

Series P215ST

Single 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 6 A (rms) full load current.

The controller 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.



P215ST
Condenser Fan Speed Controller

You can also provide a copy of this P215ST 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"/> 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 P215ST is a single phase control, it may be used only with single-phase motors approved by the manufacturer for speed control applications.

Description

The transducer and electronics are built into an IP54 enclosure.

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 P215ST cannot be mounted vertically, additional limitations apply. The maximum allowable current will be 4A instead of 6A or the maximum allowable ambient temperature is reduced to 40 °C instead of 55 °C.

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 motor cable shield have to be connected to earth. To prevent stray current, the earth connections of 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 6 A rms.

Measuring

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



Caution

The P215ST 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 P215ST. Also the P215ST should be externally fused against miswiring or short circuits. Use a thermal/current overload relay with a current rating according to the motor (max. 10 A/slow).

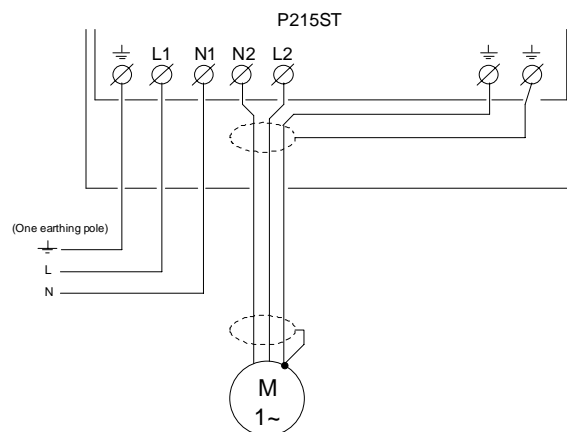


Fig. 1

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..

Adjustments

The P215ST gives a control characteristic according to fig. 2.

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

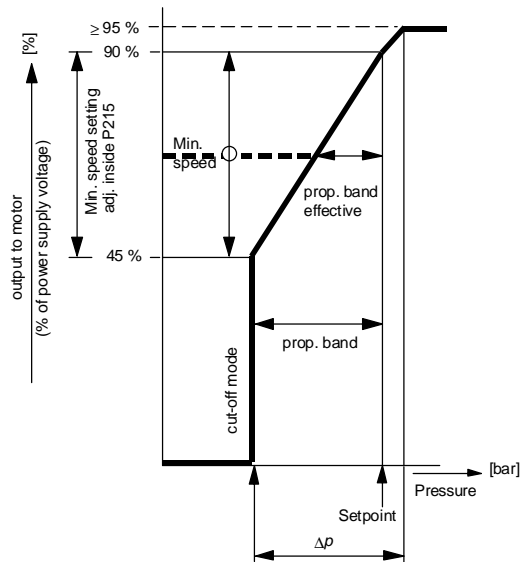


Fig. 2

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.

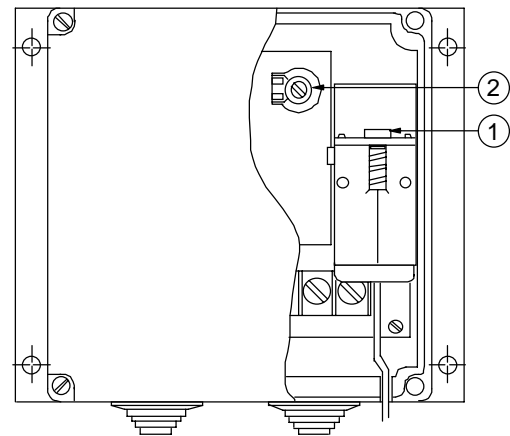


Fig. 3

- 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

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.

Type number selection table

Order nr. (bar)	Range (bar)	Element style	Setting (bar)	Prop. band
P215ST-9100	14 to 24	50	16	4
P215ST-9101	8 to 14	50	10	2.5
P215ST-9600	14 to 24	51	16	4
P215ST-9601	8 to 14	51	10	2.5

Note: 1 bar = 100 kPa ≈ 14.5 psi

Pressure connections

There are two types of pressure connections available.

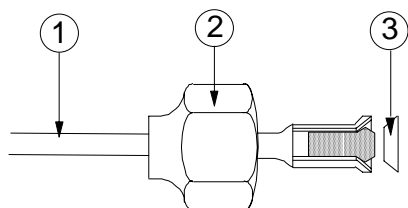


Fig. 4
Style 50 (incl. valve depressor mounted into machined flare)

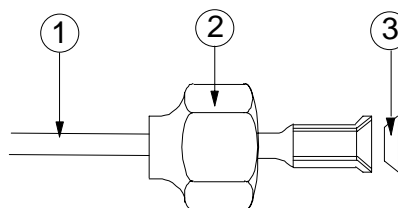


Fig. 5
Style 51 (excl. valve depressor)

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

Dimensions (mm)

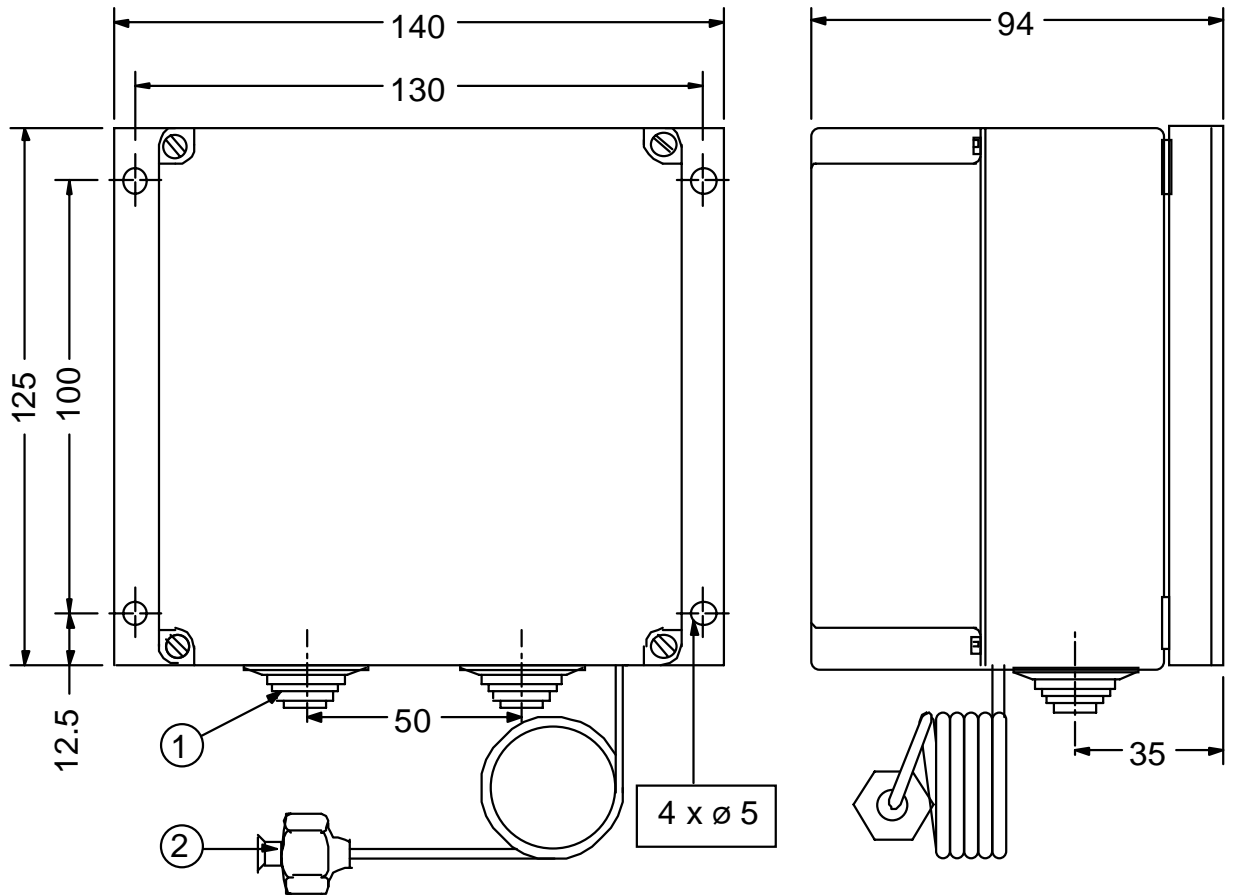


Fig. 6

- 1 cable inlet grommets
- 2 7/16 - 20 UNF flare nut

Note

Note

Specifications

Product type	P215ST	
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	6 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	at minimum speed adjustment of 45% of line voltage.
	range	
	14 to 24 bar = 4 ± 1 bar	
	8 to 14 bar = 2.5 ± 0.5 bar	
Enclosure	electronic module	IP54
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

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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