DC MOTORS
BUYING GUIDE

WHAT DO THEY DO?

DC motors convert electrical energy from a direct current source into mechanical motion. They provide precise speed control, excellent torque, and reliable operation in industrial automation environments.

Topics

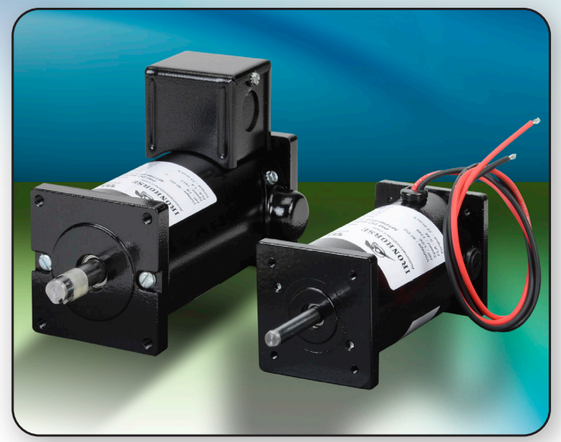
» What Do They Do?
» DC vs AC Motors
» How to Choose
» Product Lineup

Core Features

- **Electromagnetic Conversion**: Uses a magnetic field and armature current to produce rotational force with predictable performance.
- **Variable Speed**: DC motors can be controlled over a wide speed range, with excellent accuracy, by varying input power characteristics. DC motors have a consistent voltage/speed linear relationship.
- **High Torque**: Delivers strong starting and running torque suitable for heavy-load applications.
- **Directional Control**: Can easily reverse rotation by altering the polarity of the armature voltage or the direction of current in separately excited field motors.
- **Consistent Output**: Since DC motors have a linear current/torque relationship, they maintain steady performance under varying load conditions due to regulated current flow.
- **Compact Design**: Offers high power density in a small footprint.
- **Smooth Operation**: Provides low vibration and reduced mechanical noise for sensitive equipment.
- **Quick Response**: Reacts rapidly to control inputs, making DC motors ideal for speed control.
- **Simple Control**: Motor control can be achieved through several methods, without the need for a drive, since DC motor speed and torque are controlled by varying electrical power supply characteristics.
- **Energy Efficiency**: Converts most of the electrical power into mechanical work with minimal heat loss.
- **Durable Construction**: Built to withstand continuous operation in demanding production settings.
- **Maintenance Accessibility**: Designed for easy and regular preventive maintenance and part replacement, with simple mechanical construction.

HOW TO CHOOSE

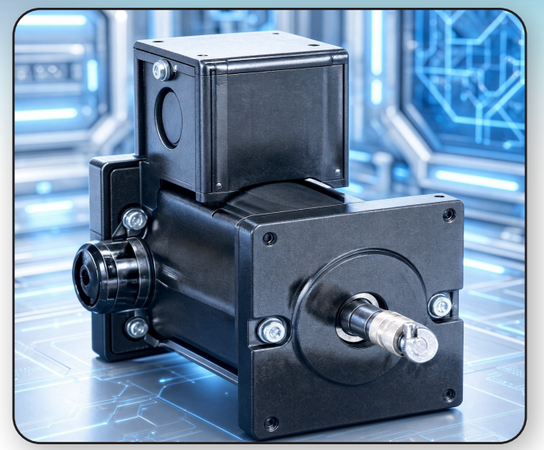
Selecting the right DC motor for industrial automation requires matching performance specifications to application demands, while balancing efficiency, longevity, and cost. Knowing key factors ensures optimal operation and minimal downtime.



1. Power Requirements: Determine voltage and current needs based on load demands; ensure the motor can supply consistent torque under working conditions.
2. Torque Output: Match motor torque capability to starting, running, and peak load requirements for reliable performance.
3. Speed Range: Identify required operating speeds; select motors with adjustable or controlled speeds to match process needs.
4. Duty Cycle: Consider how often the motor runs; intermittent versus continuous operation affects sizing and thermal limits.
5. Efficiency Rating: Choose motors with high efficiency to reduce energy costs and heat generation.
6. Environmental Conditions: Account for temperature, altitude, humidity, or contaminants that may impact motor materials or sealing.
7. Mounting Considerations: Verify that physical dimensions fit the standard mounting style.
8. Control Method: Ensure compatibility with desired control system, such as PWM, SCR, or DC motor contactors.
9. Starting Method: Select motors with suitable start characteristics for the mechanical load and electrical supply.
10. Load Type: Identify whether the load is dynamic, constant, or variable to guide motor sizing and selection.
11. Bearing Type: Choose bearing designs appropriate for load direction, vibration levels, and expected lifespan.
12. Maintenance Needs: Evaluate ease of servicing and replacement parts availability to minimize downtime.
13. Regulatory Compliance: Confirm the motor meets relevant safety and performance standards for your industry.
14. Noise Level: Consider acceptable operational noise for the application environment, especially for indoor or operator-proximate setups.
15. Cost Factors: Balance initial purchase price with operational and maintenance expenses over the motor's lifetime.
16. Availability: Opt for models with steady supply and vendor support to ensure rapid replacement if needed.

DC VS AC MOTORS

DC motors and AC motors each offer unique performance characteristics, making them suitable for different industrial automation applications. Understanding key differences helps ensure optimal selection for efficiency, control, and cost-effectiveness.



1. Speed Control: DC motors provide precise, wide-range speed control through voltage variation; AC motors often require variable frequency drives.
2. Startup Torque: DC motors deliver high starting torque, ideal for heavy loads; AC motors may need sophisticated VFD control for similar performance.
3. Maintenance: Brushed DC motors require regular preventive electrical maintenance concerning the brushes and commutators, in addition to regular mechanical maintenance (lubrication, cleaning, etc.). AC motors generally only require mechanical maintenance.
4. Cost: DC motors are usually more expensive than comparable AC motors due to construction and control requirements.
5. Efficiency: DC motors can be efficient at varied loads; AC motors are often more efficient at constant speed/load applications.
6. Durability: AC motors tend to last longer in harsh environments due to fewer wear components.
7. Control Complexity: DC motors maintain constant torque under base speed, making them simpler to control. AC motors usually require variable frequency drives to achieve the same level of control.
8. Size and Weight: DC motors are typically larger for equivalent output; an equivalent AC motor may have a smaller form factor.
9. Applications: DC motors excel in low-speed constant torque applications, such as conveyors, hoists, and textile manufacturing; AC motors perform well in variable torque applications, such as pumps, fans, and compressors.
10. Response Time: DC motors can respond rapidly to load or speed changes; AC motors may have slight delays due to drive processing.
11. Noise: DC motors may generate more electrical noise; AC motors produce less interference in many setups.
12. Reliability Under Intermittent Use: DC motors excel in cyclical tasks; AC motors fare better in continuous duty.
13. Energy Use: DC motors may consume more power compared to an equivalent horsepower AC motor due to losses from brush-to-commutator friction and resistance.
14. Parts Availability: DC motor spare brushes may be less common; three-phase AC motor spare parts are typically limited to bearings, which are widely available.
15. Cost of Operation: DC motors can incur higher long-term costs from maintenance; AC motors benefit from lower upkeep.

IRONHORSE®

GENERAL PURPOSE DC MOTORS

Series Name	Best For	Key Attributes	Primary Benefit
IronHorse MTPM Permanent Magnet DC Motors (1/4hp and under)	OEM equipment, light-duty conveyors, positioning systems, and space-constrained applications	Compact footprint, multiple DC voltage options, adjustable-speed operation, versatile mounting, reversible design, externally replaceable brushes	Delivers economical variable-speed performance in a compact package.

IRONHORSE MTPM PERMANENT MAGNET DC MOTORS (1/4HP AND UNDER)

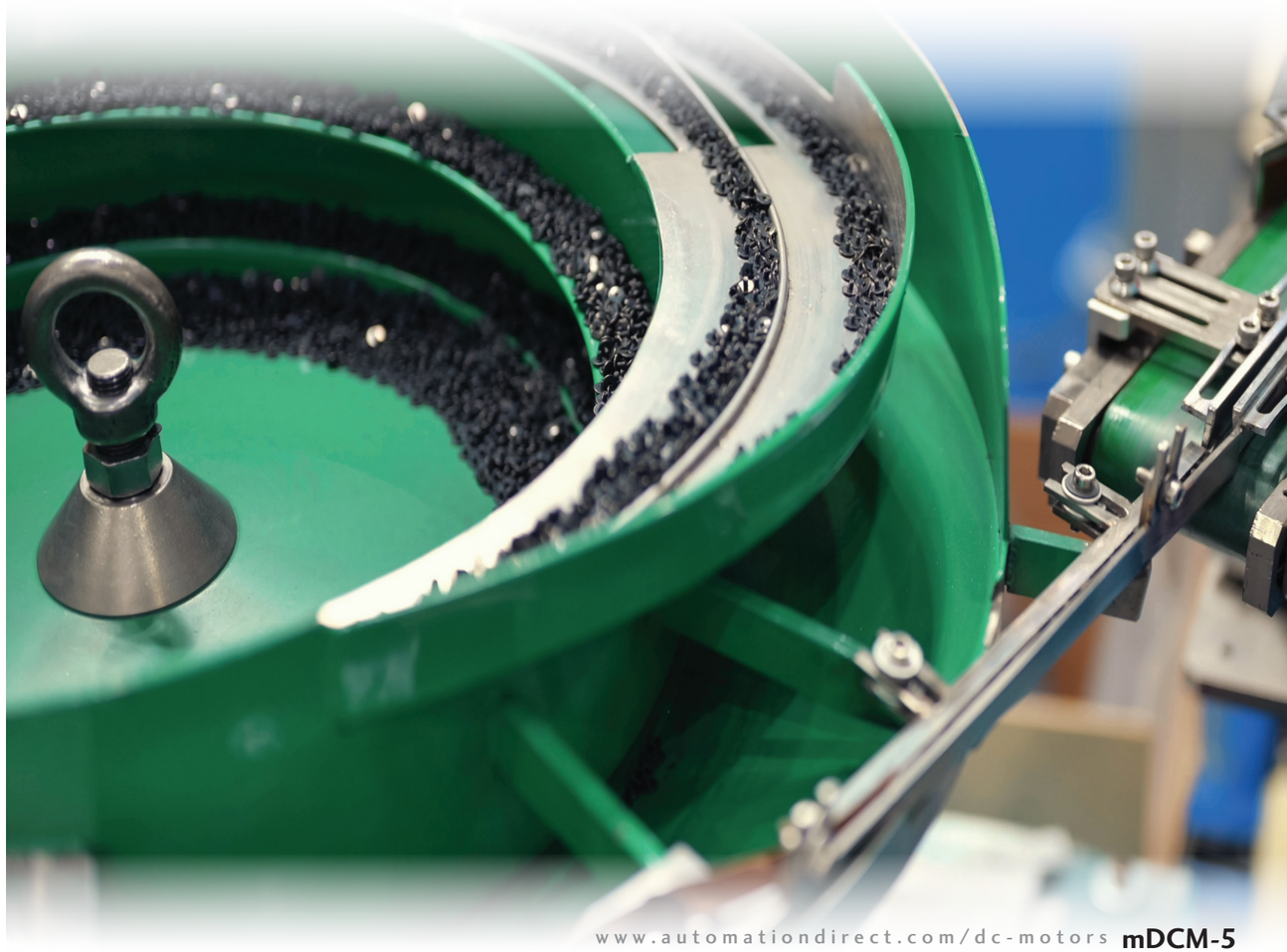
STARTING AT $155.00 (MTPM-P10-1JK43)

IronHorse MTPM permanent-magnet DC motors in the small-frame series address compact motion-control applications such as conveyors, feeders, turntables, and OEM equipment requiring SCR-drive compatibility. Power ratings from 1/31 to 1/4hp, support for several DC voltage classes, and compact TENV construction allow these motors to fit machine designs where installation space, speed control, and maintenance access are important considerations.

- Horsepower ratings from 1/31 to 1/4hp support matching motor output to light-duty conveying, positioning, and material-handling tasks
- Voltage ratings of 12, 24, 90, and 180 VDC simplify selection based on available power and drive requirements
- Full-load speeds reach 2,440 rpm with torque ratings up to 113 oz-in for applications requiring higher speed or increased starting load capacity
- SCR-drive compatibility and electrically reversible operation support controlled speed adjustment and bidirectional machine movement
- TENV construction, Class F insulation, double-shielded ball bearings, and externally replaceable brushes contribute to long-term serviceability

This buying guide was drafted with AI assistance and edited by the AutomationDirect Technical Marketing Team

DC MOTOR ACCESSORIES

Accessories and replacement parts for DC motors include adjustable mounting bases and DC motor brushes. All DC motors are shipped with brushes installed, and select models also ship with an extra set of brushes.

DC Motor Brushes
Brushes commutate the incoming current in a DC electric motor. When changing motor brushes, always change them as a set.