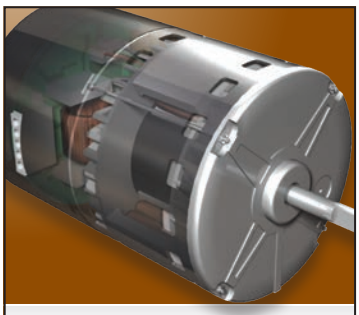
ECM Motors

ELECTRONICALLY COMMUTATED MOTOR

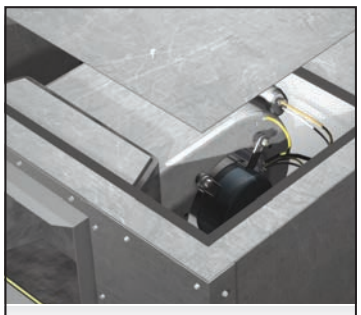
Price Fan Powered Terminal Units can be supplied with the latest motor technology: ECM – Electronically Commutated Motor. A brushless DC motor design with a built-in inverter and a microprocessor-based motor controller. The ECM features increased efficiency compared to a standard PSC motor, and will adjust speed and torque automatically to maintain design air volumes, regardless of external static pressure.

Constant fan flow, regardless of changing static pressure conditions.



Factory programmed flow set-points

Designed to provide consistent air volumes for increased efficiency



Extended life due to its low operating temperature and ball bearing design

Accepts remote adjustment signal for integration with DDC Controls Systems

www.price-hvac.com for additional product information, including product videos and brochures.

ECM Motors

Product Overview

Features and Benefits

Price Fan Powered Terminal Units can be supplied with the latest motor technology: the ECM™ – Electronically Commutated Motor. The ECM motor is a brushless DC motor design with a built-in inverter and a microprocessor based motor controller. The ECM motor has several features which make it superior to conventional electric motors:

- Factory set fan flow
- Energy efficient operation
- Long life
- Low operating temperature
- Programmable
- Wide operating range

Factory Set Fan Flow

The ECM motor allows factory setting of the unit's fan flow. Due to the factory programmed set-points in the motor, the fan flow remains constant regardless of external static pressure. The motor will adjust speed and torque automatically to maintain design air volume.

Unlike conventional permanent split capacitor (PSC) motors, Price ECM motor regulates its air flow automatically by adjusting its torque and speed to maintain a preprogrammed air flow regardless of external static pressure. The Price fan curves show that a conventional split capacity motor's air flow decreases as the static pressure increases while the ECM motor maintains constant air flow up to 0.50 in. external static pressure.

To allow future adjustment to fan flow in the event of system changes, a Price electronic speed control is provided as standard. The controller, located on the terminal unit control shroud, can be reset with a screwdriver to facilitate air flow changes, including an OFF position. The Price speed controller also accepts a 0-10VDC or 0-20 mA signal for remote adjustment from a DDC control system.

Price ECM motor's capability to provide constant air flow provides a number of important benefits, which include:

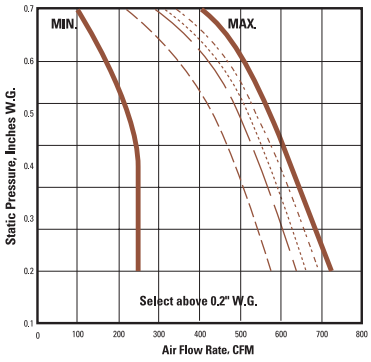
- Compensates for abnormally high downstream duct static pressures.
- Factory calibrated air flow (less balancing required).
- Compensates for increased static pressure as system air filters get 'loaded'.

Extended Life

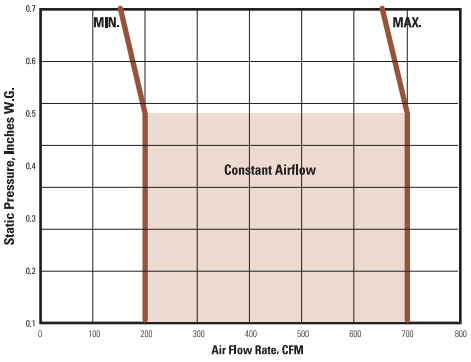
Motor life of the ECM is extended due to its low operating temperature and ball bearing design. Low operating temperatures prevent breakdown of electrical components providing long life and trouble-free operation. The ball bearings require no lubrication and allow lower operating speeds.

Fan Curves

Unit Size 20 - PSC Motor



Unit Size 20 - ECM Motor



ECM Motors

Low Operating Temperatures

The ECM motor operates at significantly reduced temperatures compared to conventional induction motors. The reduced motor heat gain provides further energy savings due to the lower cooling load required.

Innovative Fan Control Strategies

Price Fan Powered Terminal Units are factory set to provide a gradual fan start sequence. When the fan is energized it starts at low speed and smoothly ramps up to design flow for quiet, non-obtrusive operation.

An analog input to the speed control is provided as standard to allow modulation of fan speed in response to a controller signal. Modulation of fan speed as opposed to on/off operation offers optimum energy efficiency in addition to superior comfort control.

Wide Range

Due to the ball bearing design and low operating temperature of the ECM motor, the unit can be operated at lower minimum speed than conventional motors. This results in a wide air flow range for each size of terminal unit. The ECM motor provides maximum flexibility for future air flow adjustment requirements.

All Metric dimensions ( ) are soft conversion.
Imperial dimensions are converted to metric and rounded to the nearest millimetre.

Product Overview

Price DELUXE Speed Controller Description

The Price Deluxe ECM speed controller works with a high efficiency ECM motor. This low voltage (24VAC) speed control allows full manual (push button adjust) or BAS (2-10VDC signal) control of the ECM motor.

Features:

- Dual outputs for controlling 2 ECM motors (Note: Both motors will receive the same signal.)
- Red three-digit digital display for reading out:
  a) Speed 0-100%
  b) Motor RPM (for motor number one only)
  c) BAS input voltage (Digital readout of incoming BAS voltage signal.)
- Building Automation System input (2-10VDC) for remote control
- 0-10 VDC output corresponding to motor RPM.

LED Digital Display

The Digital Display shows the user several modes of operation. This allows for easier and more precise field adjustment and troubleshooting.

By pressing both the UP and DOWN push buttons at the same time the user can cycle between the following modes:

1) Speed Adjustment – is easier and more precise with the digital display and push buttons than with a standard dial.

2) Motor RPM – displays the real time motor speed to aid in troubleshooting.

3) BAS input voltage – displays the input voltage signal from the building automation system (BAS). Note: Any BAS voltage signal above 1 VDC overrides local speed control.

Important Information regarding the ECM motor.

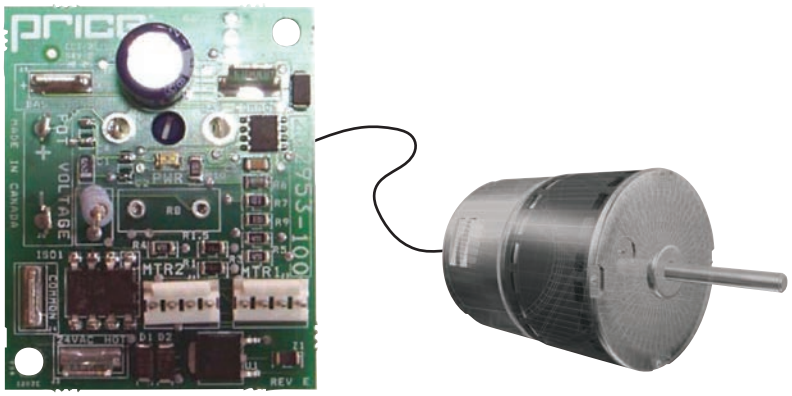
Do not switch 120/208/240/277 VAC power to turn ECM motor on and off. Instead control the 24VAC signal or BAS signal to turn the ECM motor on and off. The ECM motor has large capacitors that charge quickly on mains power up. Switching on several motors frequently could reduce building power quality and is not recommended.

BAS Operation

Input Voltage	Mode of Operation
0-1 vdc	ManualControl
1-2 vdc	Fan Off
2-10 vdc	Remote Control 0-100%

Price DELUXE ECM Speed Controller

Price Standard ECM Speed Controller



Standard ECM Speed Controller

The Price standard speed controller allows manual adjustment of the fan flow using the adjustment dial on the control board and a voltmeter. Remote control of the fan speed is also possible with the BAS input. The following chart describes the controller response to a 0-10 VDC input.

Input Voltage	Mode of Operation
0-1 vdc	ManualControl
1-2 vdc	Fan Off
2-10 vdc	Remote Control 0-100%

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Energy Efficiency

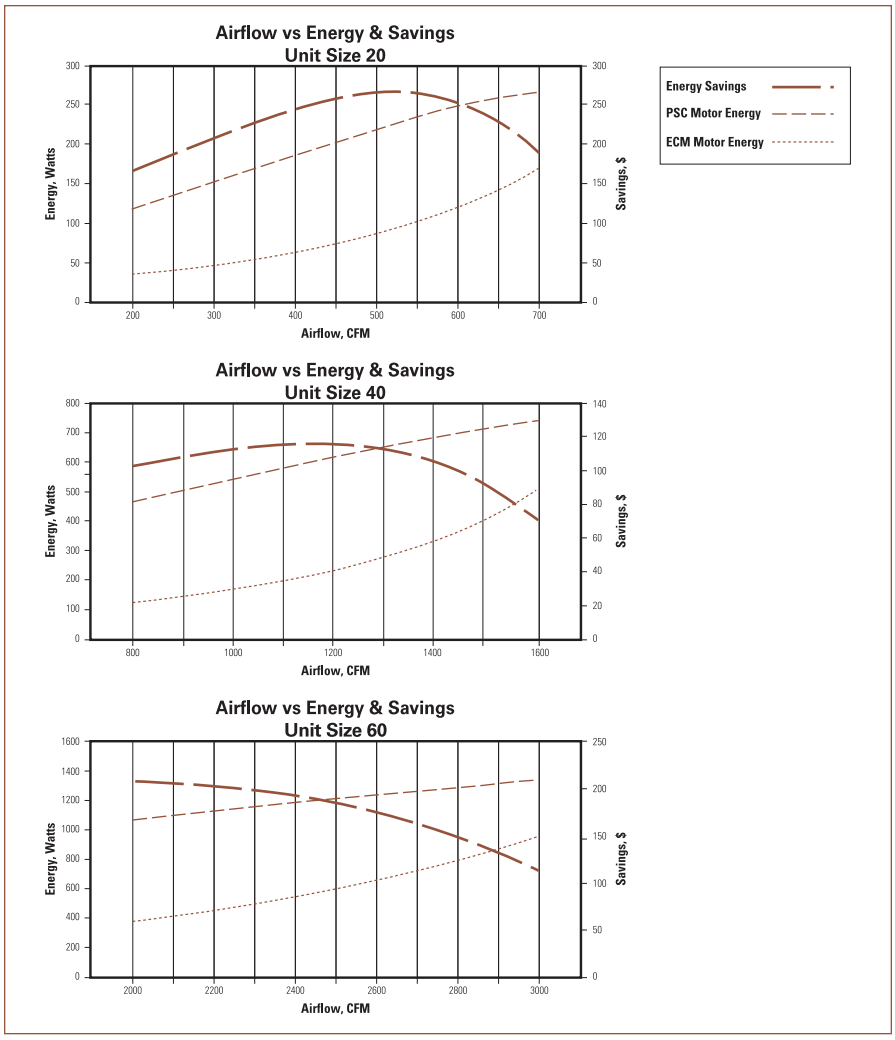
The Price ECM motor uses an ultra high efficiency, brushless, permanent magnet DC motor that has a built in internal controller that regulates the motor's speed. This method eliminates most of the power losses; brush-noise and excess heat related to rotor windings and SCR (silicon controlled rectifier) speed controllers. The internal controller assures that the fan cannot run backwards.

Price ECM motor offers significant energy savings over time to the owner when compared to conventional split capacitor motors. Power loss due to magnetic, thermal and frictional effects are dramatically reduced at all loads. At full load the Price ECM motor is 20% more efficient than a standard split capacitor motor. In addition, its permanent-magnet, DC design, absence of rotor losses and high power factor allow it to maintain its high efficiency over a wide speed range. At low speed the ECM is over 30% more efficient than a standard induction motor.

The ECM motor has a minimum efficiency of 70% throughout its entire operating range. Conventional induction motors become less efficient at the reduced speeds that are typically selected for fan powered applications. Energy savings of 50-60% can be achieved with the ECM motor at normal operating conditions resulting in excellent payback. Typical payback based on energy is between six to 24 months.

The graphs on the right illustrate energy savings for size 20, 40 and 60 size model FDC terminals.

See pages F274-F275, F322-F323, and F352-353 for actual energy consumption for Selected Price Terminals.



Example

A typical job has 200 terminals; 120 classified as small units (size 20 @ 400 CFM each). Typically the building will be run 12 hours per day, 250 days per year for a total of 3000 operational hours. Average enery cost assumed is about $0.10 per kWh with a monthly demand charge of $10.00 per kW.

Operating Cost Savings:

Small Units:	Standard PSC Motor Energy	187 watts
	ECM Motor Energy	64 watts
	Energy Saved	123 watts
	Annual Savings per box	$36.90
	Annual Savings per building	$4,428.00
Large Units:	Standard PSC Motor Energy	618 watts
	ECM Motor Energy	232 watts
	Energy Saved	386 watts
	Annual Savings per box	$115.80
	Annual Savings per building	$9,264.00
	A) Total Operating Cost Savings (per year)	= $13,692.00

Demand Charge Reduction:

Small Units	Energy Saved	123 watts
	Annual Savings per box	$14.76
	Annual Savings per building	$1,771.20
Large Units	Energy Saved	386 watts
	Annual Savings per box	$46.32
	Annual Savings per building	$3,705.60
	B) Total Demand Charge Savings (per year)	= $5,476.80
	C) **Total Energy Savings (per year)**	**= $19,168.80**

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