

FAQ: Why does my stepper motor run erratically?

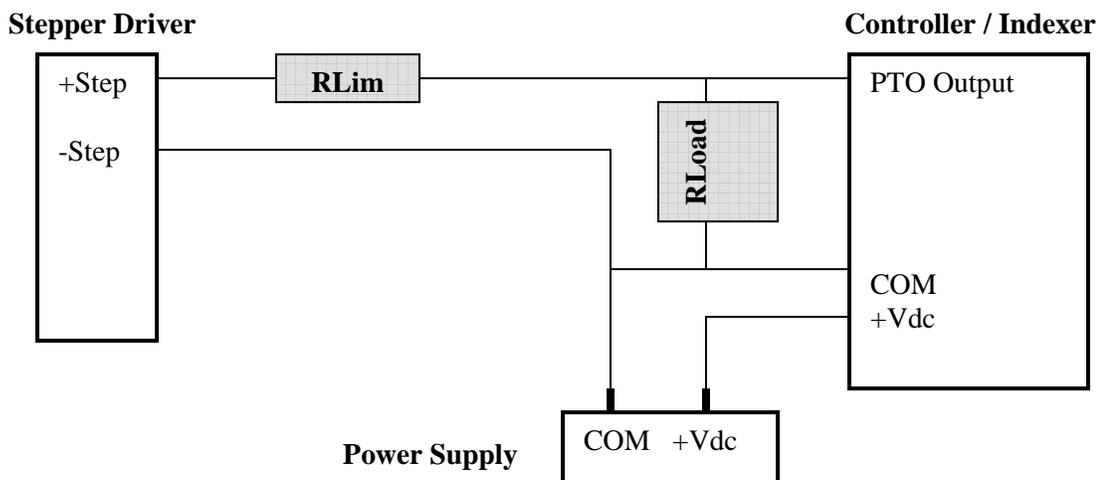
There are several possible causes. The most common of which are shown below.

1. The motor is not correctly coupled to the load.
2. The deceleration rate is too high and the inertia of load is carrying the motor past the point where it is supposed to stop.
3. You are performing a slow move (less than 1 rev/sec) while using a driver set to Full (200 steps/rev) or Half Step (400 steps/rev). To correct this problem, try increasing the indexer's starting speed parameter. However, do not increase the starting speed past your slowest running speed.
4. The driver's current setting is too low and the motor is unable to move the load.
5. The motor is not correctly wired. Most motors can be wired in two ways, either in series or in parallel. Series connections give you more torque at lower speeds and parallel connections give you more torque at higher speeds.

The sixth and seventh causes are only possible if you are using a single ended PTO (Pulse Train Output) to send steps from your controller to the driver.

6. The relationship between the fast switching opto-coupler inputs of the Stepper Driver and the slow turn off time of your controller / indexer's output transistors is the first of the two reasons that your stepper system runs erratically when being controlled by a PTO output. Because the stepper driver inputs do not provide much of a load, your controller's PTO output may take a long time to turn off. During this turn off time the stepper driver may not interpret the input step signals correctly, causing the motor to run erratically.

The solution to this problem is to simply provide an additional load resistor, **RLoad**, in the form of a **470Ω or 560Ω resistor**, which will cause the controller's output to very quickly drop to zero when the output turns off. You can use a 1W resistor if your PTO output is being powered by a 5V to 12Vdc supply. A 2W resistor will be necessary if your PTO output is powered by a 24Vdc supply that is normally on.



The value of current limiting resistor R_{Lim} shown in the above diagram will vary with the Power Supply used to power the PTO output. The following table shows the possible values of this R_{Lim} resistor.

Vdc	R _{Lim}
5V	None
12V	2.0kΩ
15V	2.0kΩ
24V	3.9kΩ



It will not be necessary to use resistor R_{Lim} if your stepper driver has a universal input with an operating range of 5 to 24Vdc.

The driver's user's manual will indicate if your driver has a 5V only or universal input.

7. The power supply used to power the PTO output is the second of the two reasons that your stepper system runs erratically when being controlled by a PTO output. There are two possible causes.

First, the power supply is not well filtered, which may be the case with some generic low cost power supplies.

Second, the power supply is also powering inductive loads, such as relays, solenoids, or contactors.

In both cases, the electrical noise on the power supply is being passed through the PTO output to the stepper driver input. This noise is interpreted by the driver as steps pulses, which will cause the motor to run erratically.

If the problem is with a supply that is not well filtered, you can either replace the supply or add additional filter caps to the system.

If the problem is inductive loads, add surge suppression devices at the input coils of your inductive loads. A dedicated power supply that is only supplying power to the PTO output will also solve the problem of inductive loads.

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