

**790-ECM(VmA) Series w/PI
ECM Motor Speed Controller**

Description

Variable Speed Drive of Blower or Propeller fans can provide the optimum temperature, volume, or pressure as may be required by an application. The Hoffman Controls model 790-ECM(VmA) Series controller allows for the use of modern, energy efficient, ECM Motors in variable motor speed applications.

Variable Speed Drives can control the flow of conditioned air or fluids to maintain temperature, maintain a constant flow as pressure changes, or maintain a constant pressure as a result of varying flow rates. These conditions can be controlled by providing a proportional output signal from a thermostat, flow, or pressure transducer. The 790-ECM(VmA) Series controller accepts a 2-10 VDC or 4-20mA input signal, and provides a pulse width modulated output (PWM) from 5% to 100% over the full factory operating span to drive an ECM motor.

The 790-ECM Series control incorporates a Minimum Speed adjustment capable of raising the motor speed at the lowest signal level and a Maximum Speed adjustment for potentially reducing the motor speed at the highest signal levels. These adjustments allow for complete flexibility of motor speed control over the control signal span.

The control signal span can be limited with the use of a Cutoff adjustment which will set the "OFF" level of the control to be higher than the factory standard 2.0 VDC / 4.0mA. An on-board Calibration adjustment allows the installer to simulate the input control signal and make any speed or span adjustments as required. The Calibration adjustment may also be utilized to keep the motor running at a fixed speed when no control signal is present, if desired.

Proportional Control

The base model of the 790-ECM Series of controls operates in a direct acting fashion (more signal = more output) with a linear increase of the output as the input signal increases over the configured minimum, maximum, and cutoff points of operation.

Proportional and Integral Control - PI

Some applications may require that the controller operate at a set point, without any signal error. An adjustable set point of operation can be added to the 790-ECM control with the optional 266-PI interface card. The interface card plugs in to, and receives it's power directly from the 790-ECM control. When this optional accessory is used, the input signal is connected directly to the 266-PI terminal block rather than the 790 terminals.

With a set point of operation, the 266-PI can be configured for direct acting (more signal = more output) or reverse acting (more signal = less output) modes of operation.

In direct acting mode the set point acts as a trigger threshold level. If the set point is exceeded by the input signal, the motor speed is increased in an attempt to reduce the input signal down below the set point level.

In reverse acting mode the set point indicates the desired input level which should be maintained at a steady state. Motor speed is adjusted as required to maintain the input signal level = set point level.

In addition to set point and operating modes, the 266-PI provides for proportional and integration functions. The proportional adjustment pot can scale the amount of input signal used to drive the output, while the integration adjustment pot is used to smooth the output response over time or cause a small delay prior to responding. Refer to the 266-PI Product Data sheet for complete details (HCC# 172-0239-000).

Applications

- 1) Controlling conditioned air flow by varying the volume of air to a space for maintaining a constant temperature in a zone or area, or constant temperature of supply air.
- 2) Maintaining a constant flow rate (fpm) or volume (cfm) as the pressure of a system increases or decreases.
- 3) Maintaining a constant negative or positive pressure within an air distribution system or space.
- 4) Maintaining a constant pressure differential between two spaces or areas.

Thermostat and Transducer Inputs

Thermostats are available for control of temperature in two ranges; 50°-90°F for environmental applications and 30°-180°F for commercial or industrial applications with both 2-10V DC and 4-20mA outputs. 906-VmA Series thermostats utilize a linear millivolt sensor output that directly converts mV to °F. (773mV=77.3°F) The 906 thermostat is available with an optional "on" - "off" - "offset" three position switch. Offset is adjustable from 0° to 20°F above or below setpoint. See 906 Series thermostat Product Data for wall or remote type thermo-

stats, sensors, and available ranges.

Transducers are available to provide flow in fpm or pressure in inches water gauge (WG). Transducers are temperature compensated and factory calibrated for various flow ranges up to 4000fpm and up to 4.0" WG pressure. See 203-5(24)V Series for flow applications and 203-6(24)P Series for pressure applications. A 2-10V DC output signal only is standard for both flow or pressure transducers.

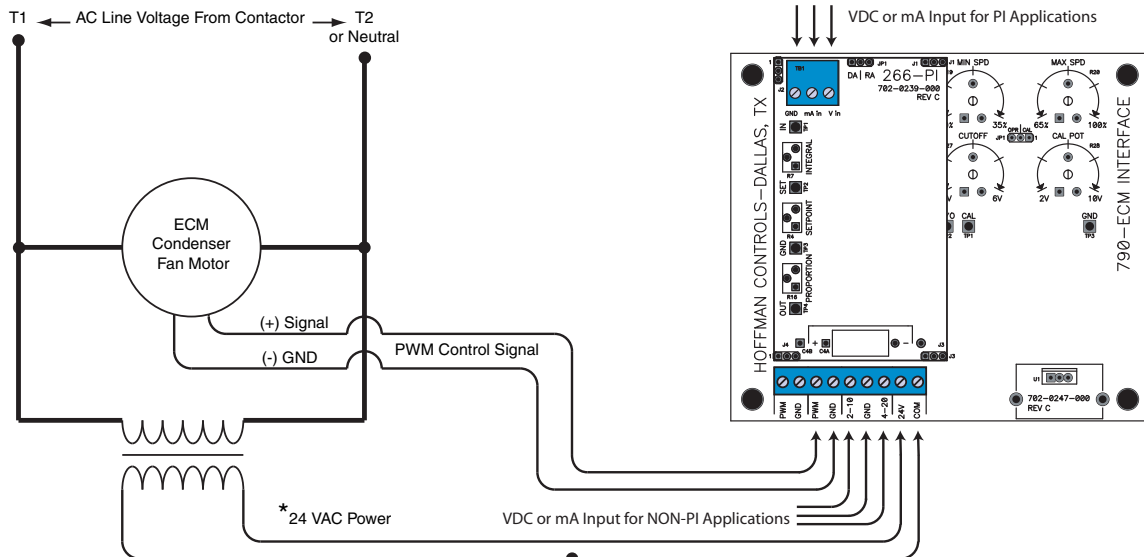
Signal Averaging

A 206-10-1 Series multiple input signal control, with averaging signal output, is available for determining the collective average of the total number of individual inputs when required. This interface can provide a common output signal that represents the average of all inputs for setting a demand for the system. These inputs can be a DA and/or RA function, and typically is the average of the multiple thermostat signals.

This averaged output signal is represented by a 2-10V DC signal. Two volts DC would represent zero demand, ten volts would represent 100% demand. This multi-signal input, with average output signal represents the proportional percent value of the demand required of the system. This average output signal can provide the percent demand for multiple compressors, heating stages, etc. for setting the required capacity for meeting the load.

Flexibility

When the 790-ECM controller is utilized with the optional PI Interface, Thermostat, Flow or Pressure Transducer, all of the peripheral controls provide a "closed loop" "single source" manufacturer of components. Therefore, all of the controls are designed, manufactured, and calibrated to function together as a complete system.



* 24 VAC Power source is NOT required to be of same phase as motor line voltage.

CAUTION
If a ground reference is applied to the 24VAC power source, the "grounded" lead must be connected to terminal 24V COM ONLY.

790-ECM(VmA) Wiring Diagram (with / without PI Interface)

Features and Benefits

Applicable for controlling energy efficient ECM motors.

- Line voltage independent.
- Minimum/Maximum speed adjustments.
- Motor cut-out adjustment.
- Optional **266-PI Interface** (Proportional Integration).
- Optional **906 Series** LM34 1°F/10mV Thermostat
- Optional **206-10-1** Signal Averaging Interface
- Optional **203-5(24)V** Flow, or **203-6(24)P** Pressure Transducers.

NOTE: Consult the 203-5 & 203-6 Series Transducer literature for complete details of applicable flow and pressure operating ranges.

Specifications

Voltage, Input (nominal)	24V AC
Input Signals	
DC Volts	2–10V DC
Input Impedance	10,000 Ohms Min.
DC milliAmps	4–20 mA D C
Input Impedance	500 Ohms
Output	5% to 100% PWM @ 80Hz 13.5 VDC, 20mA (max.)
Operating Ambient	32°F to 120°F
Humidity	95%, Non-condensing
Dimensions (L x W x H)	5.0" x 5.25" x 3.15"