
# MD-202 2-phase hybrid stepper motor’s subdivision driver User's Guide

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**NOTES:**

**Product Version : Ver 1.0**

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# Chapter1. Overview

MD-202 driver is a cost-effective unit designed to drive 2-phase hybrid stepper motor. It is featured with high frequency chopping and constant-current driving. It has strong anti-interference capability with state-of-the-art performance on high frequency and high starting frequency. The controlling signal and internal signal are separated photo-electrically. It also has the following characteristics: current selectable, simple infrastructure, stable operation, reliability and low noise.

It has long been accepted since its introduction into the market and has a wide application in fields like stage lighting, automation, instruments, POS machine, sculpture machine, receipt printer, industrial tag printer and semi-conductor diffuse kiln.

Characteristics of MD-202 driver

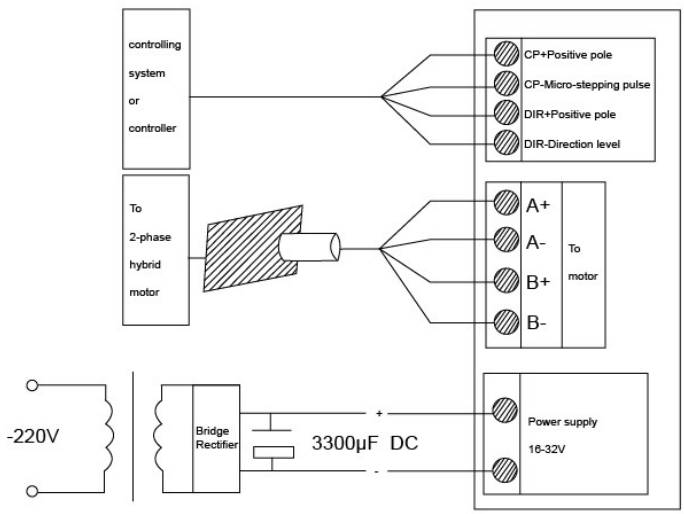
1.1 The maximum driving current of each phase is 2.0A.

1.2 Patented Non-over current technology

1.3 Phase-lock auto half-current

1.4 Subdivision options available (1/2, 1/4, 1/8), which correspond to micro-step angles of the following value (1.8° / 1 pulse, 0.9° / 1 pulse, 0.45° / 1 pulse, 0.225° /1 pulse).

Schematic of the driver's connection:




1.5All input signal has been processed by photo-electrical separation technology.

1.6Chopping frequency f=40KHz

1.7The phase current of the motor is sine wave

# Chapter2.Technical specifications

| Symbol | Name | Min | Typ | Max | Unit |
|---|---|---|---|---|---|
| Vss | input voltage | 16 | | 32 | V |
| Iss | input current | | | 2.0 | A |
| Iout | phase output current | 0.5 | | 2.0 | A |
| Iin | logic input current | 5 | 10 | 15 | mA |
| Tp | pulse continuance period | 5 | | | μs |
| Ts | Direction stabilization period | 0 | | | ms |
| Th | Direction holding period | 10 | | | μs |
| Td | ON/OFF time | 20 | | | μs |
| Fmax | Maximum running frequency | | | 50 | Khz |
| Famb | Ambient Temperature | 0 | | +50 | ℃ |
| Tstg | Storage Temperature | -40 | | +125 | ℃ |

2.1 Power supply: DC 16V—32V (input voltage); peak voltage shall not exceed 35v.
2.2 Compatible motors of the driver: 39BYG、42BYG、57BYG.
2.3 Driving current: The driver shall be adjusted in accordance with different motors used so that the output current can be matched with motors. If the motor can endure a load, the current can be adjusted to an amount of less than the rated current of motor, but it shall not exceed the rated current of motor.
2.4 Driving method: subdivision chop
2.5 Weight: 0.2 kg

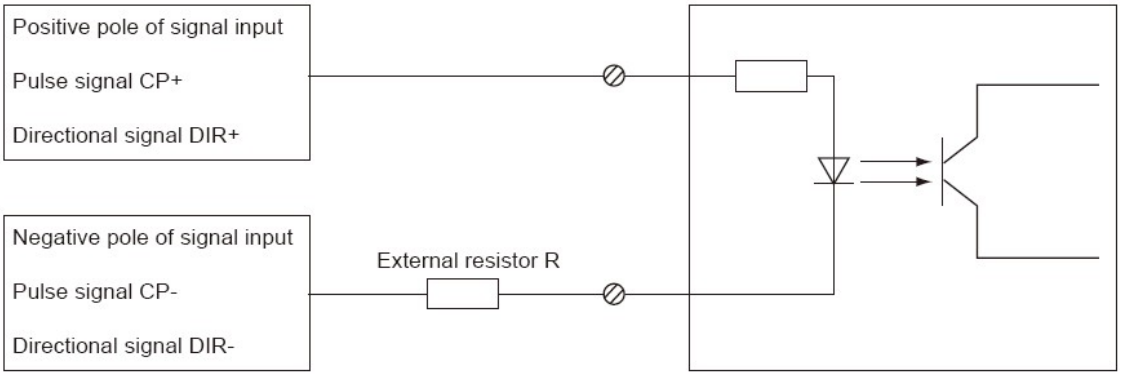
# Chapter3.Subdivision setting

This driver uses a DIP switch integrated on it to set the subdivision, users may set according to the indications on the panel. It is highly recommended to select comparatively higher subdivision within the range of controller's frequency. Users may refer to the following table for detailed setting method:

DIP switch setting:

| Switch Setting ON=0，OFF=1 | | | |
|---|---|---|---|
| Position1, 2 (Subdivision) | | Position3, 4 (Current) | |
| Position1, 2 | Subdivision | Position3, 4 | Current (A) |
| 00 | 1 | 00 | 0.5 |
| 01 | 2 | 01 | 1.0 |
| 10 | 4 | 10 | 1.5 |
| 11 | 8 | 11 | 2.0 |

# Chapter4.Controlling signal input connection diagram

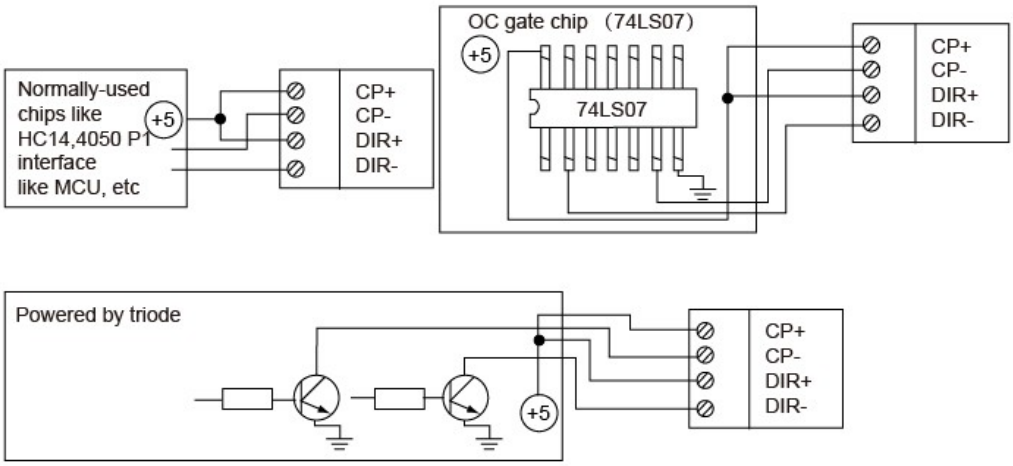



Note:
The input current of input loop is 5mA~20mA, normally, 15mA is used as input current.

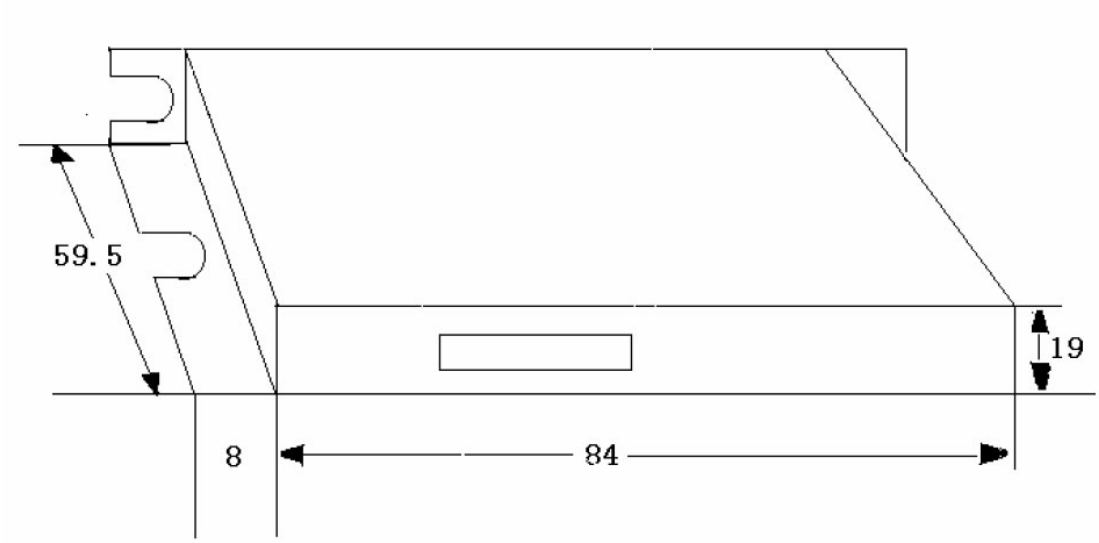
The resistance of the external resistors (R) on the pulse signal (CP-) and direction signal (DIR-) input loop is determined by the input voltage. If the voltage inputted exceeds 5v, please add an additional resistor R to limit the current with reference to table 1.

| Input Signal Voltage | Value Of External Resistor |
|---|---|
| DC 5V | External Resistor Is Excluded |
| DC 12V | 680 ohm |
| DC 24V | 1.8k |

Pulse signal parameters
Amplitude of pulse signal: "H" ----4.0~5.5V, "L" ----0~0.5V
Working status of pulse signal also duty ratio: 50% or below
Some of the users may put forward their questions, such as the inability of their controlling system in driving the driver, to which the answer is either inadequate driving current or incorrect polarity, the correct circuit which is normally used is given in fig 2 as shown below:



# Chapter5.External Dimensions: Please refer to fig 3 as shown below



# Chapter6.Wiring terminal specification

6.1 power supply wiring: +: positive pole of DC power supply (no greater than 32VDC)

-: GND of DC power supply (do not share common ground with input signal DIR-, CP-)

6.2 Motor wiring: A+, A- shall be connected to phase A, B+, B- shall be connected to phase B.

6.3 Controlling signal:

CP+, DIR+: the common positive terminal for inputting the controlling signal

DIR-: Input terminal for direction controlling signal (motor will rotate reversely if applied with low level)

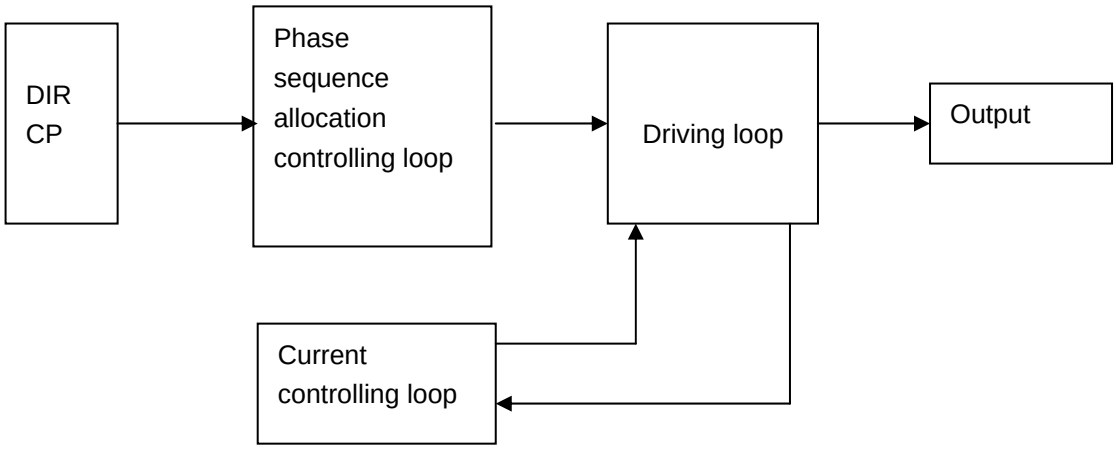
CP-: input terminal of pulse signal (make sure that CP is high level when CP stopped applying (which is also the moment when motor is locked), so that the internal photo coupler can be shut down.

Note:

The input current of controlling signal is 5mA~20mA, 15mA in normal use.

6.4 Indicator: the power indicator will be illuminated after powering up to indicate successful powering.

# Chapter7.Diagram of driving loop (Refer to fig 4 as shown below)



# Chapter8.Frequently asked questions

8.1 The rotation direction of stepping motor is inconsistent with that of my requirement, how to adjust?

One option is to change the direction signal of the controlling system, or you may change the wire connection of the motor to meet your requirement, the details are as follows:

For motors of 2-phase, 4-wire type, users will need to exchange the motor wire connection from one of the phases to the driver, for example: exchange A+ and A-.

8.2 How can I connect 4-phase 6-wire or 8-wire motor to a driver, which is requested to connect only 4 wires?

The 4-phase hybrid motor is synonymous with 2-phase hybrid. The winding lead-out wire of 4-phase motor provides many options for wire connection. For 2-phase 4-wire motor, you may connect directly with driver. For 4-phase 6-wire motor, please leave 2 wires in the middle unconnected while the rest of the 4 wires connected with driver. For 4-phase 8-wire motor, always connect each adjacent pair of wire in parallel first and connect to driver.

8.3 How can I calculate the micro-stepping angle of motor after subdivision?
For motors of 2-phase and 4-phase type, the micro-stepping angle after subdivision equals to the value after the subdivision is divided by the full micro-stepping angle. For example, if the subdivision is set to 2 0.9°/1.8°, the micro-stepping angle after subdivision would be 1.8°/2=0.9°: if the subdivision is set to 8 for 0.9°/1.8° motor, the micro-stepping angel would be 1.8/8=0.225°.

8.4 Why did the motor give off so huge noise and was found as powerless, was the motor itself vibrating too?

The reason for such phenomenon arises from the fact that the motor was working in oscillation area. To solve this issue, just change the frequency CP of input signal.

8.5 Why did the motor have difficulty in rotation at a little higher frequency but perform normal at comparatively lower speed?

The reason for most of the phenomena of this kind would be the fact that the power supply voltage applied on driver was not high enough; to solve this issue, just slightly increase the input voltage, but do not let this voltage exceed the maximum voltage marked on the power supply end of the driver, otherwise, the driver will be burnt out. For example, if the power supply voltage that applied previously was DC 24v, you may increase that voltage to 28v.

8.6 Why was the motor vibrating and cannot rotate after powering up?

First secure the connection between the winding of the motor and the driver for issue like that. If the connection is proved as correct, check again to see if the input frequency CP is too high. Users may refer to 8.7 “The speed increase and decrease of motor” to solve this issue.

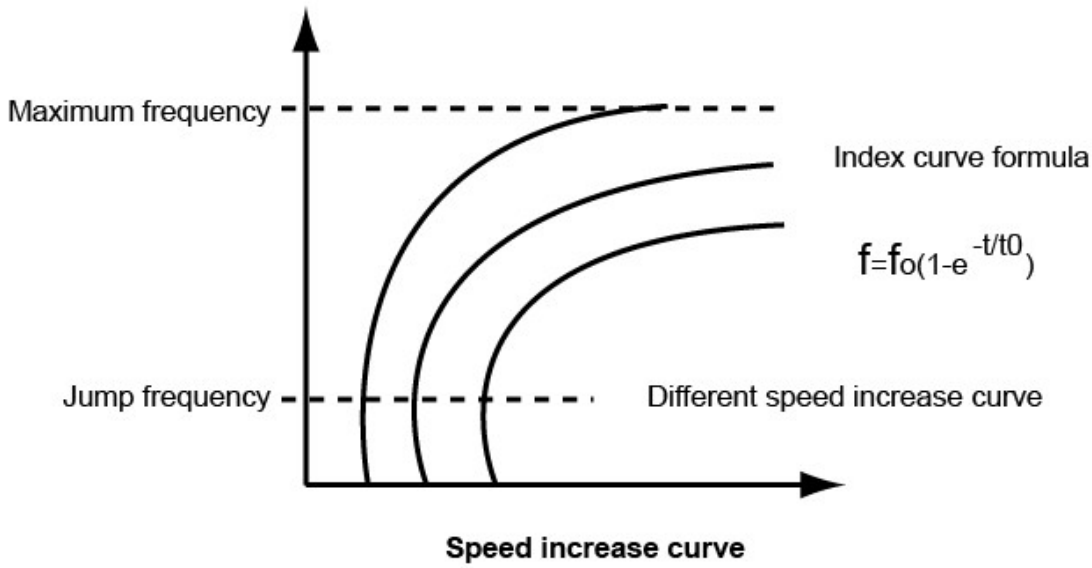
8.7 Introduction of “The speed increase and decrease of motor”

The speed control of stepper motor varies by different pulse signal inputted, theoretically, just feed pulse signal to the driver. The stepper motor rotates at a specific angle (or a micro-stepping angle after subdivision) for every pulse signal (CP) fed to the driver. But actually, stepper motor will be found as having difficulty in following up the variation of the electrical signal due to inertia if the changing pace of pulse signal CP is too fast. Normally, phenomena like having difficulty in rotation and pace-loss will occur, therefore, there must be a process of speeding up when stepper motor is starting up, likewise, there must be a process of slowing down. Normally, both speeding up and slowing down follow the same discipline and users may refer to the speeding up process given below:

The speeding up process consists of jump frequency and speeding-up curve (opposite for slowing down process). Jump frequency refers to the pulse starting frequency applied suddenly when stepper motor is in static. This frequency shall not be so huge, otherwise, motor will have difficulty in rotation and pace-loss will also occur. The speeding-up and slowing-down curve normally refers to index curve or index curve after alignment, which straight line or sine curve can also be adopted. Users may choose appropriate jump frequency and curve according to their own requirements. It’s not easy to select an ideal curve which requires more “attempts”. The index curve is troublesome in actual software programming, so normally, the time constant will be calculated in advance and stored in register which can be accessed directly during working.

The speeding-up and slowing-down design of stepper motor occupies large amounts of

the work on controlling software, its designing level will directly affect the stability, response time, noise, maximum speed, positioning accuracy when motor is running (100% accuracy is guaranteed for using our company's product under appropriate conditions). One exception is: when the running speed of stepper motor is less than the jump frequency, speeding-up and slowing-down issue will never exist.




**Speed increase curve**

# Chapter9.Sales principle

Our company provides assistance in solving problems that users encountered in using our products in the principle of "Clients first, reputation first" and it's an honor to discuss technical questions in application of system devices with our clients.

# Chapter10.Contact Us

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