

VSM-CP2

VARIABLE SPEED MOTOR CONTROLLER

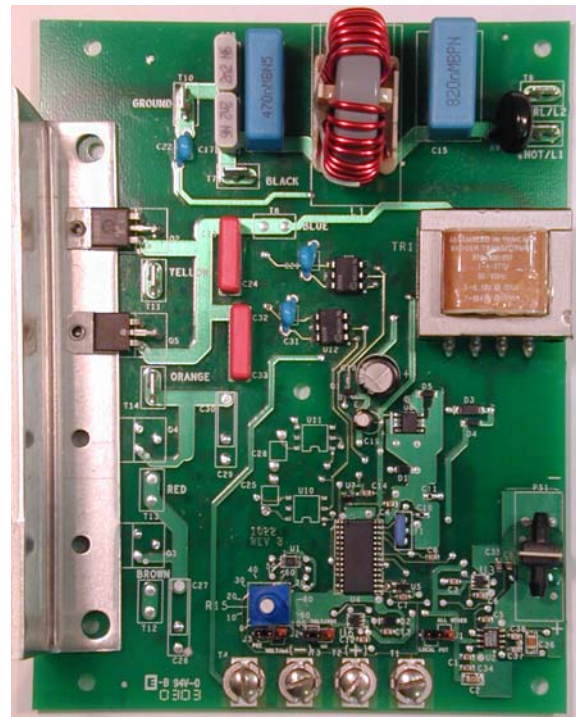
Analog setpoint and differential pressure sensor

APPLICATION

The Varidigm Variable Speed Motor Controller responds to two different inputs. An analog input provides a pressure setpoint signal while a pressure sensor provides pressure feedback to the controller. The controller responds by controlling a pressure by varying the speed of a Permanent Split Capacitor (PSC) motor in response to an analog (0–10 Volt DC or 4 – 20 maDC) signal from the building automation system or other source (i.e. remote pot, on-board pot, or infrared remote signal).

This controller is designed for use with basically standard Definite Purpose, Permanent Split Capacitor (PSC) Frame 42, Frame 48, and 3.3 inch diameter motors ranging from 1/20 to 3/4 HP. Controllers are available for 120V, 240V, and 277V, 60 Hz motors.

This Varidigm controller provides a wider speed range than traditional multi-tap motors.



FEATURES

- Controls a pressure (or vacuum) in response to both an analog input and a sensed pressure signal.
- Suitable for use with either pressure or vacuum.
- Senses differential pressures.
- Cuts building operating cost through reduced power usage.
- Provides continuously variable motor speed in response to a pressure setpoint from a 0 -10 VDC or 4 - 20 maDC input, potentiometer setting, or infrared remote.
- Interfaces with typical building controls.

- Incorporates soft start and soft transition between speeds, reducing objectionable device noise.
- Improves comfort by providing continuous air circulation at off-peak use times.
- Lower first cost when compared with inverter type controllers.
- For use with most standard PSC AC induction motors.
- UL/CUL component recognized.
- FCC Part 15 B Compliant.

SPECIFICATIONS

CONTROLLER MODELS:

VSM - CP2 - 1126 - 50000 - 001 - 0 (Example)

Series Number

Customer Special Options

Input # 5 0 = Not Used
 Input # 4 0 = Not Used
 Input # 3 0 = Not Used

Input # 2 Pressure Range: Inches Water Column
 0 = 0.1 - 1.0; 1 = 0.1 - 1.5; 2 = 0.1 - 2.0

Input # 1 Setpoint Adjustment:
 0 = 0 - 10 VDC, 4 = 4 - 20MA,
 5 = On board Pot, 7 = Remote Pot,
 9 = Remote IR

Voltage: 126 = 120VAC - 60HZ,
 246 = 240VAC - 60HZ,
 276 = 277VAC - 60HZ

Product: C = Controller
 Type of Control: A = Analog, D = Discrete, P = Pressure
 Output Type: 2 = Dual Triac, 3 = Series/Parallel

Family: VSM = Motor Control

NOTE: Most standard PSC motors can be used with this controller by making minor external changes to the motor hookup. Refer to Varidigm Form 1005 for details.

SPEED RANGE:

3:1 turndown is typical and can vary with the application. Contact Varidigm for details.

PRESSURE SETPOINT RANGE:

- 0.1 to 1.0 inch water column
- 0.1 to 1.5 inch water column
- 0.1 to 2.0 inch water column

SETTING RESOLUTION:

0.1 VDC (0.1 mADC) minimum

POWER SUPPLY:

- 120V, 60 Hz, 1 phase (102 to 132 VAC),
- 240V, 60 Hz, 1 phase (204 to 264 VAC),
- 277V, 60 Hz, 1 phase (235 to 305 VAC)

Controller and motor must have same power supply rating.

AMBIENT TEMPERATURE RATING:

-40 °C to 70 °C (-40°F to 160°F)

PRESSURE SETPOINT INPUTS:

Input	Controller Response	Jumper		
		J3	J2	J1
0 - 10 Volt DC	Off 0 to 1 V Modulates 1 to 9 V Full On 9 to 10 V	Volt or MA	Volt or Pot	All Other
4 - 20 mADC	Off 0 to 2 mA Modulates 2 to 18 mA Full On 18 to 20 mA	Volt or MA	MA	All Other
Local Pot	Off 0 to 10% Modulates 10 to 90% Full On 90 to 100%	Pot	Volt or Pot	Local Pot
Remote Pot	Off 0 to 10% Modulates 10 to 90% Full On 90 to 100%	Pot	Volt or Pot	All Other
Infrared Remote	Off 0 to 10% Modulates 10 to 90% Full On 90 to 100%	Volt or MA	Volt or Pot	All Other

MOTOR LOAD CURRENT:

Still air environment:

Ambient Temperature (°C)	120 V	240 V or 277 V
	Max Current (Amps)	Max Current (Amps)
20	13.5	10.0
30	12.1	10.0
40	10.7	10.0
50	9.3	9.3
60	7.8	7.8
70	6.5	6.5

Locked Rotor 120V 240 / 277V
 22.5A 15A

Higher ambients are permissible in moving air. Contact Varidigm for assistance.

UL/CUL COMPONENT RECOGNIZED:

UL 508, File No. E221364

UL 1917, File No. E234506

FCC Compliant:

FCC Part 15B

ENCLOSURE REQUIRED:

800 in³, (10 in. x 10 in. x 8 in.), or larger metal enclosure is required to meet temperature rise requirements. The enclosure should meet appropriate NEMA enclosure requirements.

ORDERING INFORMATION

The VSM-CP2 can be used with most standard PSC motors. Refer to Varidigm Form 1005 for details on how to determine if your standard PSC motor is compatible with the Varidigm Controller. Order motor separately.

ORDER FROM

Varidigm Corporation
3070 Ranchview Lane
Plymouth, MN 55447 USA
Tel: (763) 258-0170 Fax: (763) 258-0411
E-mail: sales@varidigm.com
www.varidigm.com

INSTALLATION

WHEN INSTALLING THIS PRODUCT:

1. Read these instructions carefully. Failure to follow them could damage the product or cause a hazardous condition.
2. Check ratings given in instructions and on product to make sure product is suitable for the application.
3. Installer must be a trained experienced service technician.
4. After installation is complete, check out product operation as provided in these instructions.

CAUTION

Controller carries line voltage. Suitable interlocks must be used to protect service personnel.

LOCATION

Choose a location where the ambient temperature will not exceed the temperature rating of the controller and where it is protected from moisture and combustion condensate.

MOUNTING

The controller is furnished with 4 plastic mounting stand-offs. These are designed to snap into four (4) 3/16 in. diameter holes in the mounting surface. The mounting plate can be up to .063 in. thick.

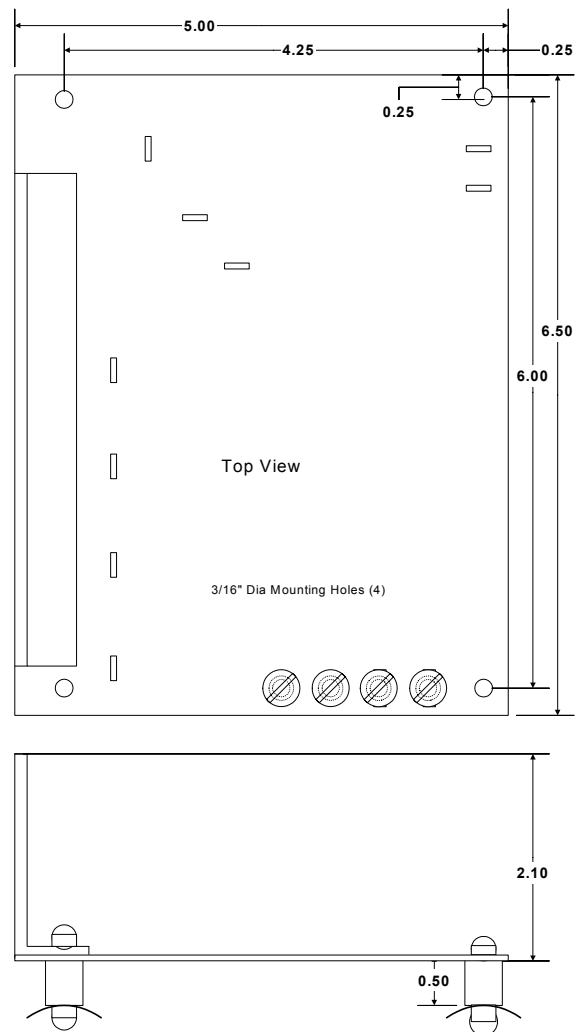


Figure 1
Mounting dimensions (inches)

WIRING

WARNING

Disconnect and branch circuit protection required per NEC and local codes.

CAUTION

1. Wire size must be selected to have capacity to handle the maximum motor current.
2. Insulated female quick connects must be used to connect the field power wiring to the control.
3. All wiring must be secured so that it does not contact moving parts.

Disconnect/Breaker Protection

External overcurrent and disconnect means must be provided in accordance with the NEC and local codes. A 20 amp time-delay fuse or breaker protecting the motor/controller is recommended.

CONNECTIONS

The motor is connected to ¼ in. male quick connect terminals on the control as follows:

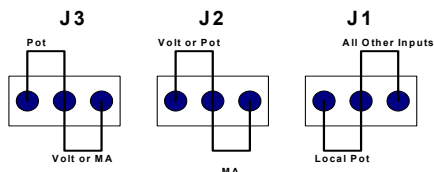
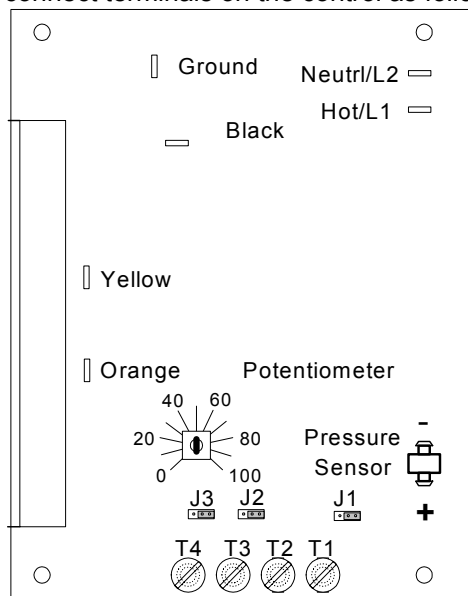


Figure 2
Wiring terminal locations and jumper locations

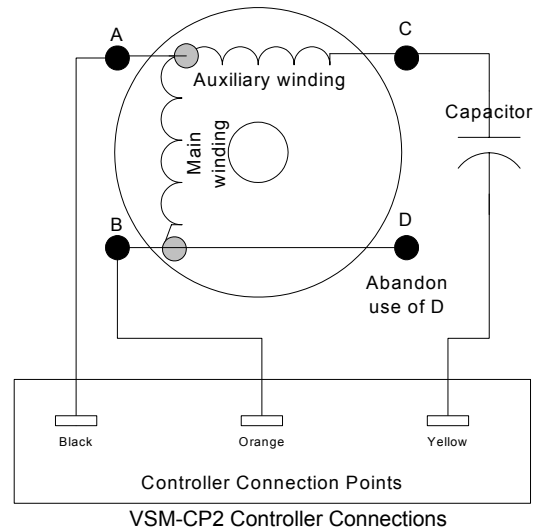


Figure 3
Wiring connections for VSM-CP2 with standard PSC motor

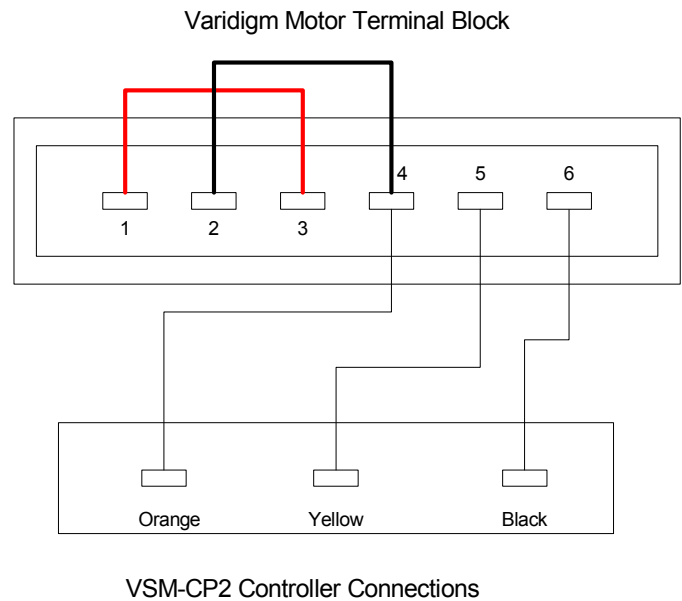


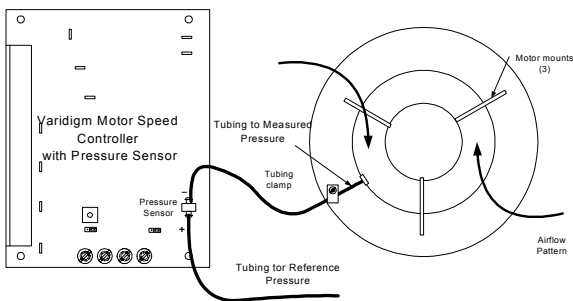
Figure 4
Wiring connections for VSM-CP2 to typical Varidigm motor

SETTING AND CHECKOUT

1. Set jumper for control input: 0 –10 VDC, 4 –20 maDC, remote 20K potentiometer, local potentiometer, or infrared remote (See Fig. 2).
2. Energize motor and controller by turning on power source.
3. Adjust system control so that it provides a pressure setpoint signal of either: 0-10 VDC or 4-20 mA DC at terminals T2 and T3; or a 20K potentiometer across terminals T1 and T3 with wiper connected to T2.
4. Motor must start and increase speed proportionally to the input signal.
5. Adjust setting up or down to verify that motor/control responds to changing control signal (i.e. if voltage or current input increases, then speed and pressure should increase).

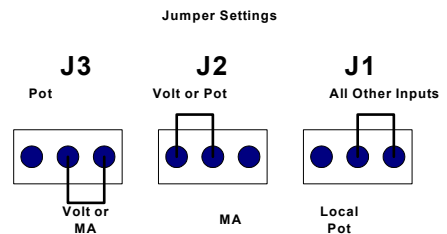
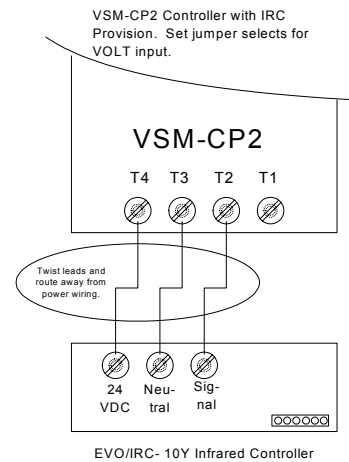
IMPORTANT

Motor horsepower must be selected so that high speed operation loads the motor to the rated maximum speed. If the motor selected is too powerful for the application, it will not respond correctly to the pressure control input signal.

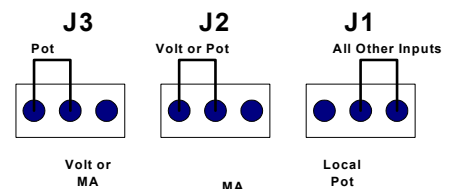
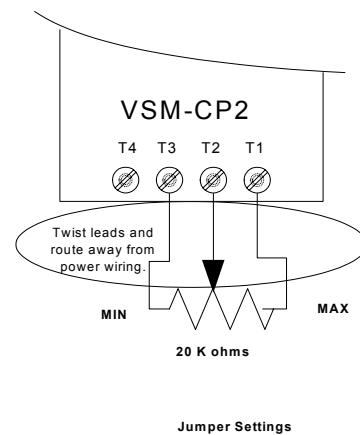


**Figure 5
Pressure Connections**

Always connect the highest pressure to the “+” end of the pressure sensor. Use flexible 1/8 inch internal diameter plastic tubing that fits snugly on the sensor connections. Be careful when installing or removing the tubing from the sensor so as not to damage the sensor.



**Figure 6
Connections for Infrared Receiver
(EVO/IRC – 10Y)**



**Figure 7
Connections for Remote
Potentiometer**

APPLICATION

The VSM-CP2 controller is intended for use in air-moving applications, but other applications may exist. The controller's ability to provide consistent output based on pressure feedback makes it suitable for application in fan powered VAV terminal boxes, fan filter units, fan coil units, ventilators, etc.

The on-board differential pressure sensor may be piped to sense inlet fan pressure, pressure downstream of the device, or pressure in a controlled space. Refer to Form 15-1007 for details on the Sensor Probe Assembly, identity number 1049A.

The VSM-CP2 is designed to enhance the controllability of standard PSC motors. Most PSC motors are compatible with the CP2. Refer to Varidigm Form 1005 for simple compatibility testing procedures.



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