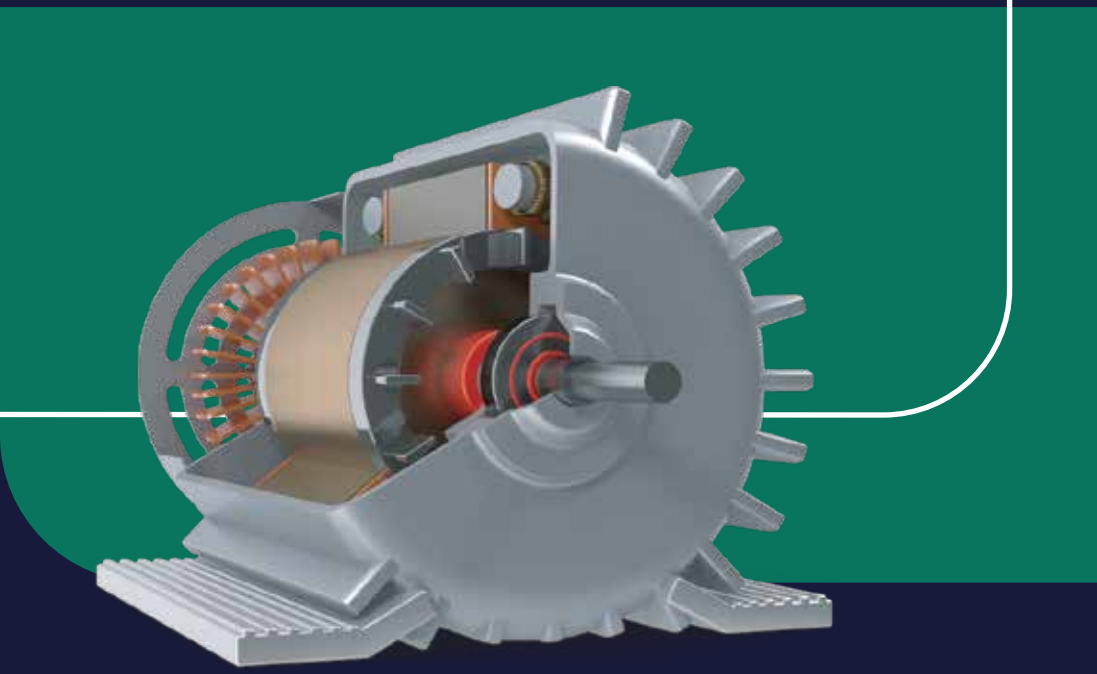
Ministry of Energy
and Public Utilities

Energy
Efficiency
Management
Office

ELECTRIC MOTORS
The Hidden Energy Guzzlers

Save Energy, Save Money!



SILENT CONSUMERS.
MASSIVE IMPACT.

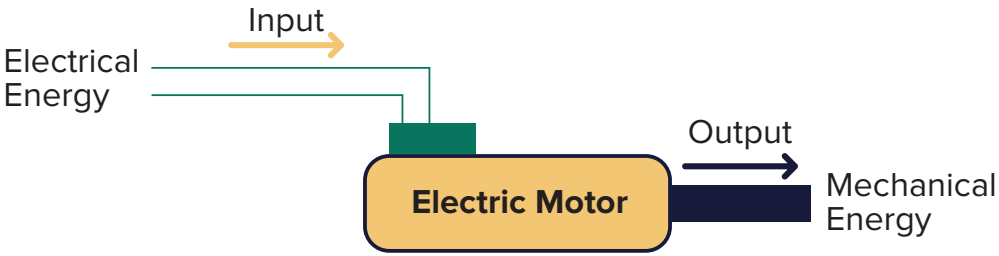
Did you know?

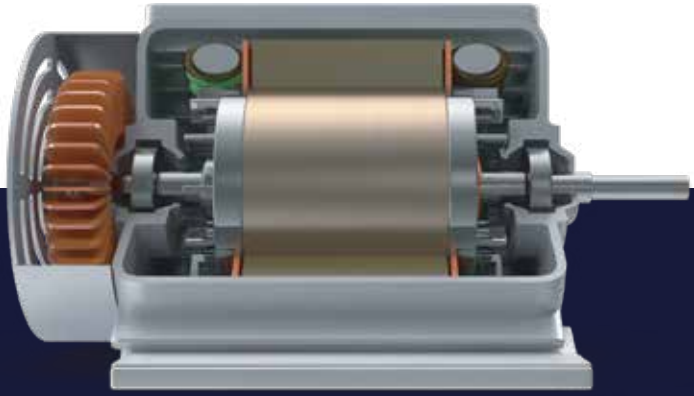
Electric motors are responsible for a substantial share of global energy consumption, accounting for more than 45% of worldwide electricity use.

UNDERSTANDING THE ENERGY GUZZLERS

How Electric Motors Work?

An electric motor transforms **electrical energy into mechanical motion** - powering pumps, fans, compressors, conveyors, and more. But **inefficient motors drain electricity,** leading to unnecessary energy waste.





TYPES OF MOTORS USED IN THE MSME SECTOR AND BY LARGE ENERGY CONSUMERS

Electric motors used in industries can be grouped into 2 main types:

- AC Motors (Alternating Current)
- DC Motors (Direct Current)

For AC motors, the IEC 60034-30-1 standard sets clear guidelines for energy efficiency. It classifies motors into four efficiency levels: IE1, IE2, IE3, and IE4, helping businesses choose motors that use less energy and perform better. This standard applies to motors with power ratings from 120 W to 1000 kW.

Common AC Motors

1) Synchronous Motors

- Run at a constant speed determined by the supply frequency and the number of poles in the motor.
- More energy-efficient but expensive.

Synchronous Speed Formula:

$$N_s = \frac{120 \times f}{P}$$

Where:

- N_s is the synchronous speed in revolutions per minute (RPM)
- f is the supply frequency in hertz (Hz)
- P is the number of poles in the motor

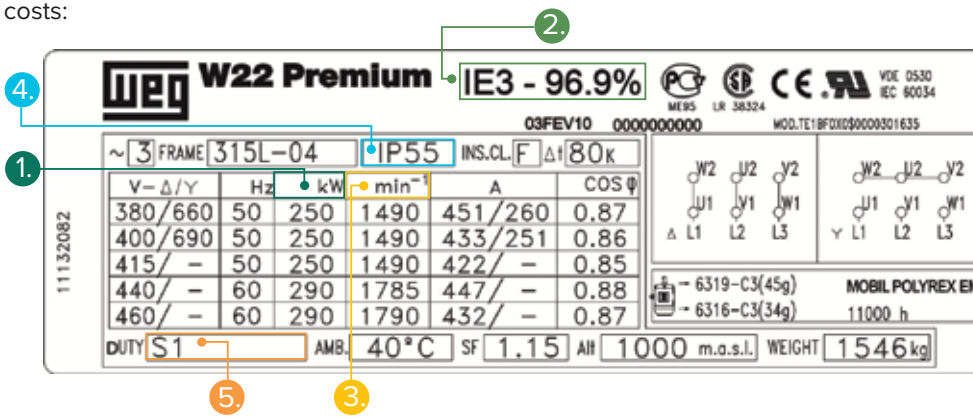
2) Induction Motors

- The most common type.
- Simple, reliable and cost-effective.
- Run at a slightly slower speed than the stator's magnetic field. This difference in speed is called slip and it depends on the load.

CRACKING THE MOTOR DATA PLATE

What You Need to Know?

A motor's **data plate** holds key technical details that impact its efficiency and operating costs:



1. Power (kW or hp): Indicates the rated output power of the motor.
2. Efficiency (IE Class): Higher classes (IE3 & IE4) mean less energy waste.
3. Speed (RPM): Indicates the speed at which the motor shaft rotates when operating at its rated load.
4. IP Rating: Indicates the level of protection against dust and water ingress.
5. Duty Cycle: Indicates how long a motor can run at its rated load.

Contribution of motors in industries

In the Manufacturing Industry, motors account for:

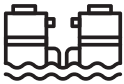
- Approximately 30% of energy use in the Textile Sector.
- Approximately 40% of energy use in the Chemical & Pharmaceutical Sector.
- Approximately 30% of energy use in the Food and Beverage Sector.
- Approximately 70% of energy use in Water and Wastewater Treatment Plants.

Inefficient motors =

Higher Energy Bills + Increased Carbon Footprint

MOTORS IN ACTION

Where Are They Used?



Water & Wastewater Treatment

- Water Treatment: Pumps circulate and filter water through treatment processes such as filtration, disinfection and chemical dosing.
- Wastewater Treatment: Aeration systems and mixers help in biological treatment processes, ensuring effective oxygen transfer and homogenisation of wastewater for better treatment efficiency.

Agriculture & Irrigation

- Irrigation Pumps: Essential for water distribution.
- Cooling and Ventilation Systems: Keep greenhouses and poultry farms at optimum temperature.
- Feed Mills: Grinding and processing animal feed.

Food & Beverage Sector

- Packaging Lines: Motors drive conveyors & sealing systems.
- Blenders & Mixers: Ensure consistency in food production.
- Pneumatic Conveyors and Pumps: Transport of stock/liquids.

Chemical & Pharmaceutical Industry

- Mixers & Agitators: Enable precise drug formulations.
- HVAC Systems: Control temperature-sensitive production.
- Packaging & Sealing Machines: Ensure sterile conditions.

Textile Industry

- Weaving & Knitting Machines: Power fabric production.
- Dyeing & Finishing Equipment: Improve textile quality.
- Cutting & Pressing Machines: Shape final garments.

Take Action Today!

AUDIT YOUR MOTORS
Identify energy guzzlers!

UPGRADE TO ENERGY-EFFICIENT MODELS
Cut electricity costs!

EMBRACE SMART TECHNOLOGY
Future-proof your business!

SMALL IMPROVEMENTS IN MOTOR EFFICIENCY
Big energy savings, Greener Future!

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