

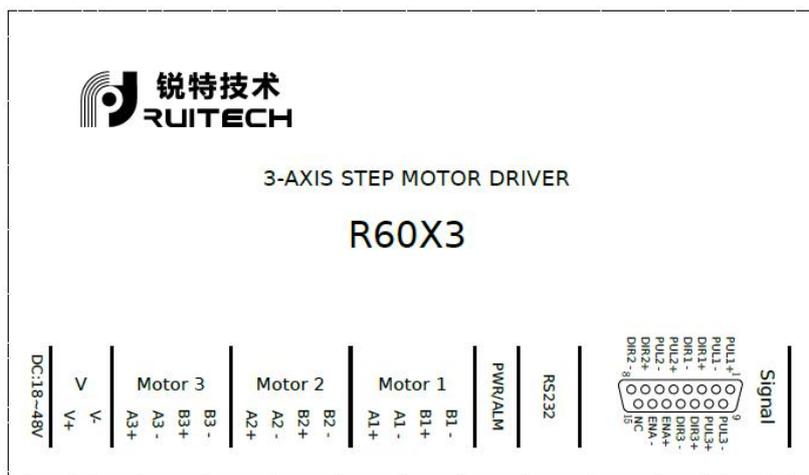
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## 1. Product Description

Thank you for choosing Rtelligent R series digital stepper driver.

R60X3 Three-axis stepper motor driver, based on a 32-bit three-core DSP processing chip platform, adopts internal PID current control algorithm design, and has excellent performance. R60X3 Three-axis independent control driver, split-drive three-axis stepper motor. The R60X3 can drive three 2 phase/3 phase stepper motors with base below 60, which is especially suitable for multi-axis equipment or platform robots.



The current and subdivision parameters are set by the R60X3 special debugging software. The driver has over-voltage, under-voltage, and over-current protection. The input and output control signals are optically isolated.

Power supply	24 - 48 VDC
Output current	Debug software settings, up to 4.2 amps (peak)
Current control	PID current control algorithm
Segment settings	Debugging software setting, 200 ~ 65535
Speed range	Optional suitable stepper motor, up to 3000rpm
Resonance suppression	Automatically calculate the resonance point to suppress intermediate frequency vibration
Parameter adaptation	Drive initialization automatically detects motor parameters and optimizes control performance
Pulse mode	Direction & Pulse
Pulse filtering	2MHz Digital Signal Filter
Idle current	The current is automatically halved after the motor stops running

We hope that our products with excellent performance can help you to complete the sports

control program successfully.

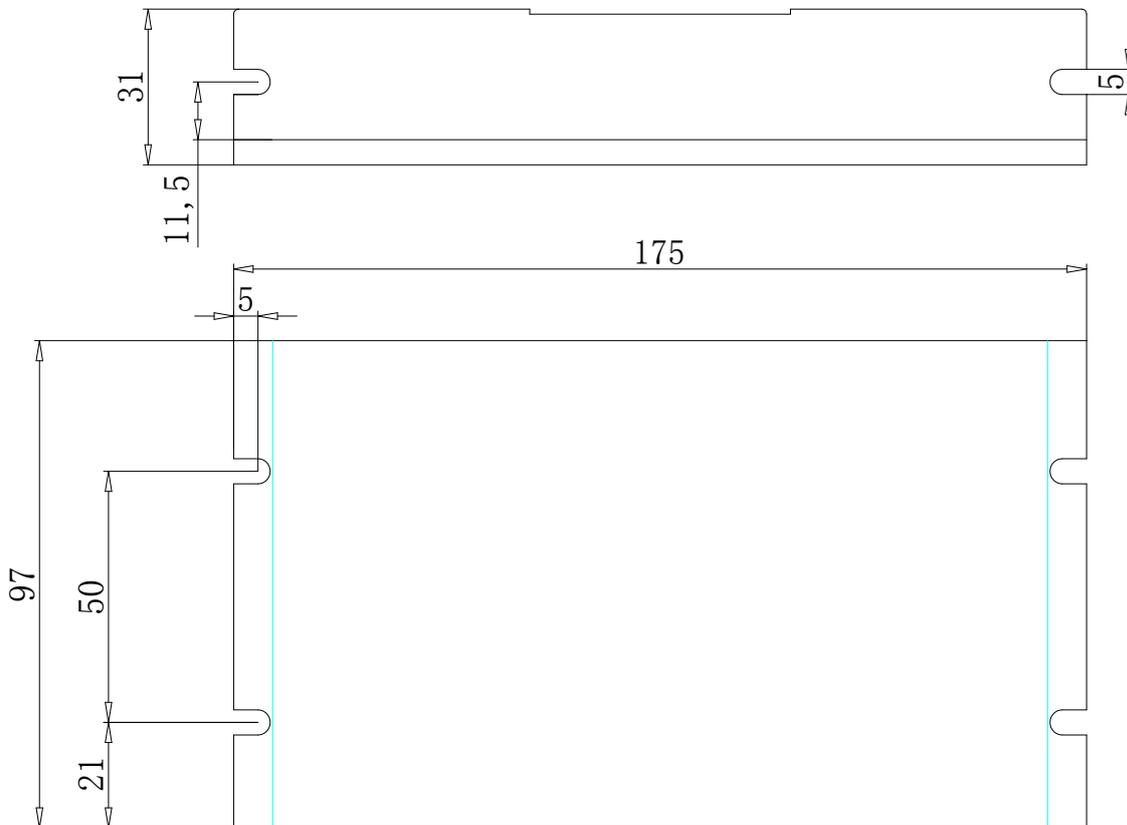
Please read this technical manual before using the products.

## 2. Application Environment and Installation

### 2.1 Environmental requirement

Item	Rtelligent R60X3
Installation environment	Avoid dust, oil and corrosive environment
Vibration	0.5G (4.9m/s <sup>2</sup> ) 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 Drive installation dimensions



### 2.3 Drive installation requirements

When installing, please attach the drive to the metal surface of the cabinet to facilitate heat dissipation. Please note that sufficient space should be reserved in the placement to obtain sufficient heat dissipation; if necessary, a cooling fan can be configured to ensure good heat dissipation conditions in the control cabinet.

During assembly, avoid drillings and other foreign matters falling inside the drive.

During assembly, please use M3 screw to fix.

When there is a vibration source near the installation (such as a drilling machine), please use a vibration absorber or install anti-vibration rubber gaskets.

### 3. Drive Port and Connection

#### 3.1 Port function description

Function	Grade	Definition	Remarks		
Power supply input port	V+	Input DC power positive	DC 24~48V		
	V-	Input DC power negative			
Motor 1	A1+	Connect both ends of Phase A winding of Motor 1			
	A1-				
	B1+	Connect both ends of Phase B winding of Motor 1			
	B1-				
Motor 2	A2+	Connect both ends of Phase A winding of Motor 2			
	A2-				
	B2+	Connect both ends of Phase B winding of Motor 2			
	B2-				
Motor 3	A3+	Connect both ends of Phase A winding of Motor 3			
	A3-				
	B3+	Connect both ends of Phase B winding of Motor 3			
	B3-				
15 Pin Control signal interface	1	PUL1+	Motor 1 pulse port	3.3-24V compatible	
	2	PUL1-			
	3	DIR1+			Motor 1 direction port
	4	DIR1-			
	5	PUL 2+	Motor 2 pulse port	3.3-24V compatible	
	6	PUL 2-			
	7	DIR 2+	Motor 2 direction port		
	8	DIR 2-			
	9	PUL 3+	Motor 3 pulse port	3.3-24V compatible	
	10	PUL 3-			
	11	DIR 3+	Motor 3 direction port		
	12	DIR 3-			
	13	ENA+	Enable signal port	3.3-24V compatible	
	14	ENA-			
	15				

### 3.2 Power supply input

The power supply of the driver is DC power, the input voltage range is between 24V ~ 50V, and the power is greater than 200W.

#### Power selection reference:

##### Voltage:

The stepping motor has the characteristic that the torque decreases with the increase of the motor speed, and the input power voltage level will affect the magnitude of the high-speed torque drop of the motor. Properly increasing the voltage of the input power can increase the output torque of the motor at high speed.

Stepping servo has higher speed and torque output than ordinary stepping. Therefore, if you want to obtain better high-speed performance, you need to increase the power supply voltage of the driver.

##### Current:

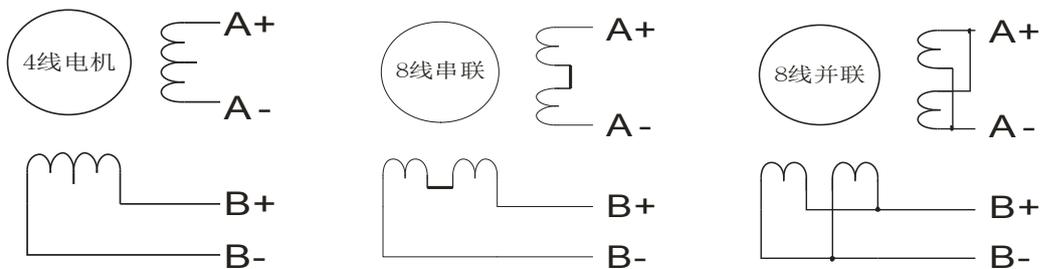
The work of the drive is to convert the input power supply with high voltage and low current to the low voltage and high current at both terminals of the motor winding. In actual use, select a suitable power source according to the motor model, load torque and other factors.

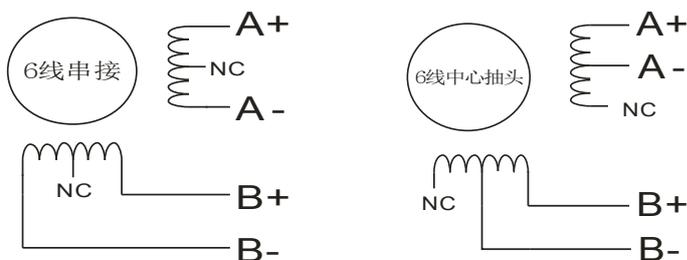
#### The effects of regeneration voltage:

The stepper motor also retains the characteristics of the generator when it is working. During deceleration, the kinetic energy accumulated by the load will be converted into electrical energy and superimposed on the driver circuit and input power. When using, pay attention to the setting of acceleration and deceleration time to prevent the protection of the driver or power supply.

When the driver is powered off, when you pull the load to make the motor move, you will see that the driver LED indicator is on, which is also affected by this.

### 3.3 Motor connection





The matching motor of the R60X3 drive is the low resistance and low inductance hybrid stepper motor.

The common 2-phase stepper motor's lead number are 4, 8 and 6.

There is only one connection mode for 4 leads motor.

Series and parallel connection mode are used by 8 leads motor:

When series used, the winding inductance increased. The set of drive current should be about 0.7times than before. This is suitable for low speed required.

When parallel used, the winding inductance decreased. The set of drive current should be about 1.4times than before. This is suitable for high speed required.

Parallel and central tapping connection mode are used by 6 leads motor:

When parallel used, all the winding connected, and the inductance was higher. This is suitable for low speed required.

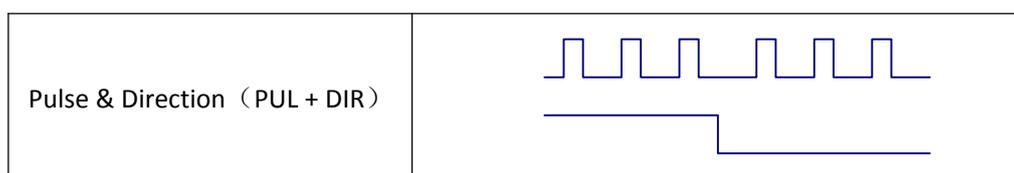
When central tapping used, half of the winding connected, and the inductance was lower. This is suitable for high speed required.

### 3.4 Control signal connection

#### 3.4.1 PUL、DIR Port: connection for pulse command

The R60X3 control signal is a pulse input and supports three-axis differential / pulse & direction mode.

Pulse level is 3.3V ~ 24V compatible (no string resistor required)



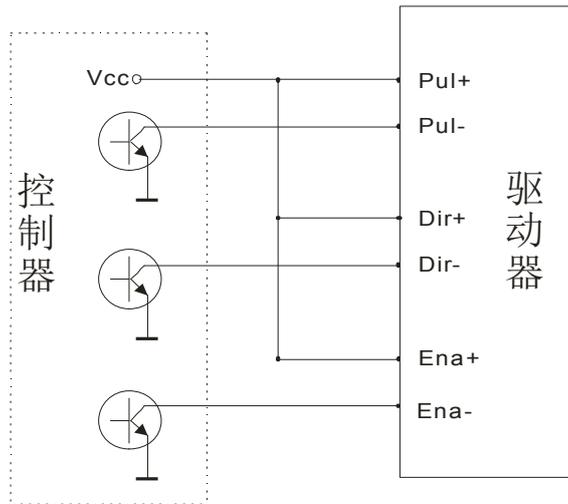
#### 3.4.2 ENA port: enable/disable

When the default optocoupler is off, the drive outputs the current to the motor. When the internal optocoupler is on, the drive will cut off the current of each phase of the motor so that the motor is in a free state, and the stepper pulse can not be responded.

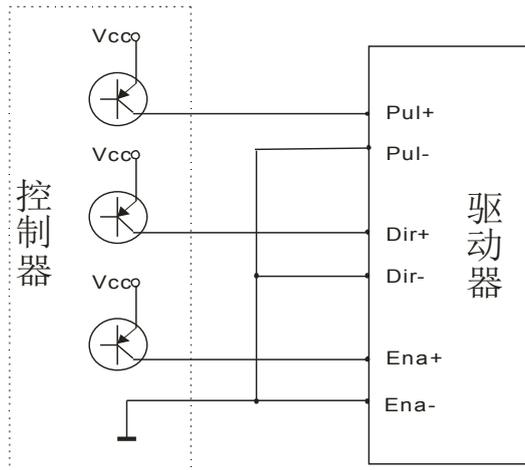
When the motor is in an error state, enable disconnection. The level logic of the enable signal can be set to the opposite by the debug software.

### 3.4.3 Examples for control signal connection

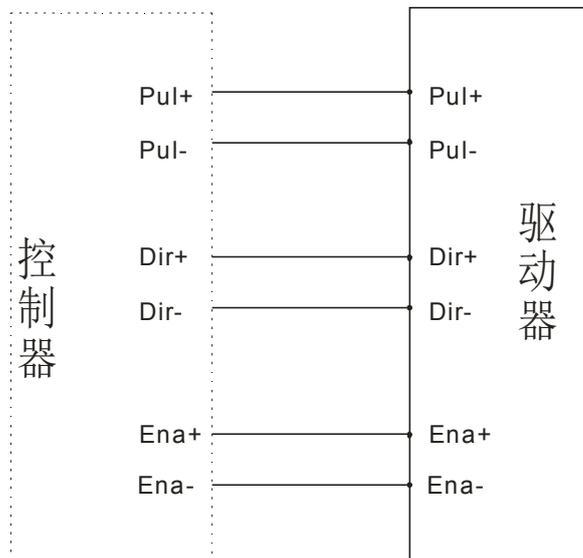
#### Common Anode



#### Common Cathode



#### Difference



## 4. The setting of operating parameters

R60X3 operating parameters are set by the debugging software, and the debugging interface is as follows:



The three axis related parameters are independent and can be set separately as needed.

Parameter analysis:

- ① Current: peak value of output current of each axis. 5600 mA
- ② Subdivision: the subdivision value of each axis. 200-65535
- ③ Standby time: the delay time when the motor enters half flow when it is stationary
- ④ Standby current: Set the current percentage during standby
- ⑤ Shaft time after power-on: the time when the current is fully established after power-on
- ⑥ S curve time: S-filter time inside the input command; unit is 50 us
- ⑦ Pulse bandwidth limitation: input pulse limit frequency
- ⑧ ENA level: enable signal logic level
- ⑨ ENA state: driver action setting when enabled

## 5. Common Faults and Troubleshooting

Phenomenon	Possible situations	Solutions
<b>Motor does not work</b>	Power indicator is off	Check the power supply circuit for normal power supply
	The motor rotor is locked but the motor does not work	Pulse signal is weak; increase the signal current to 7-16mA
	The speed is too slow	Select the right micro-stepping
	Drive is protected	Solve the alarm and re-power
	Enable signal problem	Pull up or disconnect the enable signal
	Command pulse is incorrect	Check whether the upper computer has pulse output
<b>The steering of motor is wrong</b>	The rotary direction of motor is reverse	Change the motor wiring sequence or adjust the command direction
	The motor cable is disconnected	Check the connection
	The motor has only one direction	Damaged input port
<b>Alarm indicator is on</b>	The motor connection is wrong	Check the connection
	The voltage is too high or too low	Check the power supply
	Damaged motor or driver	Replace the motor or driver
<b>The position or speed is wrong</b>	The signal is disturbed	Eliminate interference for reliable grounding
	The command input is incorrect	Check the upper computer instructions to ensure the output is correct
	Incorrect speed setting	Check the DIP switch status and correctly connect the switches
	Motor lost step	Check if the command speed is too large and the motor selection is small
<b>The drive terminal</b>	Short circuit between terminals	Check power polarity or external short circuit

<b>burned up</b>	Internal resistance between terminals is too large	Check whether there is any solder ball due to excessive addition of solder on the wire connections
<b>The motor is out of tolerance</b>	Acceleration and deceleration time is too short	Reduce command acceleration or increase drive filtering parameters
	Motor torque is too low	Select the motor with high torque
	The load is too heavy	Check the load weight and quality and adjust the mechanical structure
	The current of power supply is too low	Replace the appropriate power supply

## 6. Drive working status LED indication

LED status		Drive status
	Green indicator is on for long time	Drive not enabled
	Green indicator is flickering	Drive working normally
	One green indicator and one red indicator	Motor 1 overcurrent
	Two green indicator and one red indicator	Motor 2 overcurrent
	Three green indicator and one red indicator	Motor 3 overcurrent
	One green indicator and two red indicators	Drive input power overvoltage
	One green indicator and three red indicators	The internal voltage of the drive is wrong

## 7. Guarantee Clause

### 7.1 Warranty period: 18 months

We provide quality assurance for one year from the date of delivery and free maintenance service for our products during the warranty period.

### 7.2 Exclude the following:

- Improper connection, such as the polarity of the power supply is reversed and insert/pull

the motor connection when the power supply is connected.

- Beyond electrical and environmental requirements.
- Change the internal device without permission.

### 7.3 Maintenance process

For maintenance of products, please follow the procedures shown below:

- (1) Contact our customer service staff to get the rework permission.
- (2) The written document of the drive failure phenomenon is attached to the goods, as well as the contact information and mailing methods of the sender.

Mailing address:

Post code:

Tel.: