

Common Questions and Answers About Step Motors

- Why do step motors run hot?*
Two reasons: 1. Full current flows through the motor windings at standstill. 2. PWM drive designs tend to make the motor run hotter. Motor construction, such as lamination material and riveted rotors, will also affect heating.
- What are safe operating temperatures?*
The motors have class B insulation, which is rated at 130°C. Motor case temperatures of 90°C will not cause thermal breakdowns. Motors should be mounted where operators cannot come into contact with the motor case.
- What can be done to reduce motor heating?*
Many drives feature a "reduce current at standstill" command or jumper. This reduces current when the motor is at rest without positional loss.
- What does the absolute accuracy specification mean?*
This refers to inaccuracies, non-cumulative, encountered in machining the motor.
- How can the repeatability specification be better than that of accuracy?*
Repeatability indicates how precisely a previous position can be re-obtained. There are no inaccuracies in the system that affect a given position, returning to that position, the same inaccuracy is encountered.
- Will motor accuracy increase proportionately with the resolution?*
No. The basic absolute accuracy and hysteresis of the motor remain unchanged.
- Can I use a small motor on a large load if the torque requirement is low?*
Yes, however, if the load inertia is more than ten times the rotor inertia, cogging and extended ringing at the end of the move will be experienced.
- How can end of move "ringing" be reduced?*
Friction in the system will help damp this oscillation. Acceleration/deceleration rates could be increased. If start/stop velocities are used, lowering or eliminating them will help.
- Why does the motor stall during no load testing?*
The motor needs inertia roughly equal to its own inertia to accelerate properly. Any resonances developed in the motor are at their worst in a no-load condition.
- Why is motor sizing important, why not just go with a larger motor?*
If the motor's rotor inertia is the majority of the load, any resonances may become more pronounced. Also, productivity would suffer as excessive time would be required to accelerate the larger rotor inertia. Smaller may be better.
- What are the options for eliminating resonance?*
This would most likely happen with full step systems. Adding inertia would lower the resonant frequency. Friction would tend to dampen the modulation. Start/stop velocities higher than the resonant point could be used. Changing to half step operation would greatly help. Ministepping and microstepping also greatly minimize any resonant vibrations. Viscous inertial dampers may also help.
- Why does the motor jump at times when it's turned on?*
This is due to the rotor having 200 natural detent positions. Movement can then be $\pm 3.6^\circ$ in either direction.
- Do the rotor and stator teeth actually mesh?*
No. While some designs used this type of harmonic drive, in this case, an air gap is very carefully maintained between the rotor and the stator.
- Does the motor itself change if a microstepping drive is used?*
The motor is still the standard 1.8° stepper. Microstepping is accomplished by proportioning currents in the drive (higher resolutions result). Ensure the motor's inductance is compatible.
- A move is made in one direction, and then the motor is commanded to move the same distance but in the opposite direction. The move ends up short, why?*
Two factors could be influencing the results. First, the motor does have magnetic hysteresis that is seen on direction changes. This is in the area of 0.03°. Second, any mechanical backlash in the system to which the motor is coupled could also cause loss of motion.
- Why are some motors constructed as eight-lead motors?*
This allows greater flexibility. The motor can be run as a six-lead motor with unipolar drives. With bipolar drives, the windings can then be connected in either series or parallel.
- What advantage do series or parallel connection windings give?*
With the windings connected in series, low-speed torques are maximized. But this also gives the most inductance so performance at higher speeds is lower than if the windings were connected in parallel.
- Can a flat be machined on the motor shaft?*
Yes, but care must be taken to not damage the bearings. The motor must not be disassembled. Compumotor does not warranty the user's work.
- How long can the motor leads be?*
For bipolar drives, 100 feet. For unipolar designs, 50 feet. Shielded, twisted pair cables are required.
- Can specialty motors, explosion-proof, radiation-proof, high-temperature, low-temperature, vacuum-rated, or waterproof, be provided?*
Compumotor is willing to quote on most requirements with the exception of explosion proof.
- What are the options if an explosion-proof motor is needed?*
Installing the motor in a purged box should be investigated.