johnson Control type.

Caution

There will be line voltage on the wiring between the second input pressure transducer and the P215DP.

Measuring

For measuring amps or volts values a true rms meter should be used.

⚠ Caution

The P215DP is not equipped with a power switch. Therefore an additional switch to isolate the device should be used in the power supply wiring to the P215DP. Also the P215DP should be externally fused against miswiring or short circuits. Use a thermal/current overload relay with a current rating according to the motor (max. 16 A/slow).

Electro Magnetic Compatibility

The P215 versions have a built-in suppression filter. If connected according to fig. 1 the control meets all required EEC directives..

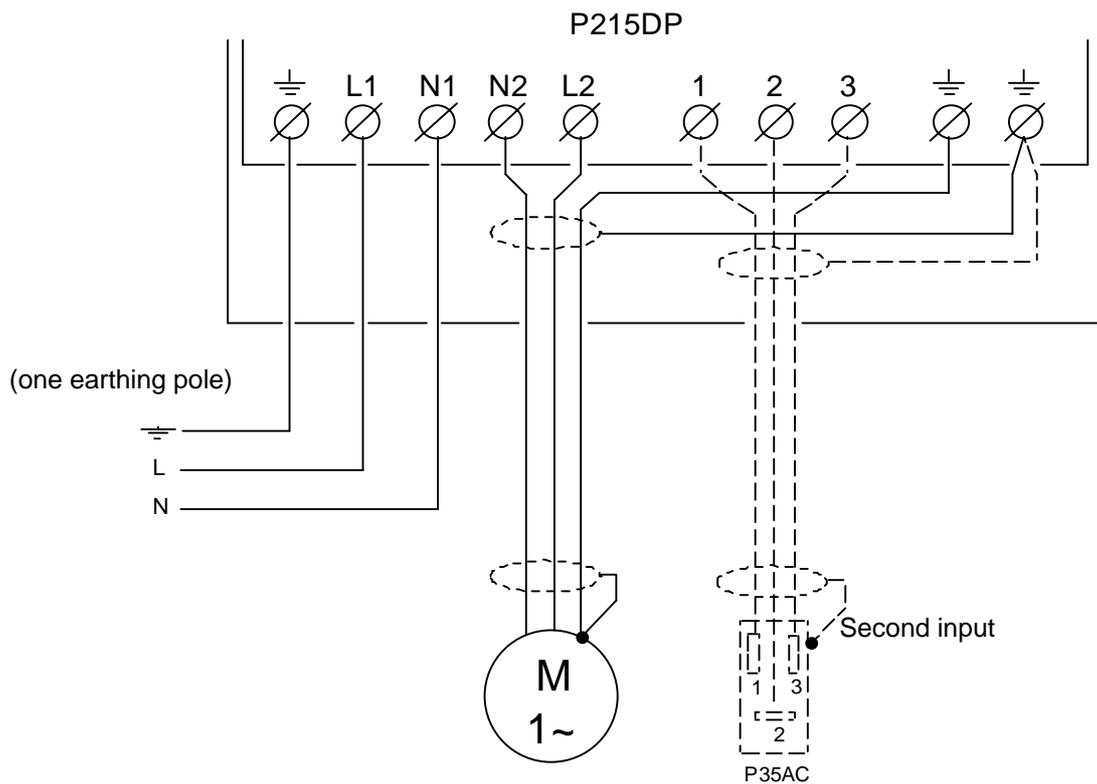


Fig. 1

Adjustments

The P215DP gives a control characteristic according to fig. 2.

The control characteristic can be affected by the load and the supply voltage.

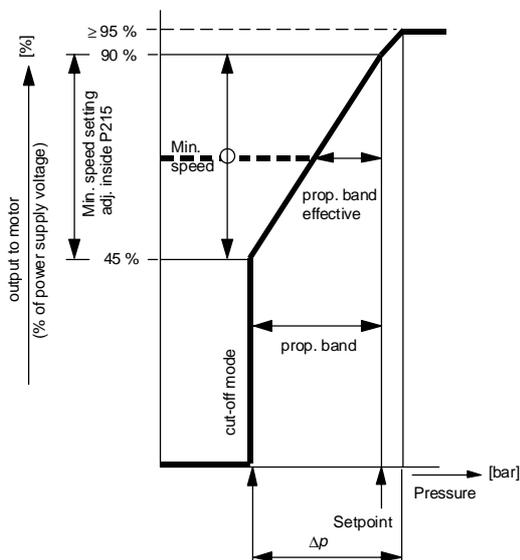


Fig. 2

The proportional band is fixed and defined as the pressure difference between the points where the output values are 45% and 90% of the supply voltage.

	Range	
	8 to 14 bar	14 to 24 bar
Prop. band	2.5 ± 0.5 bar	4 ± 1 bar
Δ p (max.)	4 bar	6 bar

There is a built-in (fixed) hysteresis. This is not indicated in the control characteristic. The hysteresis is included in the prop. band.

Minimum speed setting

The minimum speed voltage setting, to prevent fan speed reduction below desirable levels, can be adjusted between 45 % and 90 % of the line voltage by means of the potentiometer inside the controller (see fig. 3). By turning this potentiometer clockwise into the minimum speed section, the output to the motor stays at a higher level. The minimum speed setting influences the proportional band. A higher setting of the minimum speed results in a smaller proportional band.

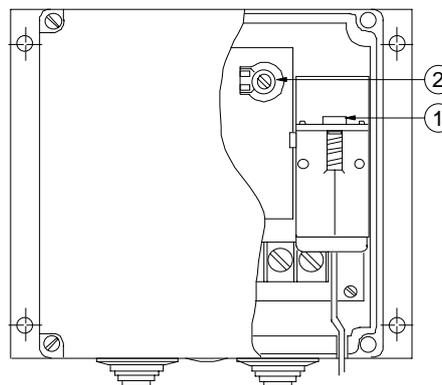


Fig. 3

- 1 Setpoint adjusting screw
- 2 Minimum speed / cut-off potentiometer

Cut-off mode

If minimum speed is not required, turn the potentiometer completely counter-clockwise. The output to the motor drops to 0 V when the pressure decreases below setpoint pressure minus proportional band. (fan stops.)

Setpoint

The pressure setpoint at which your equipment has to work can be adjusted by the setpoint adjusting screw (see fig. 2 and 3) between 8 to 14 or 14 to 24 bar.

The setpoint is factory set at:

range 8 to 14 bar	10 bar
range 14 to 24 bar	16 bar

Note

If a second input is used and it is necessary to make setpoint adjustments on P215DP care should be taken that the additional transducer does not affect the output voltage of the controller while adjustment is being made on the other transducer. The most safe and easy way to do this, is to disconnect the pressure connection of the transducer that is not being adjusted. We would suggest the use of depressible type service port valves on transducer pressure connections.

Repair and replacement

Repair is not possible. In case of an improperly functioning control, please check with your nearest supplier. When contacting the supplier for a replacement you should state the type-model number of the control. This number can be found on the data plate.

T Type number selection table

Order nr.	Range (bar)	Element style	Setting (bar)	Prop. band (bar)	Second input pressure transducer
P215DP-9100	14 to 24	50	16	4	P35AC-9100
P215DP-9101	8 to 14	50	10	2.5	P35AC-9101
P215DP-9600	14 to 24	51	16	4	P35AC-9507
P215DP-9601	8 to 14	51	10	2.5	P35AC-9508

All models are delivered with a single pressure transducer A second pressure transducer can be ordered. For type number see type number selection table

Note: 1 bar = 100 kPa ≈ 14.5 psi

P Pressure connections

There are two types of pressure connections available.

Fig. 4
Style 50 (incl. valve depressor mounted into machined flare)

Fig. 5
Style 51 (excl. valve depressor)

1. 90 cm capillary.
2. 7/16 - 20 UNF flare nut.
3. copper sealring

D Dimensions (mm)

Fig. 6
P35AC

Fig. 7
Mounting Bracket 210-25

- 1 Mounting hole \varnothing 4 mm
- 2 Extruded 6-32 UNC thread
- 3 Mounting hole for P35AC \varnothing 4 mm

Dimensions (mm)

Fig. 8

- 1** cable inlet grommets
- 2** cable inlet second input transducer
- 3** 7/16 - 20 UNF flare nut

Note

Specifications

Product type	P215DP	
Pressure range	14 to 24 bar 8 to 14 bar	
Maximum overrun pressure	14 to 24 bar = 40 bar 8 to 14 bar = 34 bar	
Pressure connection	style 50 with 90 cm of capillary style 51 with 90 cm of capillary	
Control action	direct	
Maximum output voltage	≥ 95 % of supply voltage	
Maximum current	8 A rms (at maximum voltage output)	
Minimum current	≥ 100 mA	
Power factor (cosφ) motor	≥ 0.6	
Mains supply voltage	230 Vac +10 % / -15 %	
Mains supply frequency	50/60 Hz	
Operating ambient temperature	-20 to +55° C	
Operating /storage ambient humidity.	10 to 98 % R.H. (non-condensing)	
Storage ambient Temp.	-40 to 85 °C	
Min. speed	adjustable from 45 to ≥90 % of supply voltage	
Cut-off point	45 % of supply voltage	
Prop. band range	14 to 24 bar = 4 ± 1 bar	at minimum speed adjustment of 45% of line voltage.
range	8 to 14 bar = 2.5 ± 0.5 bar	
Enclosure	IP54	
additional pressure transducer	IP20	
Material case/cover	polycarbonate	
heatsink	aluminium	
press. connection	90 cm copper capillary with brass flare nut	
Shipping weight	individual pack	1.0 kg
	overpack	21 kg (20 pcs.)
Vibration	according to DIN89011 Kennlinie I	
Residual current motor	in cut-off mode ≤ 15 mA	
Wiring connections	screw terminals 1 mm ² up to 2½ mm ²	
additional P35AC	screw terminals 1 mm ² up to 1½ mm ²	

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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