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1. Product Overview

Thank you for choosing Rtelligent R series digital step servo driver.

R series stepper drivers, based on the platform of TI's 32-bit DSP processing chip, are designed with internal PID current control algorithms and have excellent performance. The built-in micro-segmentation technology makes the R series stepper drivers feature low noise, low vibration, low heat generation and high speed and high torque output, which can be well adapted to most applications of stepper motors.

The R60-IR driver is a potentiometer speed control drive designed by Rtelligent. The driver has an internal integrated motion control module, which supports IO triggered fixed speed motion.

The current and speed can be selected via DIP switches, with 16 speeds, 2 accelerations, 8 currents, over-voltage, under-voltage and over-current protection, and the input and output control signals are opto-isolated.

Power supply	24 - 48 VDC
Output Current	DIP switch settings, 8 options, up to 5.6 amps (peak)
Current control	PID current control algorithm
Speed setting	DIP switch settings, 16 options
Speed range	Select suitable stepper motors, up to 3000rpm
Resonance suppression	Automatic calculation of resonance points to suppress medium frequency vibrations
Parameter adaption	Automatic detection of motor parameters at driver initialization to optimize control performance
Acceleration selection	Two gear options, off is 1 gear, on is 2 gear
Pulse filtering	2MHz digital signal filter
Idle current	Automatic current halving after motor stop

We hope that our products with excellent performance can help you to complete the sports control program successfully.

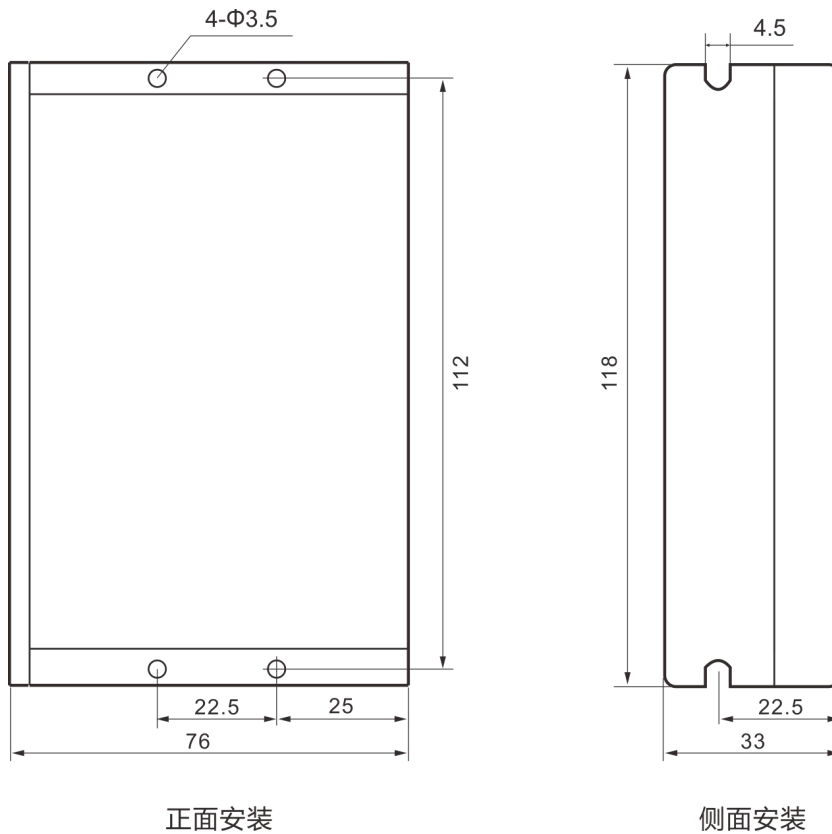
Please read this technical manual before using the products.

2. Application Environment and Installation

2.1 Environmental requirement

Item	Rtelligent R60-IR
Installation environment	Avoid dust, oil and corrosive environment
Vibration	0.5G (4.9m/s ²) Max
Operating temperature/humidity	0°C ~ 45°C / 90% RH or less (no condensation)
Storage and transportation temperature:	-10 °C ~ 70 °C
Cooling	Natural cooling / away from the heat source
Waterproof grade	IP54

2.2 Driver installation dimensions



2.3 Driver installation requirements

When installing the driver, please stand it in a vertical or horizontal position with the front facing forward and the top facing upwards to facilitate heat dissipation.

When assembling, take care to avoid drilling chips and other foreign objects falling inside the driver.

Please use M3 screws to fix it when installing.

If there is a vibration source near the installation (e.g. drilling machine), please use a vibration absorber or install an anti-vibration rubber gasket.

When installing multiple drivers in the control cabinet, please note that sufficient space should be reserved for adequate heat dissipation; if necessary, a cooling fan can be installed to ensure good heat dissipation in the control cabinet.

3. Driver Port and Connection

3.1 Port function description

Function	Mark	Definition	Remarks
Power supply input port	V+	Input DC power positive	24~48VDC
	V-	Input DC power negative	
Motor connection port	A+	Connect both ends of the motor A phase winding	
	A-		
	B+	Connect both ends of the motor B phase winding	
	B-		
Pulse connection	IN1+	Start-stop trigger input interface	3.3 ~ 24V level compatible
	IN1-		
	IN 2+	Reversing trigger input interface	
	IN 2-		
Potentiometer	ENA+	Potentiometer interface	Connect the middle tap and any other side
	ENA-		

3.2 Power supply input

The driver's working power supply is a DC power supply, and the input voltage range is between 24V and 48V.

Do not reverse the polarity of the input power ! ! !

The working mode of the driver is constant current control. When working, the driver outputs the input power to the motor by PWM chopping. Therefore, the input power will affect the performance of the driver.

Power selection reference:

Voltage:

Stepper motors have the characteristic of decreasing torque as the motor speed increases, and the level of the input power supply voltage will affect the magnitude of the high-speed torque decrease of the motor. Appropriately increasing the voltage of the input power supply can enhance the torque output of the motor at high-speed operation.

Therefore, if you want to obtain better high-speed performance, you need to increase the power supply voltage of the driver; and for low-speed applications, choosing a slightly smaller voltage can appropriately reduce the heat of the motor.

Current:

The working process of the driver is to convert the input high-voltage and low-current power supply into low-voltage and high-current across the motor windings. Therefore, the current of the power supply will be lower than the current value that the driver outputs to the motor.

In actual use, select an appropriate power supply according to factors such as motor model and load torque.

Effect of regeneration voltage:

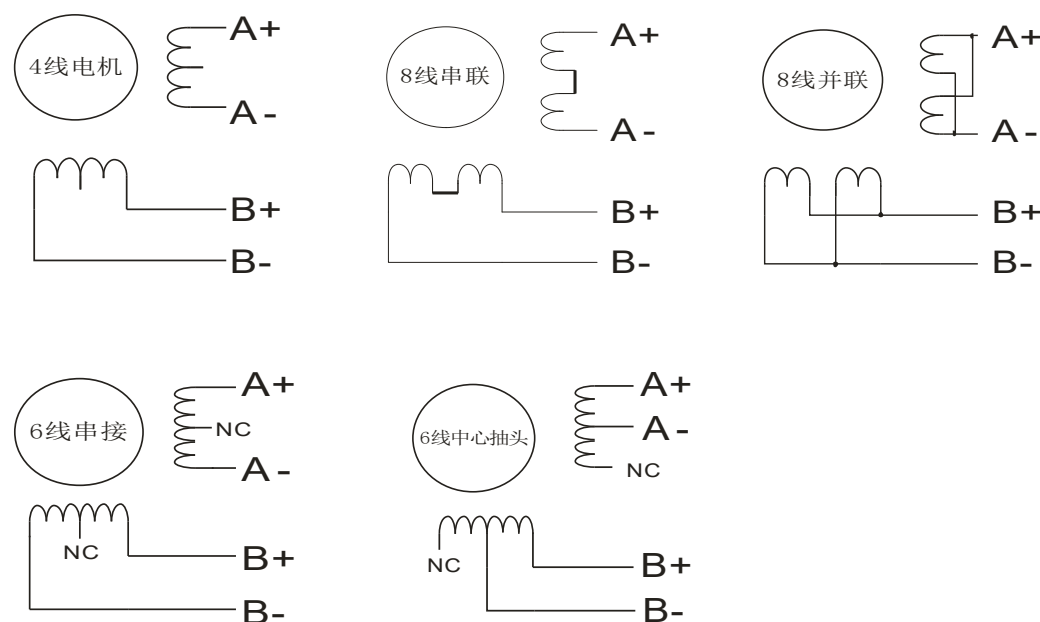
When the stepper motor is working, it also retains the characteristics of the generator. When decelerating, the kinetic energy accumulated by the load will be converted into electrical energy through the driver circuit. This part of the energy will be superimposed on

the driver circuit and input power supply, causing protection of the driver circuit and power supply.

When setting the motor running command, pay attention to the setting of acceleration and deceleration time.

In addition, when the driver is powered off, the driver's LED indicator will be on when the load is pulled to make the motor move. This phenomenon is also related to the above reasons.

3.3 Motor connection



The stepper motor that the R60-IR driver can match is a hybrid stepper motor with low resistance and low inductance.

Common two-phase stepper motors have 4-wire, 8-wire, and 6-wire outlet modes.

The 4-wire motor has only one wiring method.

The 8-wire motor has two connection modes: series and parallel:

The winding inductance of the series connection method is increased, and the driver current is set to about 0.7 times that before the series connection, which is suitable for low-speed occasions;

The winding inductance of the parallel connection method is reduced, and the driver current is set to about 1.4 times that before the parallel connection, which is suitable for high-speed occasions.

The 6-wire motor has two connection modes: series connection and center tapping:
 All series windings are connected, with large inductance, suitable for low-speed occasions;
 The center tap only connects half of the windings, and the inductance is small, which is suitable for high-speed occasions.

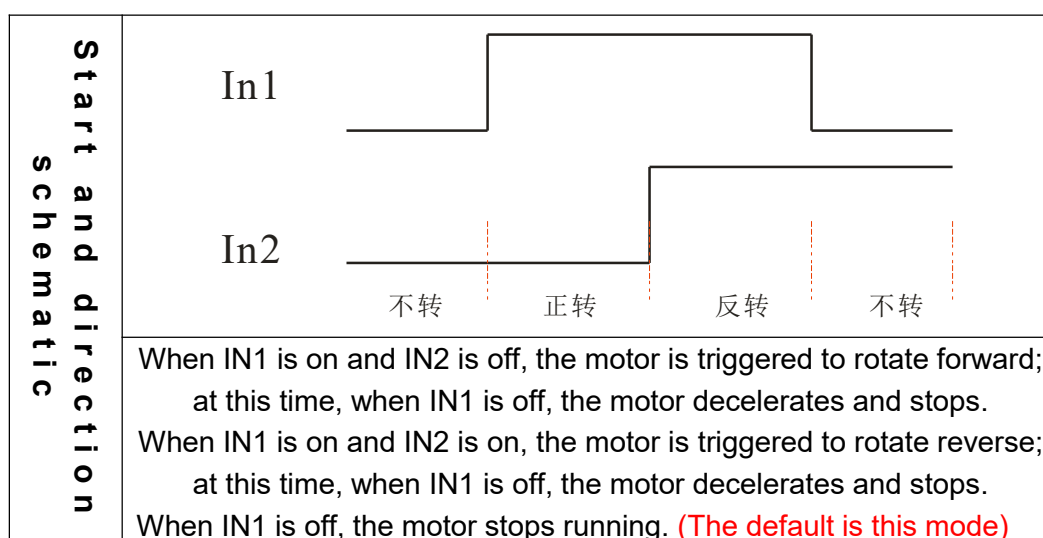
3.4 Control signal connection

3.4.1 IN port: for the connection of switching signals

The standard R-IR series driver signal interface is in the form of switching.

The source of the switching signal can be a PLC, single-chip microcomputer, control card, controller and other common output interface.

The R60-IR driver can accept switching levels from 3.3V to 24V (**no series resistors required**)



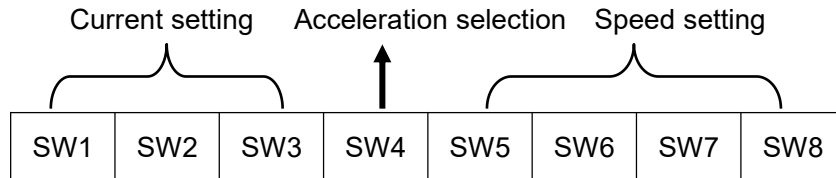
3.4.2 ENA port: for potentiometer speed regulation

The resistance of the potentiometer is between 10-20K ohms. Connect the middle adjustment head and the other end between ENA+ and ENA-.

After the speed control gear is set, adjust the potentiometer to adjust the motor speed.

If the potentiometer is not connected, the driver will run at the speed of the gear set by the DIP switching.

4. DIP switching and operating parameters setting



4.1 Current setting

Peak current	Average current	SW1	SW2	SW3	Remarks
1.4A	1.0A	on	on	on	Other current values can be customized
2.1A	1.5A	off	on	on	
2.7A	1.9A	on	off	on	
3.2A	2.3A	off	off	on	
3.8A	2.7A	on	on	off	
4.3A	3.1A	off	on	off	
4.9A	3.5A	on	off	off	
5.6A	4.0A	off	off	off	

DIP SW1, SW2, SW3 are used to set the current value output by the driver to the motor. Normally, the current is set to the rated current of the motor. If your system has high requirements for heat generation, you can appropriately reduce the current to reduce the heat generation of the motor, but the output torque of the motor will be reduced at the same time. If you do not require the motor to run continuously, you can appropriately increase the operating current to obtain a greater torque, but be careful not to exceed 1.5 times the rated current of the motor.

4.2 Speed setting

Speed/rpm	SW5	SW6	SW7	SW8	Remarks
10	on	on	on	on	Other seed can be customized
20	off	on	on	on	
30	on	off	on	on	
50	off	off	on	on	
60	on	on	off	on	
80	off	on	off	on	
100	on	off	off	on	
150	off	off	off	on	
200	on	on	on	off	
250	off	on	on	off	
300	on	off	on	off	
400	off	off	on	off	
500	on	on	off	off	
600	off	on	off	off	
700	on	off	off	off	
800	off	off	off	off	

DIP SW5, SW6, SW7, SW8 are used to set the speed when the motor is triggered, with built-in S-shaped acceleration and deceleration,

When the switching value is closed, the motor accelerates to the set speed

When the switch is disconnected, the motor will decelerate to stop

4.3 Acceleration selection






DIP SW4 is used to set the acceleration when the motor is running

off means acceleration gear 1, moderate acceleration;

on means acceleration gear 2, high acceleration.

In general applications, the default acceleration is gear 1.

5. Driver working status LED indication

LED status	Driver status
 Green light is on for long time	Driver not enabled
 Green light is flashing	Driver working normally
 1 green, 1 red	Driver overcurrent
 1 green, 2 red	Driver input power supply overvoltage
 1 green, 3 red	Driver internal voltage error

6. Common Faults and Troubleshooting

Phenomenon	Possible situations	Solutions
The motor does not rotate	Power indicator is off	Check the power supply circuit, normal power supply
	The motor locks the shaft but does not rotate	The IO signal is weak, increase signal current to 7-16mA
	Speed too low	Select the right speed
	Driver is protected	Power on again
	Enable signal problem	Pull the enable signal up or leave it unconnected
	Wrong command input	Check whether the host computer has a switch output
Wrong direction of motor	Motor turning in opposite direction	Change the motor wiring sequence or adjust the command direction
	Motor wires have a break	Check if the connection is poor
	Motor has only one direction	Damaged input port
The alarm indicator is on	Wrong connection of motor wire	Check the wiring
	The voltage is too high or too low	Check power
	Damaged motor or driver	Replace motor or driver
Position or	Signal is interfered	Eliminate interference, reliable grounding

speed error	Wrong command input	Check the command of the host computer to ensure the correct output
	Wrong speed setting	Check the status of the DIP switch and connect it
	Motor lost step	Check whether the command speed is too high and the motor type selection is small
Driver terminal burned out	Short circuit between terminals	Check power supply polarity or external short circuit
	Too high internal resistance between terminals	Check whether excessive solder is added to the connection between the wire and the wire to form a tin mass
Motor blocked	Acceleration and deceleration times is too short	Reduce the command acceleration or increase the filter parameters of the driver
	Motor torque is too small	Choose high torque motor
	The load is too heavy	Check the load weight and quality, adjust the mechanical structure
	Current is too small	Check the DIP switch to increase the output current of the driver