HYBRID STEPPER MOTOR DRIVER

SD-2H044MA user manual

Overview

SD series stepper motor and driver is a combined Thai Electric Appliance Co., Ltd. Changzhou latest high-tech products. With the rapid development of electronic technology, electronic products, processes and performance continually updated and improved, this product is very large scale integrated circuit hardware with a high degree of anti-interference and fast response nature of a fundamental solution to the traditional step - Electric low-speed crawling, there is resonance area, noisy, high-speed torque is small, low frequency and the drive to start and poor reliability shortcomings. This product is suitable for driving phase current in 4.2A any of the following a low-pressure two-phase or four-phase stepper motors are widely used in CNC machine tools, textile machinery, knitting equipment, packaging machinery, medical equipment, electronic components manufacturing and a series of automatic control.

Features

Advanced bipolar constant-current chopper drive technology.

l High-speed torque output increased 40%, to avoid the lost-step (no-load start-up speed up to 300 ~ 420r/min) maximum speed of up to 3500 r / min.

l Flexible output current set, fit different types of motors, with automatic half-current function at the same time, reduce motor heating.

l The largest sub-set 128 to meet a variety of mechanical transmission and does not affect its output torque.

l input pulse mode is set and high-low setting, easy to use.

l protection Full: Enter the power supply overvoltage, undervoltage, output overcurrent, white short, drive high temperature alarm protection.

l Electric low-speed non-creeping phenomenon, noise, non-resonant region.

Performance

Electrical properties (ambient temperature Tj = 25 º C hours)

Input Power	24 ~ 50V DC power supply, capacity: not less than 200VA. Typical Value: DC36V
Output Current	1.13A ~ 4.25A, 8 stalls adjustable with a resolution of 0.41A.
Drive Mode	Bipolar constant-current PWM driver outputs.
Insulation resistance	Normal temperature and pressure> 500MΩ.

Dielectric strength	Normal temperature and pressure 500V / minute.
Weight	About 300 grams.

Environmental requirements

Cooling	Natural cooling.
Use	Avoid dust, oil fog and corrosive gases.
Temperature	0ºC～＋50ºC。
Humidity	<80% RH, non-condensing, non-frost.
Vibration	Maximum does not exceed5.7m/s$^{2。}$
Save	－20ºC～＋125ºC To avoid the dust, it is best to use the original packing box.

Function and Use

I Power Interface DC +, DC -

DC 24 ~ 50DC, usually a linear power supply (see Appendix: linear power supply schematic) power supply, the user should be noted that the filtered rectified power supply ripple voltage, not more than 50VDC, so as to avoid damage to the drive, linear power supply rated output current should be larger than the current drive to set 60%. When using switching power supply should be attention to the nominal rated output current, to choose a match with the motor phase current switching power supply. General, the higher the supply voltage, the motor torque output greater steps to avoid the phenomenon of high-speed lost, but also lead to increased low-speed vibration, as well as fever, should be used with the mechanical requirements of a reasonable adjustment under the on-site power supply voltage, we adopted the test concludes that the most ideal voltage range of between 30VDC ~ 40VDC.

Should pay special attention to input power wiring polarity, DC + for the power supply cathode; DC-for power, the wrong cable can cause damage to the drive!

In order to meet electromagnetic compatibility requirements drive is recommended to use the company-driven design of DC power supply.

I Set output current

The Driver Design 8 file output current choices and drive the encoding switch (SW1 SW2 SW3) setting, the current size to the maximum nominal. SD-2H044MA type drives available 4.25A maximum output current, the current setting resolution of 0.41A. Coding switch (SW1 SW2 SW3) for each combination of a state represents a current value of the output settings, reference the table below:

Current output setting table

SW1	SW2	SW3	Output Current	SW1	SW2	SW3	Output Current
ON	ON	ON	1.13A	ON	ON	OFF	2.86A
OFF	ON	ON	1.53A	OFF	ON	OFF	3.36A
ON	OFF	ON	1.93A	ON	OFF	OFF	3.79A
OFF	OFF	ON	2.41A	OFF	OFF	OFF	4.25A

Important

In setting this parameter will make sure that the drive is not the power or increase power but the motor is not running the state, this would avoid the current mutation of the drive power inverter segment generated shocks. Parameter setting complete please turn off the power to re-power after the new parameters will be effective. Non-standard operations may result in damage to the drive!

I Automatic Semi-current

Drive control pulse signal to stop imposing 0.1 seconds or so, will automatically enter the semi-current state, this time to run when the motor phase current 50% to reduce power consumption and protect the motor, a new control pulse received after the drive automatically flow out of the slightest state, this function is performed by the drive panel DIP switches (SW4) to set: OFF - Automatic Semi-stream and effective, ON - Automatic semi-flow is invalid. Semi-automatic current setting it is also imperative in the drive does not power up or power-up but the motor is not running, the set finished please turn off the power to re-power after the new parameters will be effective.

I Set the drive segment

Users can drive the panel by adjusting the DIP switch (SW5 SW6 SW7 SW8) the state to set up 15 kinds of sub-modes. The 15 kinds of sub-model, basically covering all users of motor step angle requirements. The setting parameters in the table below or drive enclosure silk screen panel diagram. It is equally imperative to set the number of segments in the drive does not power up or power-up, but when the motor is not running. Please turn off the power setting is completed, re-power after the new parameters will be effective.

Sub-set table

SW5	SW6	SW7	SW8	Pulses per revolution	Step Angle (^{0})	SW5	SW6	SW7	SW8	Pulses per revolution	Step Angle (^{0})
OFF	ON	ON	ON	400	0.900	OFF	OFF	ON	OFF	5000	0.072
ON	OFF	ON	ON	800	0.450	OFF	ON	OFF	ON	6400	0.05625
ON	ON	ON	OFF	1000	0.360	ON	ON	OFF	OFF	8000	0.045
OFF	OFF	ON	ON	1600	0.225	OFF	ON	OFF	OFF	10000	0.036
OFF	ON	ON	OFF	2000	0.180	ON	OFF	OFF	ON	12800	0.028125

ON	ON	OFF	ON	3200	0.1125	ON	OFF	OFF	OFF	20000	0.018
ON	OFF	ON	OFF	4000	0.090	OFF	OFF	OFF	OFF	25000	0.0144
						OFF	OFF	OFF	ON	25600	0.014063

I control pulse mode selection (J1, J2)

Users can drive by changing the internal circuit board jumper switch (J1, J2) to receive control of the state to set the pulse form. Switch jumper J1 is defined as: ON - Pulse plus direction mode; OFF - double-pulse mode. Jumper switch J2 is defined as: ON - pulse rising edge and effective; OFF - pulse falling edge and effective. The setting parameters in the table below.

Usual, there are four forms of control pulses as shown below: Pulse plus direction mode (PULS + DIR) is the logic, dual-pulse mode (CW + CCW) is the logic, pulse plus direction mode (PULS + DIR) negative logic, dual - pulse mode (CW + CCW) negative logic. Pulse plus direction mode, the drive pulse control pulses from the receiver port (PULS +, PULS-) input, which drives the direction of the port (DIR +, DIR-) high and low level of the decision of the motor rotation direction; double-pulse mode, the drive pulse port (PULS + , PULS-) is transferred to receive instruction pulse drives the direction of the port (DIR +, DIR-) to receive instructions reverse pulse. Whatever the form of a control pulse, drives the internal high-speed optocoupler is to accept it. Control impulses settings must be in the drive does not power up or power-up but the motor is not running, do not turn off the power to set the new parameters is completed to take effect.
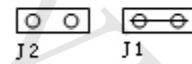
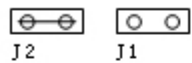J1=ON（闭合）；J2=ON（闭合）

PULS
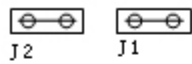
DIR

脉冲加方向模式正逻辑

J1=ON（闭合）；J2=OFF（断开）
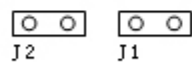
PULS

DIR

脉冲加方向模式负逻辑

J1=OFF（断开）；J2=ON（闭合）

CW

CCW

双脉冲模式正逻辑

J1=OFF（断开）；J2=ON（断开）

CW

CCW

双脉冲模式负逻辑

I protection

When the input power over-voltage, output over-current, and white short-circuit any alarm generated an alarm when the driver of the red status indicator panel will be lit at the same time enable the automatic cut off the motor, the motor is offline. To maximize the protection of drivers and motor safety.

Control Interface

I-pulse input interface PULS +, PULS -

Stepping Pulse Interface PULS: stepper motor driver control device to the upper pulse sent into stepper motor angular displacement, the drive pulse signal for each receive a PULS, to drive a stepper motor rotating a step angle, PULS frequency and stepper motor speed is proportional to. The signal reception as a standard differential receiver circuit, recommended command pulse output mode differential, there are also practical instruction open collector pulse output mode, in the standard wiring diagram, we will detail. For the best input requirements, this signal preferably 1:1 duty cycle, pulse

frequency of requests is not more than 500KHz; pulse width requirement is not less than 1μS, detailed requirements see below.
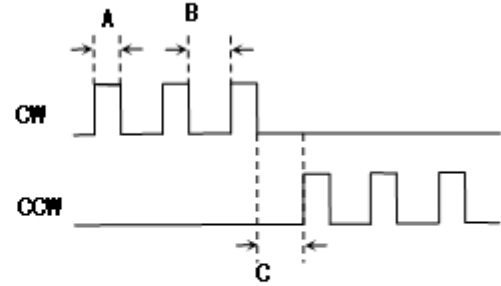
CCW
CW
A
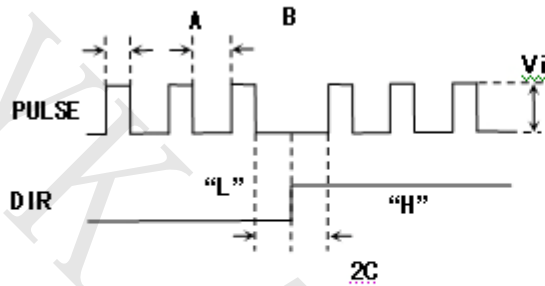
脉冲加方向模式 双脉冲模式

脉冲宽度A≥1μS；脉冲宽度B≥1μS；脉冲频率≤500KHz，占空比可任意

切换时间C≥2μS；输入信号电平Vi要求 3.6V≤高电平≤5.5V； -5.5V≤低电平≤0.3V

Pulse plus direction mode
Double pulse mode
Pulse width A ≥ 1μS; pulse width B ≥ 1μS; pulse frequency ≤ 500KHz, duty cycle can be arbitrary
A
B
Switching time C ≥ 2μS; input signal level Vi require 3.6V ≤ high ≤ 5.5V;-5.5V ≤ low ≤ 0.3V
2C
B
C
"H"
DIR
PULSE
"L"
Vi
I direction input DIR +, DIR -
Direction-level signal DIR: This decision signals the direction of motor rotation. For example, this signal is high when the motor is clockwise rotation, this signal is low compared to the opposite direction when the motor counter-clockwise rotation, such a change to the way we call pulse plus direction mode. In addition, there is a double-pulse drive mode: accept the two-way drive pulse signal (CW; CCW), when one way (eg, CW) has a pulse signal, motor forward run, when the other route (such as the CCW) has a pulse signal motor reverse run.

When using double-pulse drive mode, the pulse input interface PULS +, PULS-link pulse signal is being transferred CW, the direction input DIR +, DIR-link reversal pulse signal CCW. The signal receiving the same as a standard differential receiver circuit.

Important

If the drive input signal to voltage signal, required: 3.6V ≤ high ≤ 5.5V;-5.5V ≤ low ≤ 0.3V, the most commonly used for the TTL level. If the drive input signal to current signal requirements: 7mA ≤ high current ≤ 18mA;-18mA ≤ low current ≤ 0.2mA. Pulse frequency of requests is not more than 500KHz; pulse width requirement is not less than 1μS; pulse signal of the drive current requirements for 7-18mA.

I enable signal interface ENBL +, ENBL-:

Enable signal ENBL: drive up and down with the electric power to electric-pass operation will drive rapid aging, in order to avoid this situation. The drive is designed to enable the signal (ENBL) input ports, commonly known as the de-electromechanical-level signals (FREE). Users can always control this signal, when this signal is active, the drive will automatically cut off the motor winding currents, the motor is in a free (no power) state. When this signal is not connected by default to be invalid state, then through the motor winding current can function properly. The signal receiving circuits and pulse input interface circuit line, this signals an effective means for making the internal drive to receive optocoupler conduction.
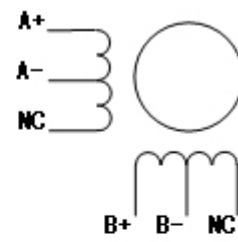
I Electric Power Output:

This product is suitable for driving current of 4.25A relative to the following four lines, six lines or eight lines of any one phase or two four-phase stepper motor. A total of five kinds of motor winding connection access method, see below:
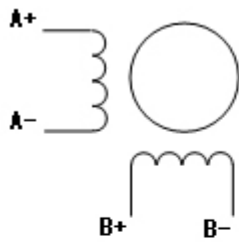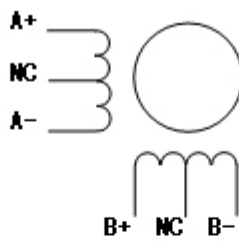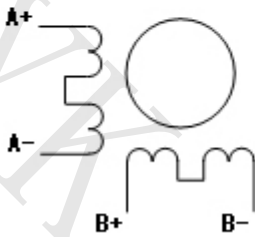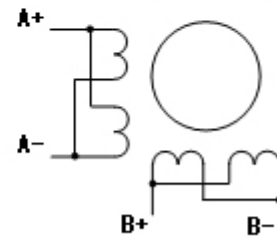
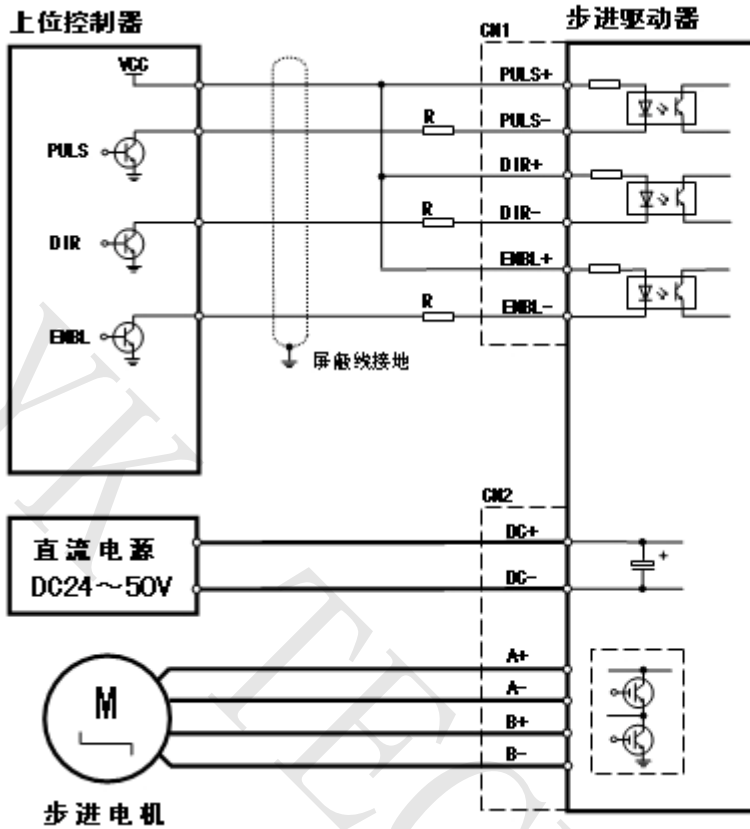普通4线电机   6线电机，高力矩输出。   6线电机，高速输出。

8线电机，串联接法，高力矩输出。   8线电机，并联接法，高速输出。

Based on the wiring diagram shown in five kinds of ways should be reasonable to set driver output current, in theory, the greater the current setting, the greater the motor torque output can be used to avoid the phenomenon of motor speed lost step, but it can also cause the motor temperature l. In general, high-speed output wiring its output current set in the motor phase current rating of 1.4 times; high torque output of the wiring of its rated output current set in the motor phase current 70%. Practical applications, should be set in the motor current long-term surface temperature does not exceed +80 ℃ range.

Standard wiring diagram
I NPN open-collector pulse control mode:

上位控制器　步进驱动器

CN1

VCC
PULS+
PULS－
PULS
DIR+
DIR－
DIR
ENBL+
ENBL－
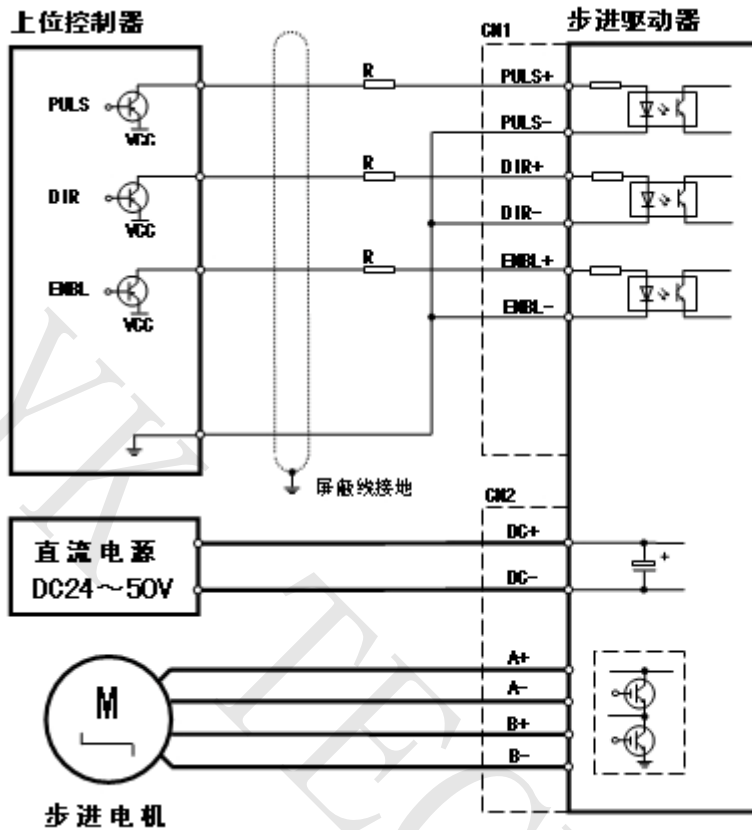ENBL

R

屏蔽线接地

CN2

直流电源 DC24～50V
DC+
DC－

M
A+
A－
B+
B－

步进电机

注意:
- 当 VCC 电源为+5V 时,无需串接电阻 R,即为 0Ω。
- 当 VCC 电源为+12V 时,电阻 R 应选 1KΩ/0.25W。
- 当 VCC 电源为+24V 时,电阻 R 应选 2KΩ/0.25W。
- 驱动器与上位控制器的连接电缆最好选择带屏蔽,屏蔽层连接标准地或上位控制器接地端。
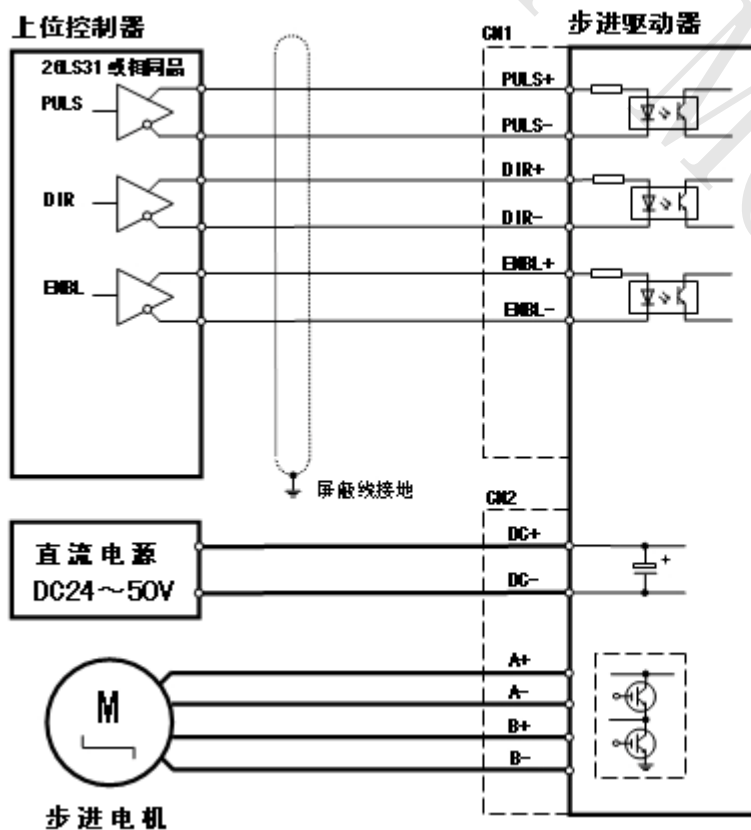- 根据驱动器输出电流设置选择电源线和电机动力线的直径,一般不要小于 1mm² 线径。

I PNP open-collector pulse control mode:

注意:

● 当 VCC 电源为 +5V 时, 无需串接电阻 R, 即为 0Ω。

● 当 VCC 电源为 +12V 时, 电阻 R 应选 1KΩ/0.25W。

● 当 VCC 电源为 +24V 时, 电阻 R 应选 2KΩ/0.25W。

● 驱动器与上位控制器的连接电缆最好选择带屏蔽,屏蔽层连接标准大地或上位控制器接地端。
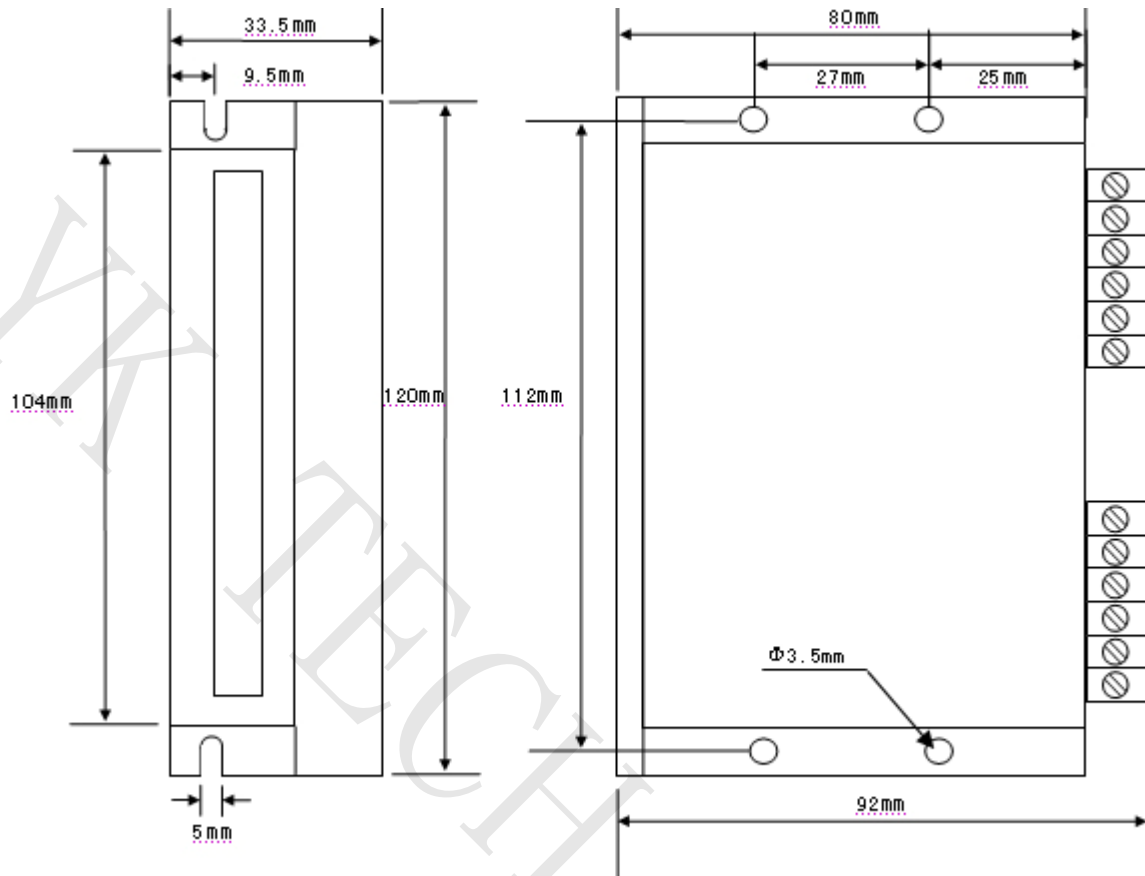
● 根据驱动器输出电流设置选择电源线和电机动力线的直径,一般不要小于 1mm² 线经。
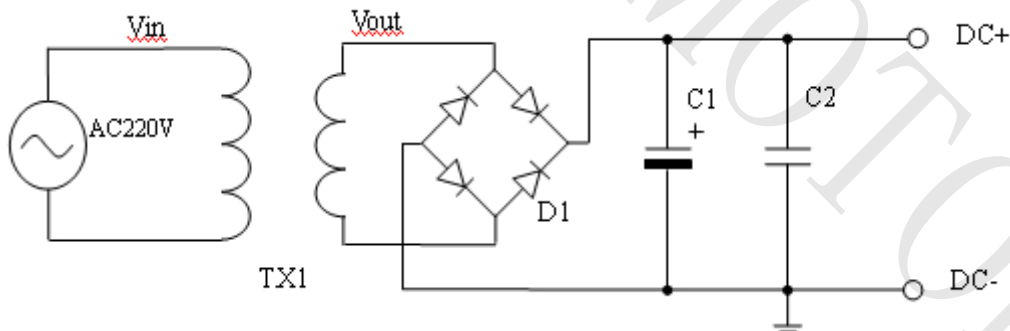
I Differential driving pulse control mode:

注意:

● 推荐采用此种脉冲输出方式。

● 差分驱动芯片推荐采用 26LS31 或同类品。

● 驱动器与上位控制器的连接电缆最好选择带屏蔽,屏蔽层连接标准大地或上位控制器接地端。

● 根据驱动器输出电流设置选择电源线和电机动力线的直径,一般不要小于 1mm² 线经。

Installation size map

Appendix: Linear Power Supply Schematic

Diagram:

TX1 for the isolation transformer, according to the power load to determine its parameters. In general, the transformer output voltage of the output

DC voltage requirements may be, rectified and filtered DC voltage $VDC + \approx 1.414 \times Vout$. When used

SD-2H044MA drive is recommended voltage output for the AC21 ~ 28V. Of which: transformer capacity is based on the load

Current decision; C1 for the electrolytic capacitor is recommended parameters: 100V/2200uF; C2 without a sense of surge absorption capacitor,

Recommended parameters are: 400V/0.22 uF; D1 parameters depending on the load current and output voltage may be.