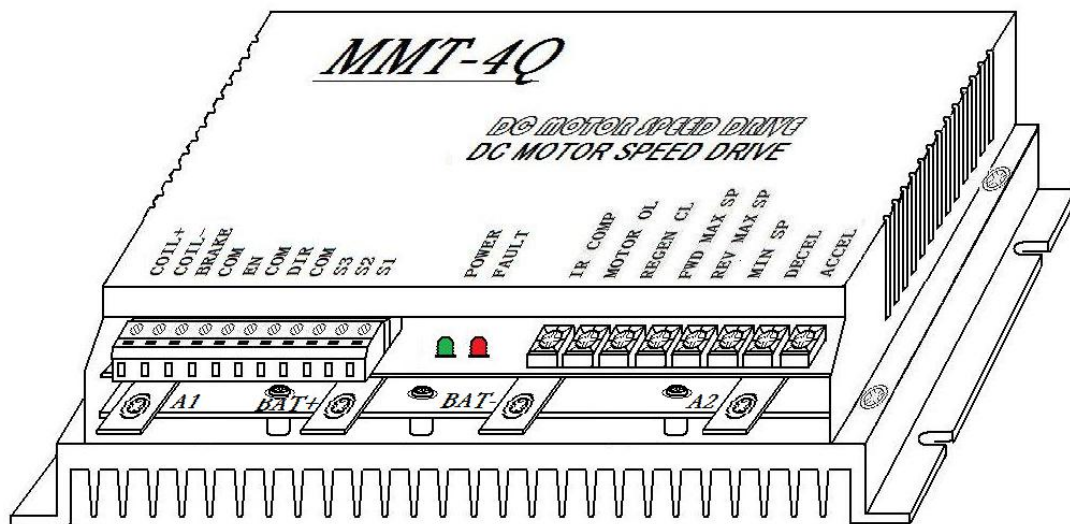


# 4Q Braking-Reversible, PWM series DC Drive

## MMT-DC24RT100BL



JiNan KeYa Electron Science and Technology Co., Ltd

Please read the operation instruction carefully prior to using this product.

Any fault and loss due to not complying with the cautions of operation and installation instructions is not within the scope of the warranty, and manufacturer will not undertake the related responsibility for that. Please keep all documents handy, and for any inquiry, please contact the manufacturer.

#### Safe Cautions

- Please arrange professional technicians for installation, connection and debugging of the equipment.
- In the charged case, it is forbidden to install, remove or change the circuit of equipment.
- Please equip with necessary protector between the power input terminals and the power supply (storage battery) for this product to avoid dangerous accidents or critical damages; over current protector, fuse, emergency switch, etc. shall be installed.
- Please keep isolation and insulation protection for the product, earth, and all equipments.
- If should it be deemed necessary to debugging the equipment in a charged case, please select non-metal special screwdriver or special debugging tool.
- The produce shall be installed under a good ventilation circumstance.
- This product can not be used under abnormal circumstance full of high humid, dust, corrosion gas and strong vibration.



This sign means an important prompt or warning

#### Specification and model:

Model	Maximum Output current DC : (A)	Maximum Output voltage DC: (V)	Direct voltage Working range DC: (V)
DC12RT100BL	100	12	8-18
DC24RT100BL	100	24	18-36
DC48RT100BL	100	48	36-62

## Features:

DC-4Q Braking-Reversible, PWM series DC Drive, has quickly dynamic response, smooth operating, works well and perfect functions.

- \* PULSE WIDTH MODULATION

Motor runs quieter, with greater efficiency and less maintenance, longer life.

- \* FOUR QUADRANT REGENERATIVE OPERATION

- \* REGENERATIVE BRAKING

No contactors required. No electromechanical components to overheat or wear out.

- \* ENABLE / BRAKE / DIRECTION TERMINALS

Choose a function by simply opening or closing a dry contact or through an open collector transistor.

- \* STATUS LEDs

Power and Fault LEDs provide a visual status of the drive.

- \* Forward and reverse can be set separately

- \* Output current can be set

- \* Braking current can be set

- \* Torque compensation function

- \* Standard analog control mode:

Analog:0-5V or potentiometer

- \* Over voltage & less voltage protection

- \* OVER TEMPERATURE PROTECTION

Drive will fold the output power back to prevent from overheating. Drive will fault if it still remains too hot.

## Technical parameters:

- \* Soft start time: 0.2—20S

- \* Soft stop time: 0.2—20S

- \* Analog control signal: 0—5V (wired to earth ground)

- \* Signal input impedance  $\geq 200K$

- \* Speed accuracy: 1%

- \* Speed adjustable range : 100:1

- \* Speed Ratio: 1:80

- \* Ambient temperature: -10°C - +60°C

- \* Relative Humidity: Below dew point

- \* Weight: 1.5kg

- \* Dimension: 212\*115\*63 (mm)

Size (mm / inch)

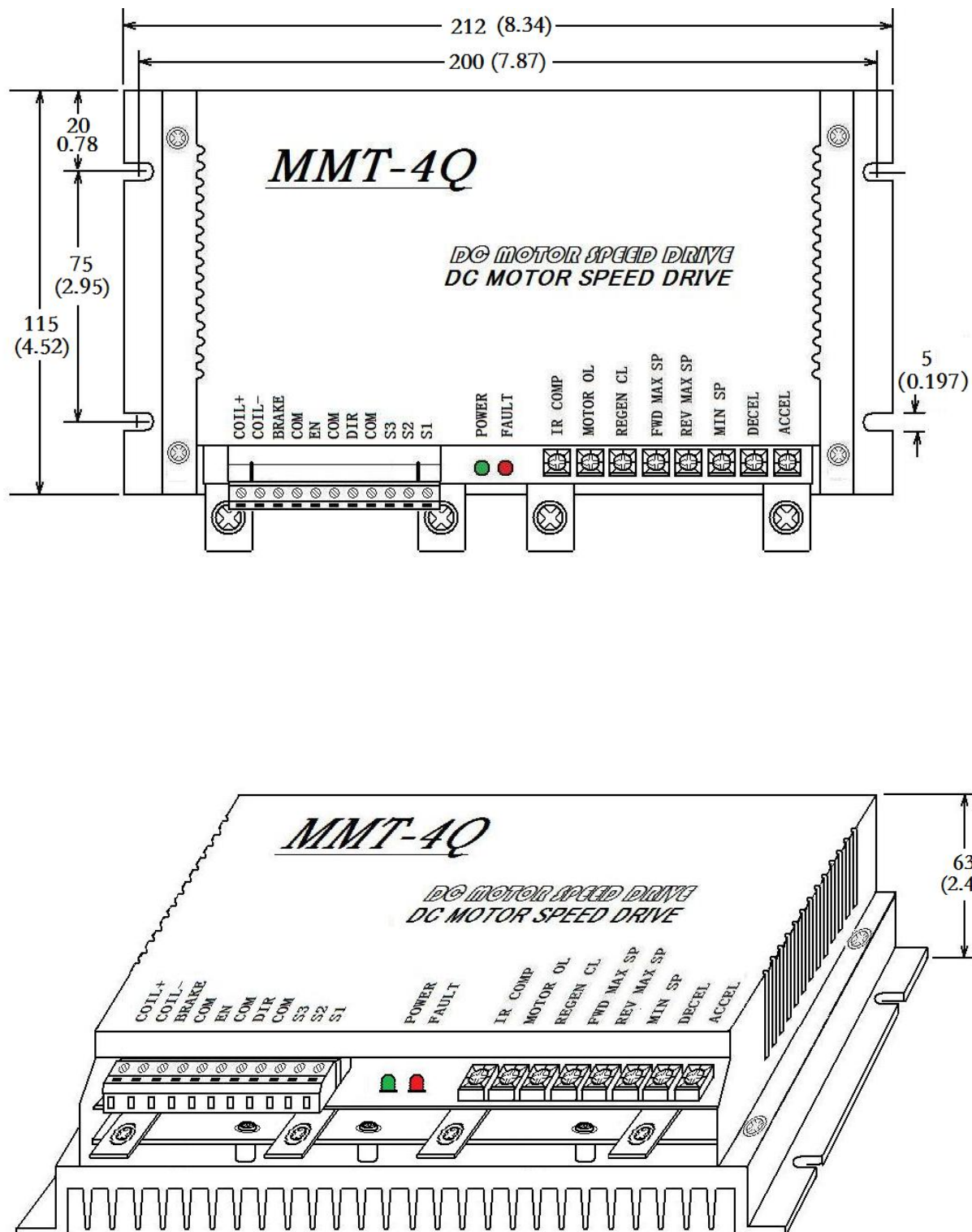


Figure 1

## Installation Note:



### WARNING

1. Do not install, rewire, or remove this control with input power applied. Doing so may cause damage or serious injury. Make sure you have read and understood the Safety Warnings section before attempting installation.
2. 4\* $\Phi$ 5mm mounting hole is equipped on the bottom of driver housing to facilitate horizontal installation.
3. Driving element is sensitive to electrostatic interference magnetic field, avoid installed in electrostatic easily occur environment, otherwise it will cause the damage.
4. This driver shall be kept away from dust, high-humidity environment and accidental contact shall also be avoided. Enough space shall be reserved around the driver for ventilation and regulation.
5. When fixed, this driver shall be kept away from other heat source.
6. Guarantee that this drive works within the range of specified environment temperature.
7. Installed on equipment with intense vibration is not recommended; if not, please take precautions against vibration.

### I. Wiring requirements:

1. Do not connect wire under charged circumstances.
2. Insulated wire and shielded wire matching well with driver's voltage and current shall be selected for the device; Specifications of power input line and motor connecting line selected for the driver are shown in following table:

**Table 1 Specification and length of wires**

	Current (A)	Wire specification (mm <sup>2</sup> )	Max. length (m)
Power input line:	100	15	15
Motor output line:	100	15	15

3. Signal wiring and control wiring should use shielded wire connect, and is separated from power supply input & put wiring.



### WARNING

In any cases, signal line and logic control wire is not allowed to be bound, mixed or wired with power input wire, output wire (motor wire) and other power lines, induced voltage generated may cause interface, malfunction or direct damages upon the driver.

4. As driver does not have internal protection of opposite connection, please be sure to guarantee that positive and negative poles of power input are consistent with that of external power supply, otherwise, damages may be caused.
5. Please use proper tools for wiring and guarantee its correctness.

## Diagrammatic sketch of connecting terminal

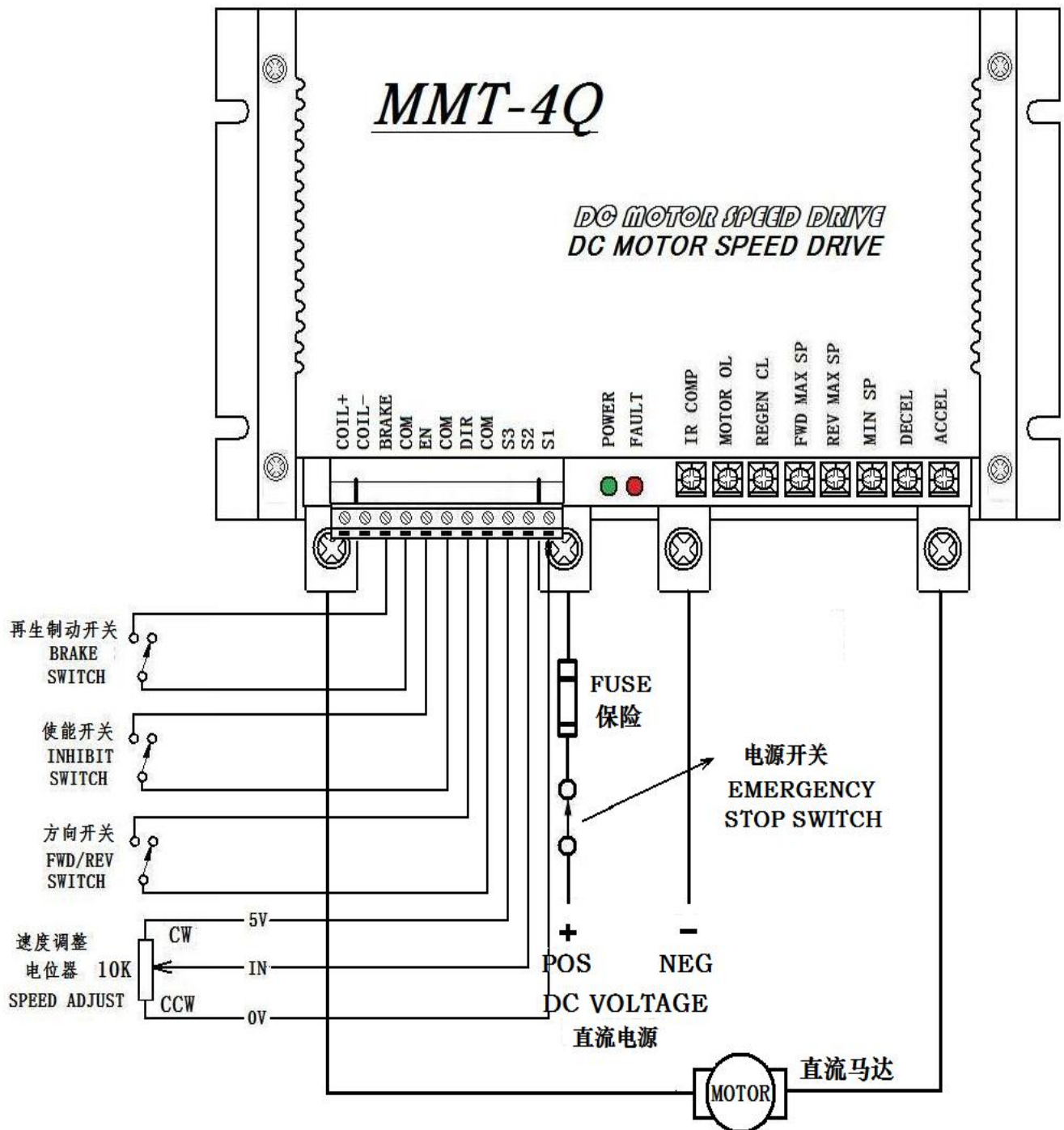


Figure 2

### Connection about fuse, power switch and motor:

1. One piece of quick-blowing fuse and power supply emergency switch must be added between power input port of motor controller and power supply in sake of emergency power off in some case. (See Figure 3)

Note: When select quick-blowing fuse and power supply emergency switch, the rated current value of switch should be equal or greater than 150-200% value of rated current of applied motor.

2. Connection of motor

A1 and A2— terminals connected motor controller with DC motor are in Figure 3, please see it.

The voltages from motor controller are transferred to applied motor through connecting terminals of A1 and A2. When A1 terminal is with positive polarity and A2 terminal is connected with negative polarity, motor will rotate in clockwise, if need the motor rotate counter clockwise, Just convert the Reversing switch (FWD/REV).

Note: Please ensure the rated voltage value of motor must match with output voltage value of motor controller.

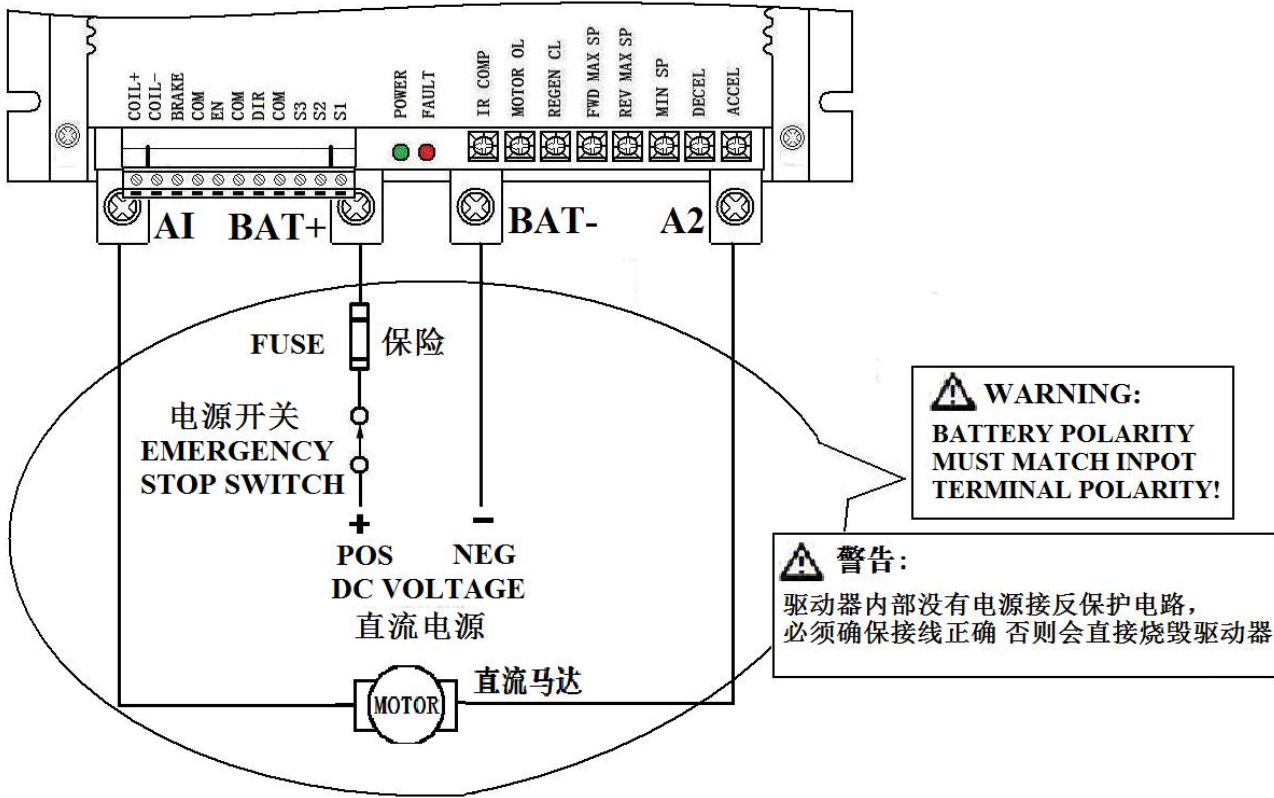


Figure 3

Power Input Connection:

**WARNING**

The driver input end don't have the connect protection circuit of the polarity reverse. Please must confirm POS(+) connect the "BAT+" of the drive, the NEG(-) connect the "BAT-"of the driver.

1. Ensure power supply( or Battery) 'positive pole and negative pole respectively connected with motor controller's power input "BAT+" and power input "BAT-" correctly.
2. According to Chart 1, select suitable cables and wires during wiring.
3. Inspect whether the power supply(or Battery)'s voltage match with motor controller's working voltage and whether the capacity of power supply(or Battery) bear the motor's load current.

Connection about speed control potentiometer:

Installation: See Figure 4



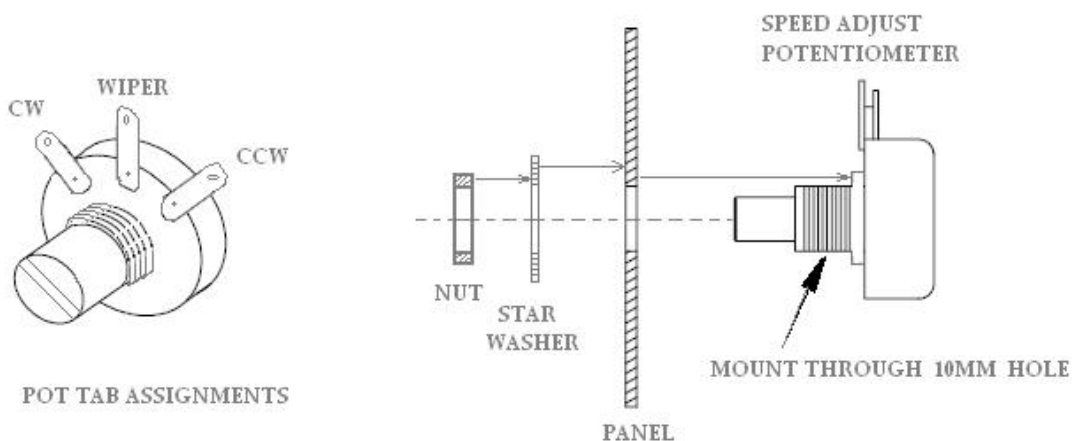


Figure 4



**Caution:**

Please ensure the external end of lead wire of speed control potentiometer is insulated from outside shell. The value should be equal or greater than 20MΩ.

Connection: see figure 5

The operation of speed control potentiometers should follow above instructions in Figure 6. Fit 10K regulator potentiometer between 5V terminal, IN terminal and 0V terminal.



**Caution:**

The connecting wire of speed control potentiometer should be away from conductors of power input terminal and output in sake for reducing unnecessary interfere of electronic signals. The length of connecting wire should be shorten as far as possible. If the length is over 0.5m, the shielding wire is recommended.

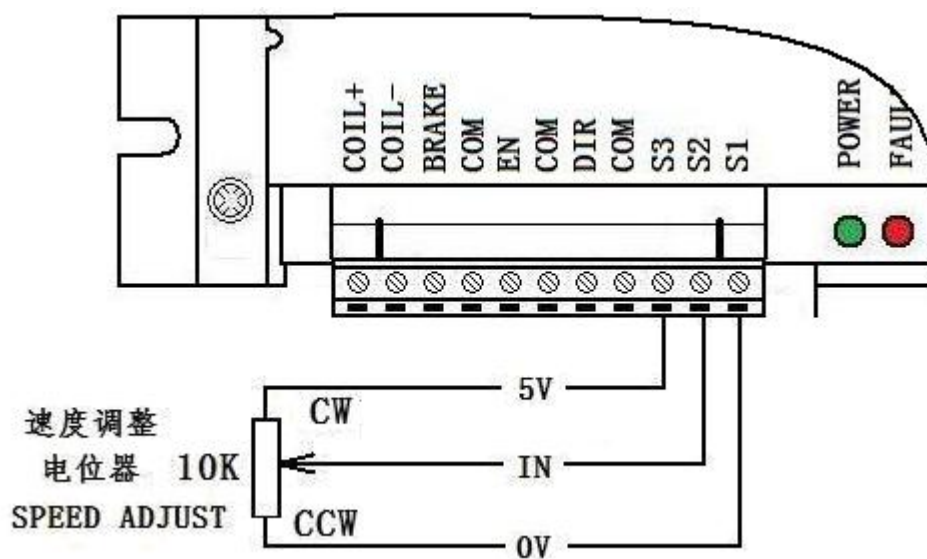


Figure 5



## Function and connection about control terminal:



### Caution:

Connecting wires of speed control terminals should be away from conductors of power input terminal and output in sake for reducing unnecessary interfere of electronic signals. The length of connecting wire should be shorten as far as possible. If the length is over 0.5m, the shielding wire is recommended.

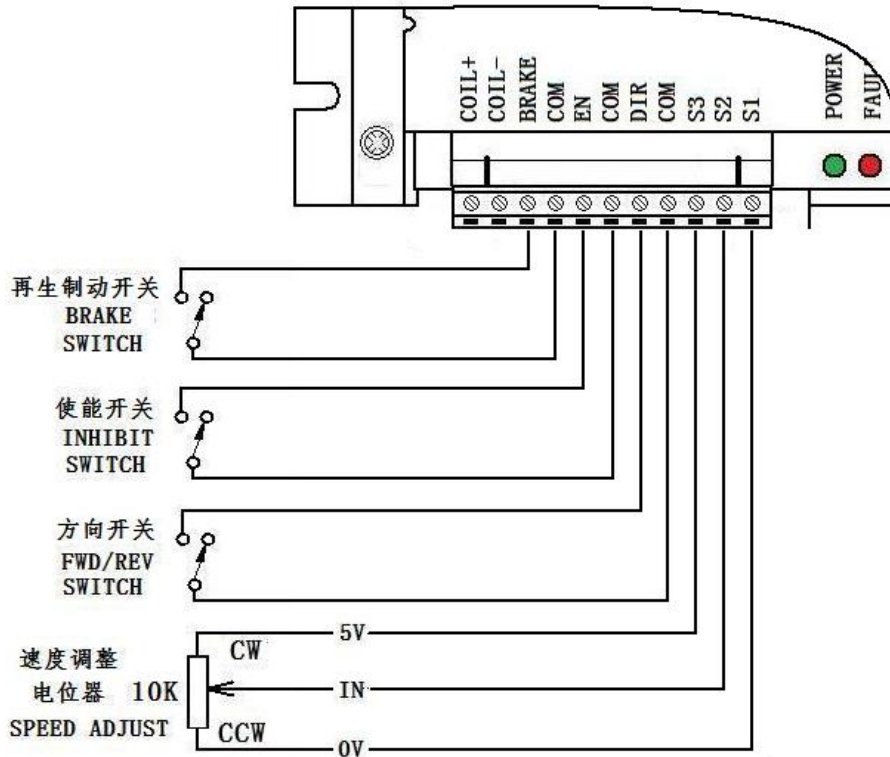


Figure 6

### 1.BRAKE:

#### Regenerative braking control terminal:

Regenerative braking control: When quick stopping of motor is required, this function is suitable. Close brake switch, motor controller rapidly brakes motor's speed by the way of regenerative braking then make motor stop immediately.

### 2.EN: Enable control terminal:

Enable control: Control the start and stop of motor

Open external enable switch, motor controller will automatically lock in internal circuit and make motor stops.

Close external enable switch, motor will start to rotate at the speed value set by potentiometer or input analog signals.

#### Note:

**A.**When regenerative braking, the motor's stop time is decided by set value of brake current ("REGEN CL" potentiometer set current )or set value of soft stop ("DECEL" potentiometer set soft stop time).

Eg. If the set value of brake current("REGEN CL" potentiometer set current ) is high and the set value of soft stop time("DECEL" potentiometer set soft stop time) is low, the motor's brake time will be shorten.

**B.**When close brake switch, rotate speed value after braking is decided by set value of "MIN SP"

potentiometer (means Min speed ). Eg. If the “MIN SP” potentiometer set the value “0”, then after brake, the motor rotate speed will be “0”. If the “MIN SP” potentiometer set the value “N”, then after brake, the motor rotate speed will be “N”.

### 3. DIR: Reversing (Direction)control terminal:

The reversing control of motor: Rotation direction can be easily get through open or close reversing switch.

## Control mode and connection about external analog quantity



#### Caution:

Connecting wires of control terminals should be away from conductors of power input terminal and output in sake for reducing unnecessary interfere of electronic signals. The length of connecting wire should be shorten as far as possible. If the length is over 0.5m, the shielding wire is recommended.

### 1. Connection of function control signal's switching analog value

Photocouplers or open collector control:

Please see Figure 7.

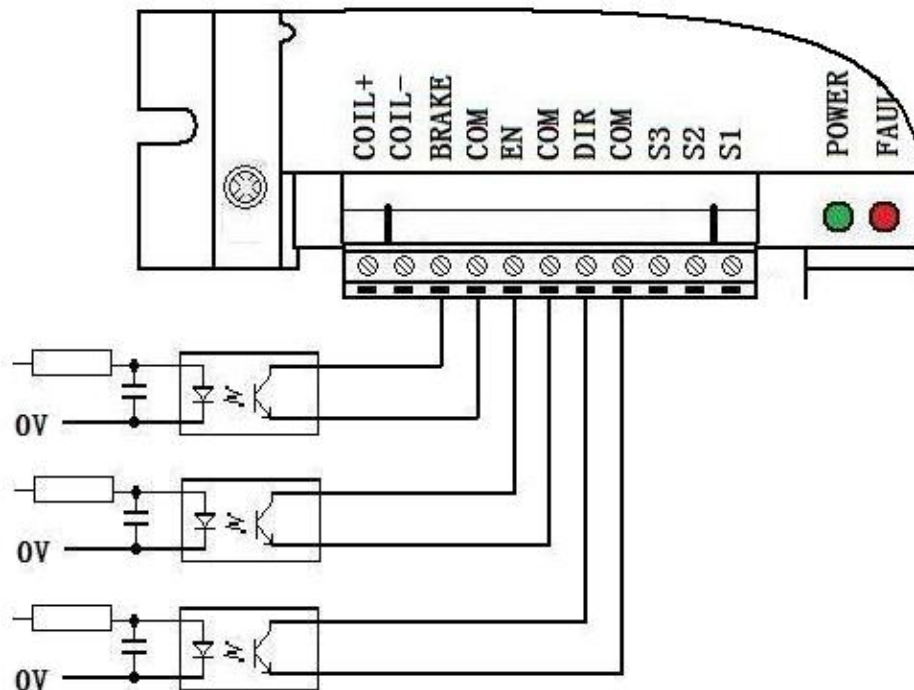


Figure 7

### 2. Connection of speed control's analog quantity

Please see Figure 8.

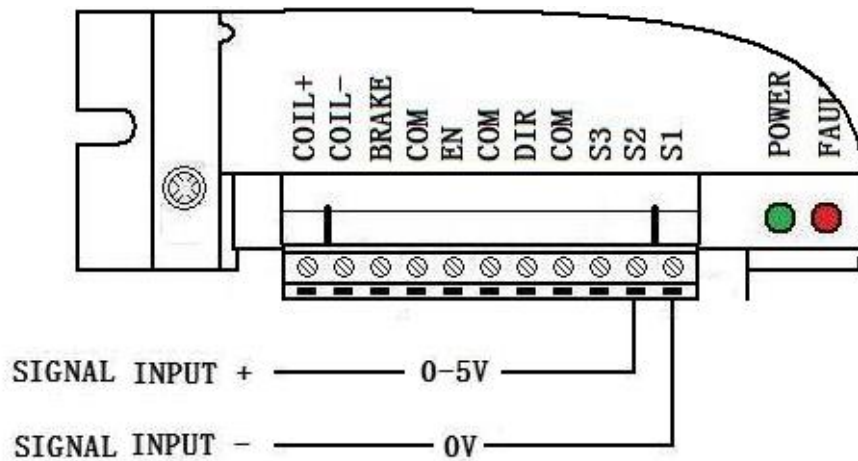


Figure 8

## Introduction and setting of adjustable potentiometer:

Please see Figure 9

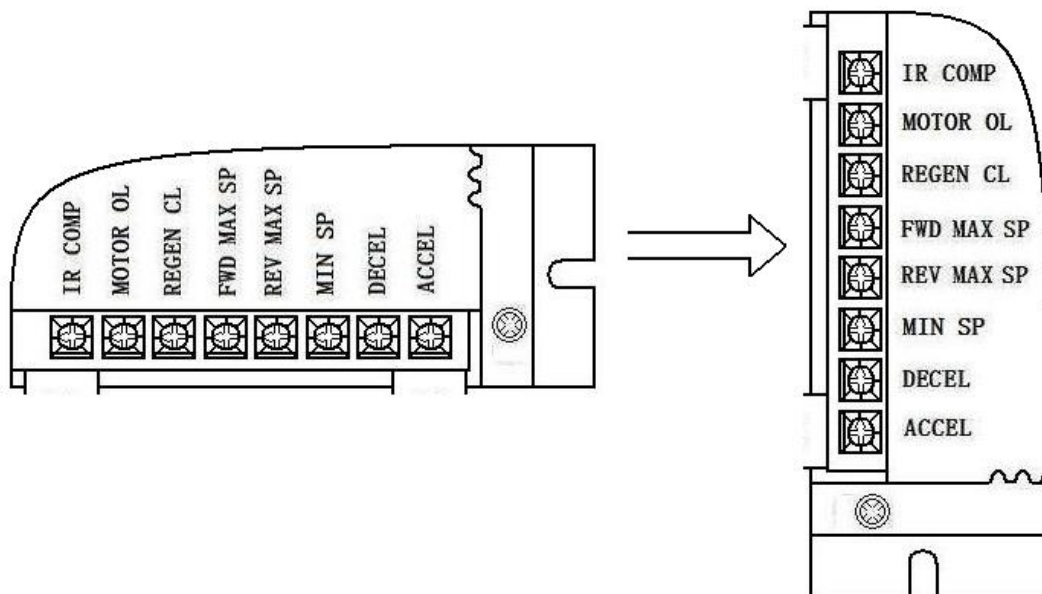


Figure 9

### 1. "ACCEL" potentiometer( Set soft start time ):

Adjust "ACCEL" potentiometer to set ramp up from initial speed value to setting speed value(it means acceleration time, the time can be adjusted between 0.2 seconds and 20 seconds).Please see the Figure 10.

Note: Adjust this potentiometer in counter-clockwise to shorten soft start time while adjust this potentiometer in clockwise to prolong soft start time.

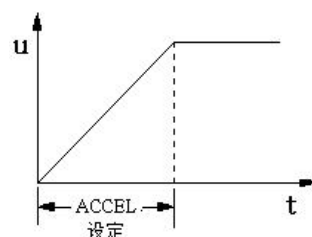


Figure 10

## 2. "DECEL" potentiometer( Set soft stop time ):

Adjust "DECEL" potentiometer to set ramp down from Max.speed value to Min.speed value(it means deceleration time, the time can be adjusted between 0.2 seconds and 20 seconds).Please see the Figure 11.

Note: Adjust this potentiometer in counter-clockwise to shorten soft stop time while adjust this potentiometer in clockwise to prolong soft stop time.

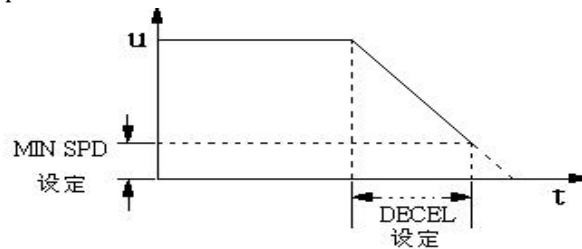


Figure 11

## 3. "FWD MAX SP" potentiometer(set Max. forward speed value):

Adjust this "**FWD MAX SP**" potentiometer to set motor's Max. forward speed value(it is also be used to limit motor's Max. forward speed value). When adjust this potentiometer in clockwise, forward speed value is increased.

## 4. "REV MAX SP" potentiometer(set Max. reverse speed value):

Adjust this "**REV MAX SP**" potentiometer to set motor's Max. reverse speed value(it is also be used to limit motor's Max. reverse speed value). When adjust this potentiometer in clockwise, reverse speed value is increased.

## 5. "REGEN CL" potentiometer(set regenerative braking current value):

Adjust "REGEN CL" potentiometer to limit Max. braking armature current value(it also means brake/stop time). The braking current value affect brake/stop time. When adjust this potentiometer in clockwise, the braking current value will be increased.

## 6. "IR COMP" potentiometer(set torque compensation):

Adjust "IR COMP" potentiometer to make motor have constant speed value in different load conditions(Before the motor controller is delivered out of factory, the torque compensation generally set"0"). When adjust potentiometer in clockwise, torque compensation value is increased.

The following procedures can be adopted to collate torque compensation again.

A. Set the "IR COMP" potentiometer at Min.value(adjust this potentiometer at end in counter-clockwise).

B.Adjust the external speed control potentiometer until motor speed is up to medium speed value( eg. Motor speed should be at 900rpm if its rated speed value is 1800rpm), measure motor's speed value with the help of handheld tachometer.

C.Apply load until it is up to rated current value of armature, motor speed will be distressed at the moment.

D.Hold motor's rated current load,at the same time adjust "IR COMP" potentiometer until the motor's speed value is up to 900 rpm in no load condition.

E.Release load from motor

Note: If motor's rotation speed is constant in no load condition while rotation speed is increased or motor shakes after loaded,it means adjustment of "IR COMP" potentiometer is overbig(we also say torque compensation is overbig).

If motor's rotation speed is decreased after load, it means adjustment of "IR COMP" potentiometer is oversmall(we also say torque compensation is over small).

## 7. "MIN SP" potentiometer(set Min speed value):

When external given signal is "0V"(or adjust external signal setting potentiometer at end in counter-clockwise),adjust "MIN SP" potentiometer to set motor's Min speed value(Generally this potentiometer is set "0",before the motor controller is delivered out of factory).

## 8. "MOTOR CL" potentiometer(set motor's rated current):

Adjust "MOTOR CL" potentiometer to limit motor controller's Max.output current(we also says motor's setting current value).The setting of this current should be based on motor's rated current value.Current value should be moderate.If not,torque is not enough or overcurrent protection is failure. Adjust this potentiometer in clockwise to increase motor controller's output current.

Note: Motor controller's output current value should be twice as much as motor's rated current value in general.However,motor controller can't operate at setting value which is greater than motor's rated current value for a long time, or the motor will be burnt out.

### Collation procedure of motor's current:

- A. In power off condition, series one ampere meter between motor controller's output end and motor's armature.
- B. Adjust motor controller's "MOTOR CL" potentiometer to "0"(adjust this potentiometer at end in counter-clockwise).
- C. Adjust external speed setting potentiometers to Max.value(potentiometers contacted with"S1,S2 and S3" in Figure 3).
- D. Apply enough load on motor
- E. In power on condition, adjust "MOTOR CL" potentiometer(adjust in clockwise) at the same time look at ampere meter.The current value will increased until it is twice as much as motor's rated current value.
- F. Cut off power supply, remove ampere meter and renew wires between motor controller and motor.
- G. Adjust back speed control potentiometer and collation is finished.

## Inspection procedure before powered on motor controller:

1. Ensure power supply(or Battery) are connected motor controller's positive pole and negative pole correctly and tightly. Input power source should meet motor controller's requirement.
2. Ensure uncovered part of motor controller's PCB is clean. Conductive metals, humidification,water and sundries is not permitted.
3. Ensure motor controller's external connecting wires are correctly wired. Short circuit or GND is not permitted (About correct connection, please see Figure 12).
4. Ensure external speed control potentiometers is Min value(we also say given signal is "0").

## LED Status Light

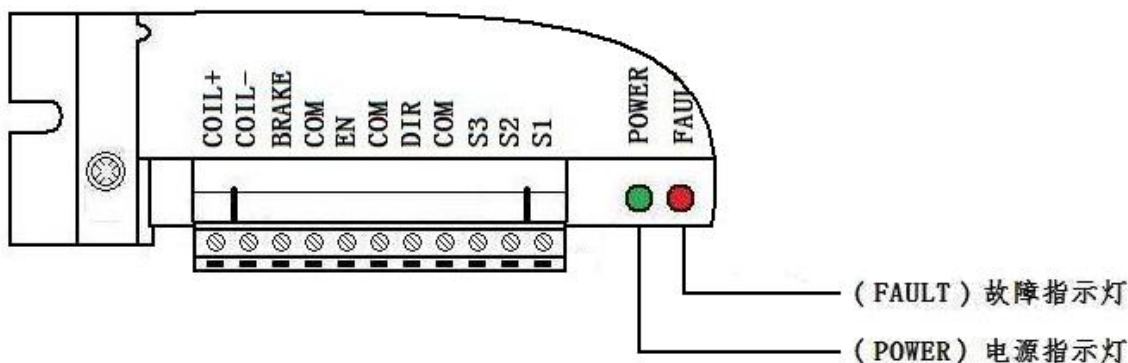


Figure 12

1. POWER (Green): Power Indicator
2. FAULT(Red): Fault Indicators are as follow

LED Codes		
<b>Power</b>		The drive is receiving battery voltage
<b>Fault</b>	-Solid:	Current Limit.
	-Two Blinks	Under Voltage
	-Three Blinks	Over Voltage
	-Four Blinks	Short Circuit
	-Five Blinks	Overheat( $\geq 75^{\circ}\text{C}$ )