

R110 PLUS USER MANUAL



Shenzhen Rtelligent Mechanical Electrical Technology Co., Ltd.

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1. Product description

R110-PLUS is a high-voltage digital two-phase stepper motor driver with integrated intelligent motion controller function and built-in S-shaped acceleration and deceleration instructions. Through the USB port, you can easily configure the driver and expand the application of the driver.

1.1 characteristic

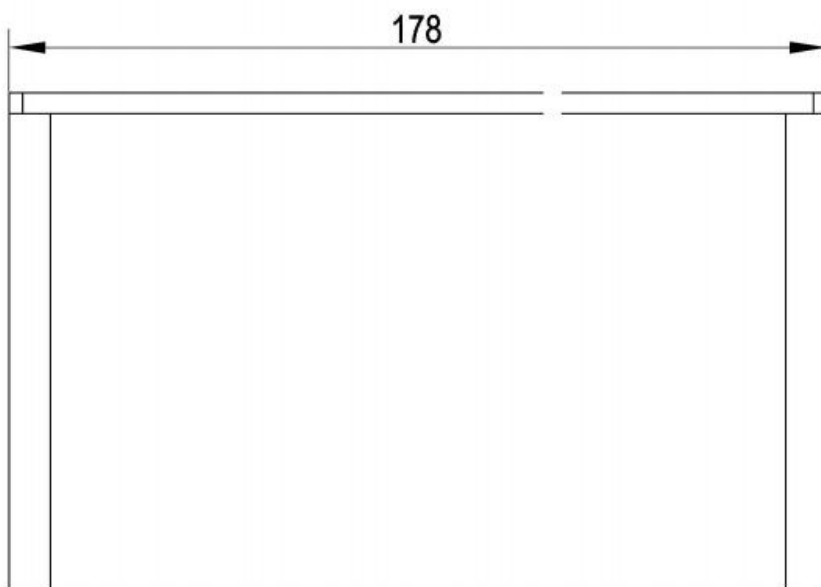
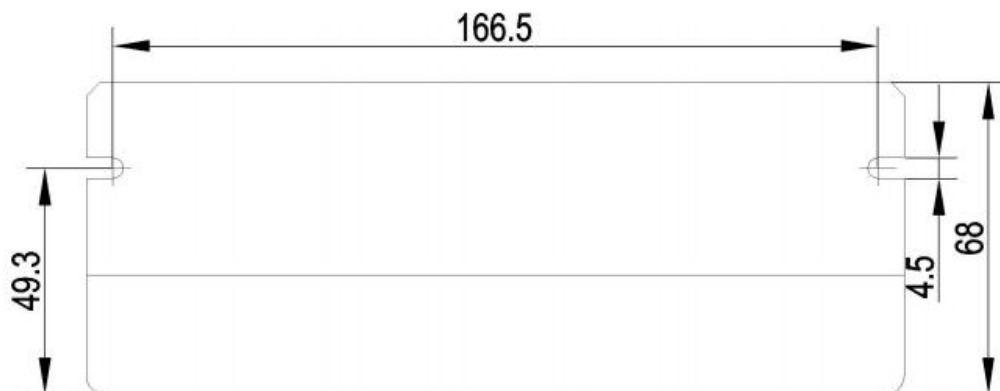
- Working voltage: 110 ~ 220VAC
- Communication method: USB to COM
- Maximum phase current output: 7.2A / phase (sinusoidal peak)
- PUL + DIR / CW + CCW pulse mode is optional
- Phase loss alarm function
- Half-flow function
- Digital IO port:
3 optically isolated digital signal inputs, high level can directly receive 24V DC level;
1 optically isolated digital signal output, maximum withstand voltage 30V, maximum sink or pull current 50mA.
- 8 levels of user-definable current
- 16 levels of user-definable subdivisions, supporting any resolution in the range of 200 ~ 65535
- IO control mode, support 16-speed speed customization
- Programmable input port and output port

2. Application environment and installation

2.1 Application environment requirements

project	R110-PLUS
Installation Environment	Avoid dust, oil, and corrosive environments
vibration	0.5G (4.9m / s ²) Max
Use temperature / humidity	0 °C ~ 45 °C / 90% RH or less (non-condensing)
Storage and transportation temperature	-10 °C ~ 70 °C
cooling method	Free cooling / Keep away from heat sources
waterproof level	IP54

2.2 Drive installation size



3. Drive ports and wiring

3.1 Power and motor port function description

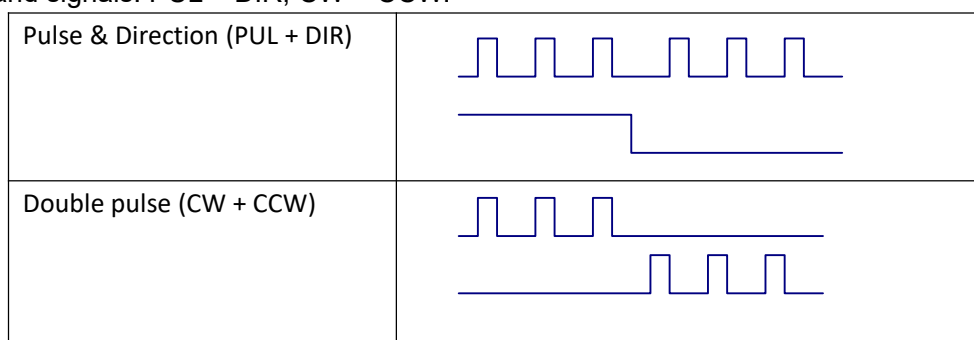
Features	Label	Definition	Note	
power supply	PE	Single-phase 220VAC power input		
	AC			
	AC			
Motor	PE	Two-phase stepping motor B-phase winding	Reversing A +, A- or B +, B- can make the motor run in the opposite direction	
	B-			
	B+			
	A-			single -phase winding of
	A+			two-phase stepper motor

3.2 Control signal wiring

Features	Label	Description
Pulse / IN1	PUL+	The control signal is 5 ~ 24V compatible. No additional current limiting resistor is required.
	PUL-	
Direction / IN2	DIR+	
	DIR-	
Enable / IN3	ENA+	
	ENA-	
Alarm / OUT1	ALM+	Optocoupler isolation, open collector output
	ALM-	Description

3.2.1 PUL、DIR(IN1, IN2) port

When working in external pulse command mode by default, R110-PLUS can receive two pulse command signals: PUL + DIR, CW + CCW.



The command form of the external pulse is set by the debugging software:

Set by DIP switch 10SW10 = OFF, PUL+DIR
SW10 = ON, CW+CCW

3.2.2 ENA (IN3) port:

The default ENA port is the drive offline (enabled) function:

When the internal photocoupler is turned off, the driver outputs current to the motor;

When the internal photocoupler is turned on, the driver will cut off the current of each phase of the motor to make the motor in a free state. At this time, the step pulse is not responded.

When the motor is in an error state, the enable is automatically disconnected.

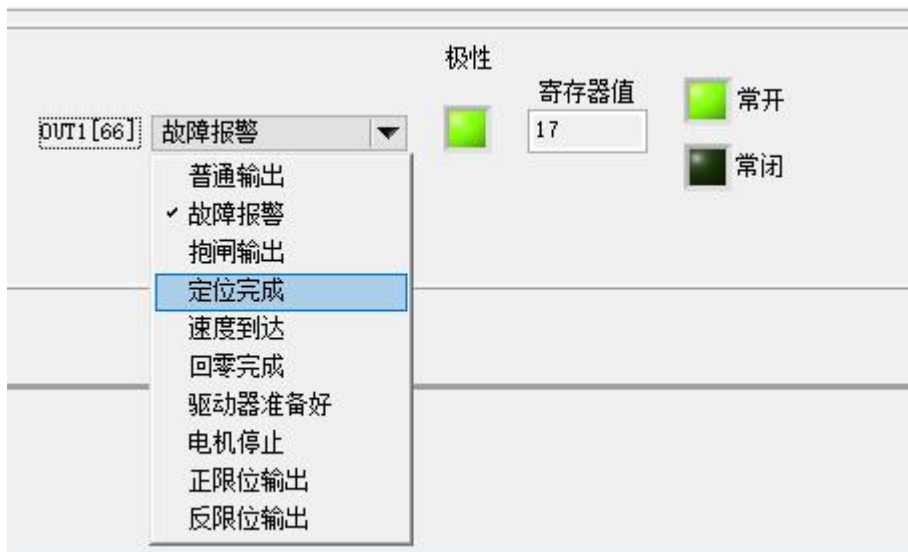
The level logic of the enable signal can be set to the opposite.

At the same time, this port can be multiplexed with other functions like IN1 and IN2.

3.2.3 ALM (OUT1) port:

The driver includes an optically isolated output port ALM. By default, the ALM port is an alarm output. When the driver is in an error state and a normal working state, the ALM outputs different optocoupler levels.

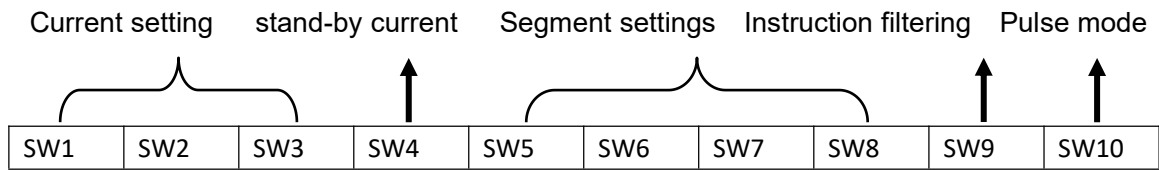
At the same time, it can be reused for other functions, as shown below:



3.3 USB port

The USB is a micro usb connection port, and a USB driver needs to be installed.

4. DIP code and operating parameter settings



4.1 Current setting

Sine peak A	SW1	SW2	SW3	Note
2.3	on	on	on	User can set 8 levels of current through debugging software
3.0	off	on	on	
3.7	on	off	on	
4.4	off	off	on	
5.1	on	on	off	
5.8	off	on	off	
6.5	on	off	off	
7.2	off	off	off	

4.2 stand-by current

SW4 is used to set the current percentage of the driver when it is in standby.

SW4 = ON, as long as the driver is in the enabled state, the current remains at the set current

SW4 = OFF. After the driver stops receiving pulses for a certain time, it enters the standby state, and the current drops to a certain percentage of the set current.

The default setting is: 1 second after stopping receiving the pulse, the motor winding current will be 50%.

4.3 Pulse per revolution setting

Set the number of pulses required for one revolution of the motor. Due to digital control, the number of subdivisions can be set to any number between 200 and 65535.

Steps / revolution	SW5	SW6	SW7	SW8	Note
7200	on	on	on	on	Users can set 16 levels of subdivision through debugging software
400	off	on	on	on	
800	on	off	on	on	
1600	off	off	on	on	
3200	on	on	off	on	
6400	off	on	off	on	

12800	on	off	off	on
25600	off	off	off	on
1000	on	on	on	off
2000	off	on	on	off
4000	on	off	on	off
5000	off	off	on	off
8000	on	on	off	off
10000	off	on	off	off
20000	on	off	off	off
25000	off	off	off	off

4.4 Pulse command filtering

The built-in pulse command smoothing function of the driver can make the motor start more smoothly.

SW9 = ON, enable pulse command filtering

SW9 = OFF, disable pulse command filtering

The default instruction filtering time is $512 * 61\mu s = 31ms$

The instruction filtering can smooth the motor movement, and also introduces lag. The user needs to choose whether to enable the change function according to the actual situation.

The filtering time can be set by the debugging software:




4.5 Pulse mode setting






SW10 is used to set the form of pulse received by the driver.

SW10 = OFF, pulse + direction mode

SW10 = ON, CW + CCW double pulse mode

5. Driver working status LED indication

LED state	Drive status
	Steady green light Drive is not enabled

	Flashing green	Drive works fine
	1 green, 1 red	Drive overcurrent
	1 green, 2 red	Drive input power overvoltage
	1 green, 3 red	Drive internal voltage error
	1 green, 5 red	Motor phase loss

6. Phase loss alarm

The driver has a motor phase loss alarm function, which can detect the phase loss state that occurs when the motor is stationary and in motion. During the operation of the stepper motor, due to mechanical reasons, the motor winding wire may be loosened and disconnected. At this time, the driver will output an alarm signal to prevent the device from making wrong actions. Since this function depends on the current detection of the motor winding, when the motor current is too small (less than 300mA), this function has a false alarm. At this time, the user can turn off this function. In the parameter management and setting interface of the debugging software, Set parameter 188: Phase loss detection enable, set it to 0.

7. Internal motion control function

When working in the internal pulse command mode, the PUL and DIR ports are used as IO input signals. The IO function needs to be set through the debugging software RStepper Configurator. As shown below:



7.1 Communication control mode

In this mode, the user can make the motor run the specified pulse stroke or jog operation by communicating with the given running command.

Motor operation is controlled by register 18 in internal pulse mode

0: wait state.

When the driver receives any control instruction, it will return to the bit waiting state after processing by the driver. So reading this register always returns 0.

1: Fixed length forward rotation.

In the relative position mode, the motor runs forward according to the 70 ~ 74 register parameters.

In the absolute position mode, the running status is determined according to the current position and the absolute position set from 70 to 74.

2: Fixed length reversal.

In relative position mode, the motor runs in reverse according to the 70 ~ 74 register parameters.

In the absolute position mode, the running status is determined according to the current position and the absolute position set from 70 to 74.

3: Speed mode, continuous forward rotation.

The motor performs forward acceleration operation according to the 75 and 76 registers

4: Speed mode, continuous reverse.

The motor performs reverse acceleration operation according to the 75 and 76 registers

5: Emergency stop.

The motor decelerates and stops according to the 77 register

6: Decelerate to stop.

Position mode, the motor decelerates and stops according to the 71 register

Speed mode, the motor decelerates and stops according to the 76 register

Other: No effect.

7.1.1 Point control mode

The function that the communication controls the motor to run the specified pulse stroke. The specific modes and parameters that need to be set are as follows (the register addresses are

decimal numbers unless otherwise noted or explained):

(1) Set the value of register address 20 (selected by the preset application program in internal pulse mode) to 0 (communication control, respond to the instruction of register address 18);

(2) Set the functions of the digital input and output ports according to the application needs and the actual wiring terminals;

(3) Set motion parameters:

address	unit	Parameter Description
70	R / S ^ 2	Acceleration of point motion
72	RPM	Speed of point motion
73	Command pulse	Low 16-bit register of command pulses for point motion
74	Command pulse	High 16-bit register of command pulses for point motion
78	R / S ^ 2	Emergency stop deceleration
84	-	Set position operation mode:

(4) Communication given operation instruction: Start the point movement by writing the value 1 (fixed length forward rotation), 2 (fixed length reverse rotation) to register 18 (for detailed description of this register, please refer to "Drive Control Mode" Set register 18 in [17 ~ 23]");

(5) During operation, if stopping is required, you can write value 6 (deceleration stop, deceleration is set value of register 71), value 5 (emergency stop stop, deceleration is set value of register 78) to register 18 .

● Note:

- When the motor is running, it only responds to the stop command (deceleration stop or emergency stop). If you need to change the running direction of the motor by instructions, you need to send a stop command to wait for the motor to stop before sending a start signal in the other direction.
- Change the acceleration (register 70), deceleration (register 71), and speed (register 72) during the running of the motor, but the driver will not respond to these settings immediately. The setting will be set after the motor is stopped and restarted again. Set value to run. It is important to point out that the emergency stop deceleration (Register 78) is responded to the emergency stop of the current movement, and there is no need to wait for the emergency stop of the next movement.

7.1.2 Jog control mode

The function of controlling the jog operation of the motor through communication. The specific modes and parameters that need to be set are as follows (the register addresses are decimal numbers unless otherwise noted or explained):

(1) Set the value of register address 20 (selected by the preset application program in internal pulse mode) to 0 (communication control, respond to the instruction of register address 18);

(2) Set the functions of the digital input and output ports according to the application needs and the actual wiring terminals;

(3) Set motion parameters:

address	unit	Parameter Description
75	R/S^2	Acceleration of jog motion
76	R/S^2	Deceleration of jog motion
77	RPM	Speed of jog motion
78	R/S^2	Emergency stop deceleration

(4) Communication given running instruction: Start the point movement by writing the values 3 (continuous forward rotation) and 4 (continuous reverse rotation) to register 18 (for detailed description of this register, please refer to "Drive Control Mode Setting [17 ~ 23]" in register 18);

(5) During operation, if stopping is required, you can write value 6 (deceleration stop, deceleration to the value set in register 76) and value 5 (emergency stop, deceleration to the value set in register 78) to register 18 .

Note:

When the motor is running, it only responds to the stop command (deceleration stop or emergency stop). If you need to change the running direction of the motor by instructions, you need to send a stop command to wait for the motor to stop before sending a start signal in the other direction.

The acceleration (register 75) and deceleration (register 76) are changed during the running of the motor, but the driver will not respond to these set values immediately. The motor will run at the set values only after the motor is stopped and started again. It is important to point out that the emergency stop deceleration (Register 78) is responded to the emergency stop of the current movement, and there is no need to wait for the emergency stop of the next movement.

The speed can be changed during the operation of the motor (register 77), and the driver will respond immediately, that is, the motor will immediately run at the set speed value, and there is no need to restart after stopping to respond.

7.2 IO control: start / stop + direction

In this mode, two IN ports are used to control the operation of the motor. One of the IN terminals is used to control the start / stop of the motor, and one IN terminal is used to control the running direction of the motor. The specific settings are as follows:

(1) Command working mode: 0-internal pulse mode

(2) Internal application mode: 2-IO speed control: start / stop + direction



MODBUS地址	参数名称	参数值	默认值	单位	最小值	最大值	读写属性
17	Pulse source	0-Inner Pulse command	1	—	0	1	RW
19	Pulse mode	0-PUL+DIR	0	—	0	1	RW
20	App	2-IO Speed:Start+dir	2	—	0	20	RW
21	Motor type	0-Two phase	0	—	0	1	RW
23	Motion direction	0-Normal	0	—	0	1	RW
26	Idle current	50	50	%	1	100	RW

(3) IO settings:



(4) The speed for this mode is the speed defined by the speedometer, selected by SW5, 6, 7, 8

(5) Set motion parameters, you can modify acceleration and deceleration



7.3 IO Control: Forward + Reverse

Same as 7.2, you only need to modify (2) to: 3-IO speed control: forward + reverse.



9. Common problems and countermeasures

phenomenon	Possible situation	solution
Motor does not turn	Power light is off	Check the power supply circuit for normal power supply
	The motor locks the shaft but does not rotate	Weak pulse signal, signal current increased to 7-16mA
	Too slow	Select the right segment
	Drive protected	Eliminate the alarm and power on again
	Enable signal problem	Pull the enable signal high or not
	Incorrect command pulse	Check if the upper computer has pulse output
Motor turning error	Motors turn in opposite directions	Adjust motor wiring, or change direction with software
	Motor line is open	Check if the connection is bad
	The motor has only one direction	Incorrect pulse mode or damaged DIR port
Alarm indicator is on	Motor wire is incorrectly connected	Check motor wiring
	Voltage is too high or too low	Check power
Position or speed error	Signal is disturbed	Eliminate interference, reliable grounding
	Incorrect input	Check the host computer instructions to ensure the correct output
	Pulse setting error per revolution	Check DIP switch status and connect
Driver terminal burned out	Short between terminals	Check power polarity or external short circuit
	Too much internal resistance between terminals	Check if there is excessive solder added to the wire-to-wire connection

Appendix A. Guarantee Clause

A.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.

A.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.

A.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.: