

RPM™ AC MOTOR SALES GUIDE



Less Is More

**RELIANCE
ELECTRIC** 

LESS IS MORE



RPM™ AC Variable-Speed Motors

Less Drive Matching/Operating Problems – More Drive & Motor Life

Less Inertia – More Speed Command Response

Less Size & Weight – More Design Flexibility

Less Vibration – More Bearing Life

Less Limitations – More Flexibility

Less Amps – More Peak Torque

Less Hassle – More Choices

Now Available from 1/4 to 1000 HP

RELIANCE
ELECTRIC

RPM AC MOTORS **INTRODUCTION**

RPM AC Motors – a Unique Solution.

When compact size is needed, or when exceptionally fast response to speed changes is required or the demand is for peak torque, RPM AC is the motor to choose. This guide has been developed to help you sell the advantages of RPM AC motors over competitive brands. They're unique and offer significant advantages over competitive products in a wide variety of applications.

Contacts

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RPM AC motors are available with a wide selection of enclosures, cooling options, mounting configurations and modifications.

OVERVIEW RPM AC MOTORS

RPM AC motors have been developed specifically for use in variable-speed PWM controller applications where fast response to speed commands and high peak torques are required.

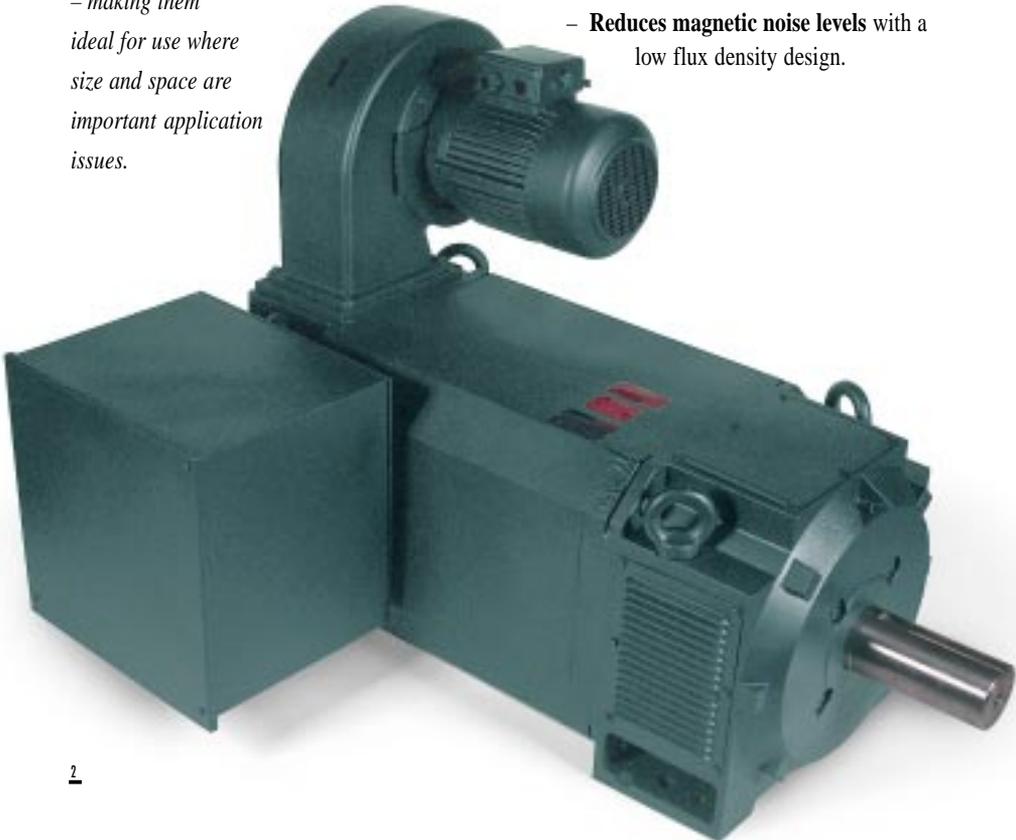
They eliminate damaging reflective wave problems that plague many motors marketed as “variable-speed.” These motors are up to three frame sizes smaller and weigh less than NEMA frame motors – making them ideal for use where size and space are important application issues.

Optimized Variable-Speed Electrical Design

Unlike many variable-speed motors, RPM AC motors are developed especially for trouble-free and high performance variable-speed operation – they’re not re-rated or oversized constant speed motors.

The difference is evident in the optimized rotor slot configuration and rotor design of these motors which:

- Reduce KVA/horsepower for **lighter controller loading.**
- Lower flux saturation to **reduce peak currents** and nuisance controller “tripping.”
- **Greater horsepower per frame** size – up to three frame diameters smaller than corresponding NEMA frame constant speed motors.
- **Operate smoothly at very low speeds.**
- **Reduces magnetic noise levels** with a low flux density design.



Rugged, Long Lasting Insulation System

The NEMA Class H materials and construction of the RPM AC insulation system provides superior **mechanical and thermal strength**. The insulation system of every Reliance Electric variable-speed motor is designed, manufactured, tested and proven to provide optimum performance when used with fast-switching power semiconductors (IGBTs) – even with extended lead distances. They surpass the requirements of NEMA MG.1 part 31.40.4.2 for voltage spikes.

Uncommon Looks, Uncommon Results

There's nothing like this motor. Reliance motor engineers designed it from the ground up with the features needed for durable and highly responsive variable-speed performance.

- Feet-on-the-bracket design provides a **rigid, vibration-resistant mechanical assembly** with maximum bearing support for superior structural integrity.
- Laminated “monobloc” frame provides the **highest possible power density**.
- A machined mounting face for installing feedback devices is included.
- Cast iron end brackets have concentric bearing and frame fits and are machined in a single operation to ensure a **perfect fit for all accessories**.
- RPM AC motors use the Reliance exclusive **PLS® open bearing lubrication system for optimum bearing life** while minimizing the risk of over-greasing or grease contamination.
- **Easily modified** for splash-proof or totally-enclosed separately-ventilated duty.

PERFORMANCE SPECIFICATIONS

Horsepower Range.....1/4 through 1000
 Enclosures.....DPFV, TEBC, TEFC, TENV
 Standards.....CSA, IEC, NEMA, UL
 Speed/Torque Capabilities:
 – 100% torque to zero speed continuously with flux vector control.
 – 100:1 minimum constant torque below base speed with open loop control.

APPLICATIONS RPM AC MOTORS

The following pages describe prime applications for RPM AC motors – applications which take advantage of the compact design and high operating performance characteristics of RPM AC motors.

Applications and Industries

This chart summarizes popular applications for RPM AC motors. To use this section of the Sales Guide, select the industry and application and then go to the page referred to in the chart for more information and selling tips.

Industries/Page Number

	Automotive	Converting	Food Processing	Forest Products	Machining	Metal Mfg.	Metal Forming	Packaging	Textile	Plastics
Test Stands	13	–	–	–	–	–	–	–	–	–
Press Feeders	12	–	–	12	12	12	12	12	–	–
Stamping Presses	7	–	–	–	–	–	7	–	–	–
Winders	6	6	6	6	–	6	6	6	6	6
Web Processing	8	8	–	8	–	8	–	8	8	8
Cut-To-Length	12	12	12	12	12	12	12	12	12	12
Beamers	–	6	–	6	–	–	–	–	6	–
Extrusion	–	5	5	5	–	5	5	5	5	5
Spindle	–	–	–	14	14	14	14	–	–	–
Crane & Hoist	9	9	9	9	9	9	9	9	9	9
Paper Machines	–	–	–	10	–	–	–	–	–	–
Shears	11	11	–	11	–	11	11	11	11	11
Wire Drawing	–	–	–	–	–	12	–	–	–	–

Extruders

Extruders are common to the plastics and food industries. They are also found in industries such as wire drawing, where insulation is extruded on wire.

Extruders operate over wide constant-torque speed ranges. An individual extruder may run multiple products, which all have different speed and torque requirements.

Overload torque is an important consideration, as extruders are sometimes required to start with the barrel full, or with the material starting to set up.

During startup, or with product changes, the extruder may be required to creep for extended periods of time. It is during these situations that conventional TEFC motors cause the manufacturer and user serious problems.



Selling Tips

- DC motors have powered extruders for years. Environmental issues that require enclosed motors are infrequent in extruder applications.
- Customers are familiar with DPFV (Drip-Proof, Force Ventilated) enclosures. With some gentle persuasion, they will recognize that a DPFV enclosure is the best AC value as well.
- A DPFV enclosure is the most price effective offering, especially as horsepower increases.
- Motors with a DPFV provide 1000:1 constant torque.
- RPM AC motors are capable of providing higher peak torque (in excess of 175%) than the NEMA Design B motors that competitors will offer.
- The RPM AC motor package is smaller than other AC motor packages and will neatly fit where a DC motor was previously used.

APPLICATIONS RPM AC MOTORS



Winders

Winders exist in many industries and are identified by a number of names: winders, unwinders, recoilers, tension reels or beamers. Whatever they are called, they have similar characteristics.

The motor is often required to operate at stall (zero speed at full torque) for long periods of time. Winders are all typically operated over wide constant-horsepower speed ranges. This is referred to on DC machines as the “field range” or the area above base speed. Because breakdown torque diminishes as voltage is held constant and frequency is increased, NEMA Design B AC motors are limited to approximately 90 Hz in the constant power range. The requirements of motors for this application can be 3:1, 4:1 or 5:1 in this constant power range.

Selling Tips

- RPM AC motors are routinely designed for low base speeds to support winder applications, and still keep the benefits of four pole designs. By designing the motors to achieve full voltage at 15 or 20 Hz, wide power ranges are possible without sacrificing power factor and efficiency as is done with 10 or 12 pole motor designs.
- Inverter motor electrical designs inherently have higher peak torque than NEMA Design B motors. In the area above base speed, RPM AC motors will continue to have sufficient torque at speeds where other motors will have reached stall.
- The DPFV enclosure design of RPM AC motors is ideal for providing full torque continuously, even at zero rpm.

Stamping Presses

Stamping presses are used in the automotive and appliance industries or anywhere that metal is stamped or cut into a shape.

Typical operation requires high peak torque, and high-shock mechanical designs. In addition, because of large belt loads, the shaft and bearings are often over sized.

Selling Tips

- All RPM motors have a distinct advantage in press applications because the mounting feet are on the end brackets, directly under the bearings.
- Because RPM AC motors accommodate more torque per frame size as standard, shaft and bearing capability, on a per frame basis, is greater than any competitor. This means that, even with the overframing that is sometimes required, RPM AC motors will be able to meet the application needs in a more compact package.
- More peak torque is available in a RPM AC motor than in any other standard motor.

APPLICATIONS RPM AC MOTORS



Web Processing

Web processing is probably the broadest and most common application in industry. Included are printing, metal coating, film, paper coating and other processes that take a roll of material and process it before converting to customer size orders by slitting, trimming, or cutting.

These applications generally require tight control over a very wide constant-torque speed range, with multiple motors connected to the web. Motors must be controlled to operate in a coordinated way. In addition to the process-line motors there is usually an unwind at one end, and a reel, winder, recoiler, or beamer at the other.

Selling Tips

- RPM AC motors will operate over 1000:1 speed range in constant torque mode. They are actually superior to a DC motor in that they provide full torque at zero speed without damaging the motor.
- Because RPM AC motors are designed to have lower rotor inertia than other AC motors, they respond faster and easier to the small control adjustments required to keep the process line “in sync.”
- The smaller physical size of RPM AC motors makes them a great choice when refitting a process line that was powered by DC motors. RPM AC motors will fit where other AC motors will not.
- Because RPM AC motors are high-performance motors, they have the mechanical features that make them right for these applications: encoder mounting provisions as standard, feet on the brackets for very low vibration mounting, and small profile to fit in or under the machine.

Crane & Hoist

Crane and hoist applications exist in almost every industry. Variable-speed drives and motors are increasingly being applied to these devices to provide flexible control.

There are multiple applications for RPM AC motors for lifting applications. The trolley motors move the hoist back and forth, or position it for lifting. Hoist motors do the actual lifting.

Trolley motors must have minimal size and weight, as well as being capable of accurate positioning.

The hoist requires dependable torque. Motors must be capable of overloads as high as 200%, as well as being able to operate at low speeds continuously.

Selling Tips

- Need small size, light weight, and performance? A RPM AC motor is the answer.
- The DPFV enclosure design of RPM AC motors are ideal for providing full torque continuously, even at zero rpm.
- RPM AC motors are easily sized for 200%, or even 250% overloads. The RPM AC Wizard software selection program makes selecting RPM AC motors for crane and hoist applications fast and easy. To get your copy, download it from the Reliance Electric website: www.reliance.com



APPLICATIONS RPM AC MOTORS



Paper Machines

There are many different applications on a paper machine for RPM AC motors, from the fourdrinier to the reel. For many years paper machines were powered with DC drives and motors. The DC motors that were used were splash proof and separately ventilated from air supplied by the paper mill, or force ventilated from blowers mounted on the motor. These were popular because of wide speed range capability (20:1) and cost effectiveness.

The same is true with AC motors and drives. Today, AC technology eliminates environmental issues because there is no longer a DC commutator.

RPM AC motors with ratings up to 1000HP are a natural to provide motors for a variety of paper machine applications – from the screen and couch sections on the wet end, to dryer sections, paper rolls, and the reel.

Selling Tips

- Because RPM AC motors provide high efficiency and power factor at a low base speed, and wide constant power range, they are a natural for the reel and direct-drive dryer sections of a paper machine.
- RPM AC motor insulation systems are capable of withstanding any hostile environment that the wet end of a paper machine can deliver. This makes the SPFV (Splash-Proof, Force Ventilated) enclosure a choice a clear choice for cost and space savings.
- The smaller physical size of the RPM AC motor allows easier retrofits, as well as saving aisle space on new installations. Why pay for floor space that is wasted by bulky TEFC motors?

Shears

Shear applications exist in several industries, including metals, automotive and corrugated box manufacturing.

Shears can be as simple as a push-button operated knife blade or as complicated as a high performance, in line shear that must track the material and be able to cut the metal, paper or other material within extremely tight tolerances on-the-fly.

Motors on high-performance shear applications must be able to produce peak torque from zero speed to required speed and back again at extremely high rates and must be able to withstand high impact loads.



Selling Tips

- Because RPM AC motors are designed with a lower rotor inertia than other AC motors, they respond faster and easier to torque commands and require less inverter power than NEMA frame AC motors.
- More peak torque is available in a RPM AC motor than in any standard motor because a RPM AC motor is specifically designed for industrial drive applications and not limited by NEMA Design B rotors.
- The smaller physical size of RPM AC motors make them an economical choice for retrofits or for easy mounting in an OEM's existing design on a new shear opportunity.

APPLICATIONS RPM AC MOTORS

Wire Drawing

Wire drawing machines represent one of several drive and motor applications in the wire industry. Wire drawing machines "draw" (make longer and thinner) steel, copper or aluminum rod. Wire drawing machines demand very accurate motor speed and torque control, wide speed range and the ability to respond to rapid changes in load and speed commands.

Selling Tips

- RPM AC motors operate over a 1000:1 speed range in constant-torque mode. They are actually superior to a DC motor in that they provide full torque at zero speed continuously without damaging the motor.
- The smaller physical size of RPM AC motors makes them a great choice when refitting a process line that was powered by DC motors. RPM AC motors will fit where other AC motors will not.



Cut-to-Length

Cut-to-length applications are common in the pipe and tube, metal can, metal service shop, automotive and corrugated paper areas. Part of a process that may include other sections such as unwinds, levelers or stackers, the cut-to-length section must follow the rest of the process and rapidly make speed changes to cut the material precisely. The motors used must be low inertia and able to respond accurately to rapid, and repeated speed changes.

Selling Tips

- Because RPM AC motors are designed with a lower rotor inertia than other AC motors, they respond faster and easier to torque commands and require less inverter power than other AC motors.
- To solve especially tough applications, low inertia RPM AC motors are available.

- More peak torque is available with a RPM AC motor than in any standard motor because RPM AC motors are specifically designed for industrial drive applications and are not limited by NEMA Design B rotor designs.
- The high power density and peak torque capability allows for optimum motor-to-load matching.

Test Stands

Test Stands are primarily found in the automotive and aircraft industries. Customers who test a rotating device at a specified speed and torque, or life test a component, need a test stand.

Test Stands primarily produce a defined speed or speed profile, a torque or torque profile, or a position or position profile. They are almost always single-motor, dual-motor or three-motor systems.

RPM AC motors are ideal for test stand duty. The low inertia rotors and the extremely high torque-to-inertia characteristics are almost always a requirement for the test. Accelerating to a given speed in minimum time requires the high torque low inertia of a RPM AC motor.

RPM AC motors also have extremely high overload capability. This is ideal in the testing environment. High overload capability allows the use of a smaller motor to meet the application requirements.

Selling Tips

- Rugged construction supports the high transient load requirements of the testing application.
- Low profile frames are ideal to fit into the compact machines, which are designed for testing.
- The high power density and peak torque capability allows for optimum motor-to-load matching.
- Low inertia allows improved response time to minimize test time and improves through put.
- The high torque-to-inertia ratio allows the test system to loosely emulate the environment of the test piece in operation.



APPLICATIONS RPM AC MOTORS

Spindle – Machine Tool Applications

The motors used to drive the spindle heads in machine tool applications are called spindle motors. These motors require special electrical and mechanical design characteristics to match the application and controller requirements. Standard RPM AC motor features and capabilities such as compactness and low inertia with high peak torques make it the ideal basis for the creation of a line of special spindle motors.

RPM AC Spindle and Induction Servo motors are available in ratings from 5.5 kw (7.5HP) up to 93 kw (125HP). These motors are packed with features such as:

- High peak torque-to-inertia ratios for fast acceleration and deceleration.
- Wide constant horsepower ranges of 4:1 up to 16:1 which are available in single winding designs.
- High-speed capability: 5.5 to 11 kw available up to 9000 RPM, 15 to 22 kw to 8000 RPM, 30 to 45 kw to 6500 RPM, and 55 to 93 kw to 5000 RPM.
- Designs based on IEC standards for foot and DIN flange mounting that are compatible in the world market for interchangeability. (NEMA dimensions also readily available.)
- Quiet, low vibration designs by using feet on bracket construction with precision balance.

Selling Tips

- Opportunities may exist with OEMs who either make their own control or buy drives and are sourcing motors separately.
- Many machine tools today incorporate motors that are from Europe or Japan. The RPM AC spindle motor family makes retrofit a possibility with a Reliance Electric motor made in the U.S.A.
- To solve especially tough applications, low inertia, RPM AC motors are available.
- Consider these high-performance motors for other fast response applications that may presently be using “Brushless Servo” motors.
- RPM AC motors may offer a cost-effective solutions for some applications using the simpler, lower cost capability of induction motors with vector controllers instead of brushless technology.

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