ELTA

AC vs EC

Information Centre

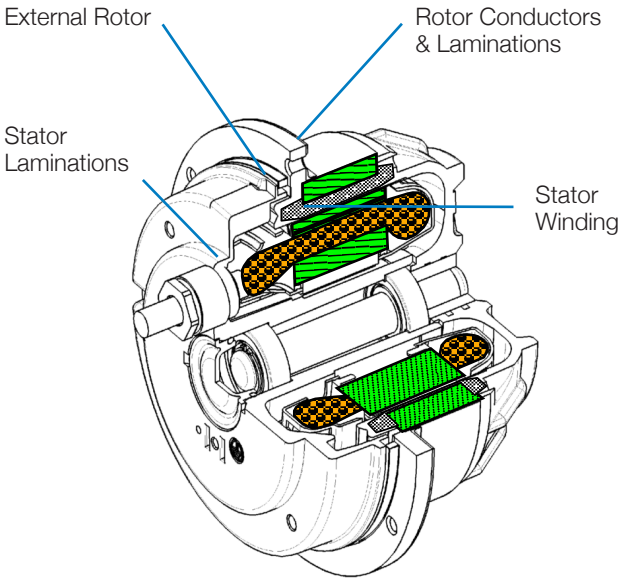
AC vs EC

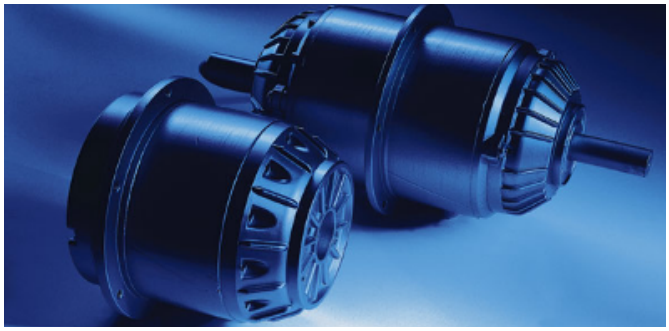
The Facts

AC

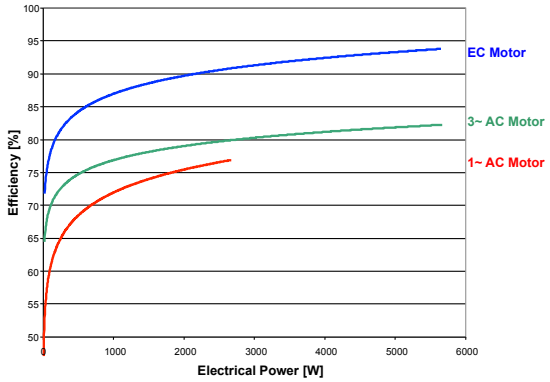
External Rotor AC Motor

AC Motor Mechanical Configuration





Comparative Motor Efficiencies



Main Component Orientation

Motor rotor positioned outside the stator.

Fan Application

Fan impeller either integral with the rotor, or bolted to the rotor. Very compact design, when compared with internal rotor motor.

AC Motor Losses

Stator copper losses – Current flowing through stator windings creates heat.
Rotor copper losses – Current flowing through rotor conductors creates heat
Rotor slip losses – Increasing slip increases the current flowing through rotor conductors, creating more heat, especially at reduced speed.
Iron core losses – Hysteresis and eddy currents in the stator and rotor laminations, creating heat
Electronic losses – N/A
Other losses – Bearing friction, windage

AC or EC driven fans?

- Relatively low capital expenditure
- Some electrical power is required to 'induce' magnetic fields in rotor laminations and induce current flow in rotor conductors- (lowered efficiency)
- Additional items required for speed control-additional cost for speed control
- Relatively high losses (slip, core), compared with EC motors, especially at reduced speed - (lowered efficiency at reduced speed)
- Relatively high running costs and so relatively high 'life-time costs'.

Summary

- Relatively low capital expenditure
- Lower efficiency than equivalent EC fan, especially at reduced speeds
- Additional items required for speed control
- Relatively high running costs compared with equivalent EC fan, and so higher 'life-time costs'

Source: Ziehl-Abegg

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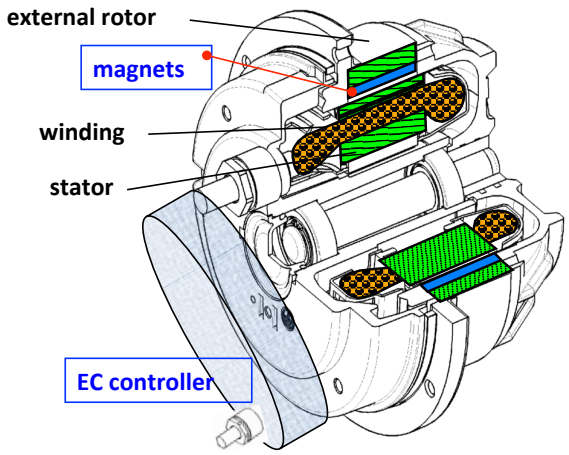
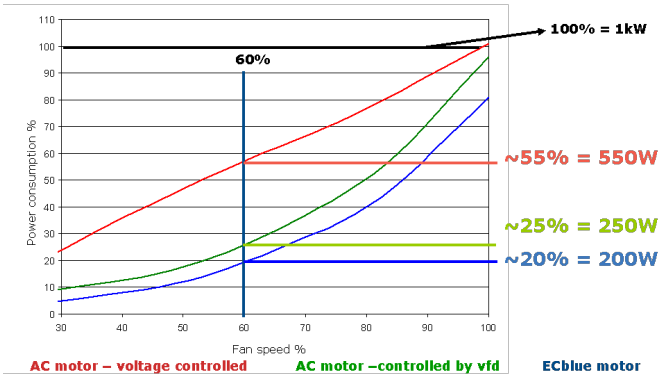
External Rotor EC Motor

EC Motor Mechanical Configuration



EC Fans vs AC Fans



Main Component Orientation

Motor rotor positioned outside the stator.

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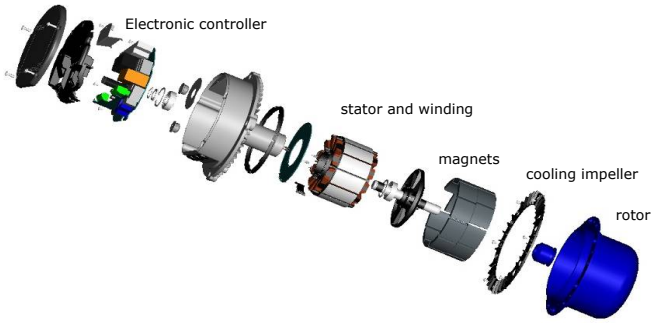

EC Motor Losses

Stator copper losses – Current flowing through stator windings creates heat
Rotor copper losses – None
Rotor slip losses – None
Iron core losses – Hysteresis and eddy currents in the stator and rotor laminations, creating heat
Electronic losses – Low level losses from using electricity to drive electronics
Other losses – Bearing friction, windage

AC or EC driven fans?

- Relatively high capital expenditure, but reducing
- Using permanent magnets means none of the electricity applied tto the stator is required to induce magnetic fields in the rotor- (higher efficiency)
- Speed control built into the electronic commutation electronics
- Relatively low losses compared with equivalent AC motors, especially at reduced speed.
- Higher efficiency than equivalent AC motor, especially at reduced speed, so lower running costs and ‘life-time costs’.

Summary

- Relatively high capital expenditure, but reducing
- Higher efficiency than equivalent AC fan, especially at reduced speeds
- Speed control built into the electronic commutation electronics
- Higher efficiency than equivalent AC fan, especially at reduced speeds, so lower running costs and ‘life-time costs’

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