



MC556-2A Step Drive

User Manual

Shenzhen Xinlichuan Electric Co., Ltd.

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Chapter I Product Introduction

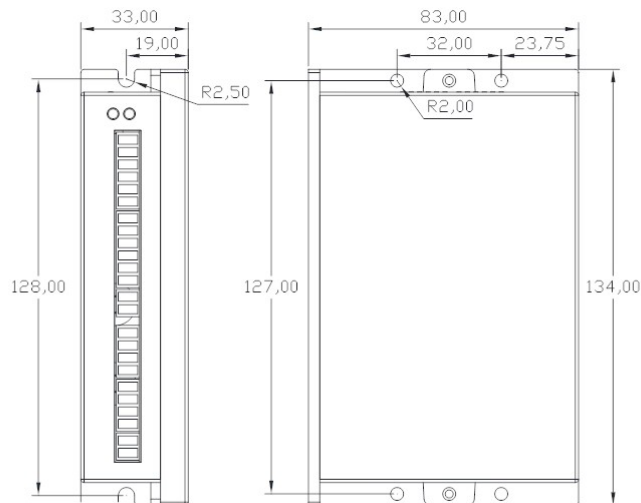
1.1 Product Introduction

MC556-2A, developed based on the latest generation 32-bit DSP chips, is a digital step drive device controlled by one drive and two axes and used for 57-, 60- and 86-seat step motors; This drive integrates two control modes regarding external pulse and IO spontaneous pulse and can be used to independently or synchronously control the two-axis step motors for precise positioning or control motor running through external IO velocity regulation. This drive integrates the stepping of the two axes, saving not only one pulse axis and the cost, but also improving the flexibility and convenience of on-site application.

1.2 Product specification

- ◆ Supporting two control modes, i.e. external pulse and IO spontaneous pulse control modes
- ◆ Voltage input range: 24~50 VDC
- ◆ Max. current: 5.6A
- ◆ Subdivision/velocity range: 1000~12800ppr/60~540r/min
- ◆ Signal input: differential/single-ended, pulse/direction or dual-pulse
- ◆ Pulse response frequency: 200KHz
- ◆ Supporting parameter configuration setting through serial port

1.3 Mounting dimensions

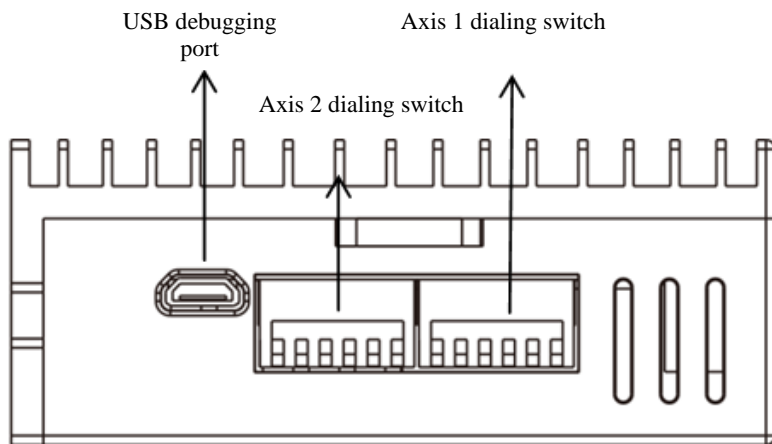
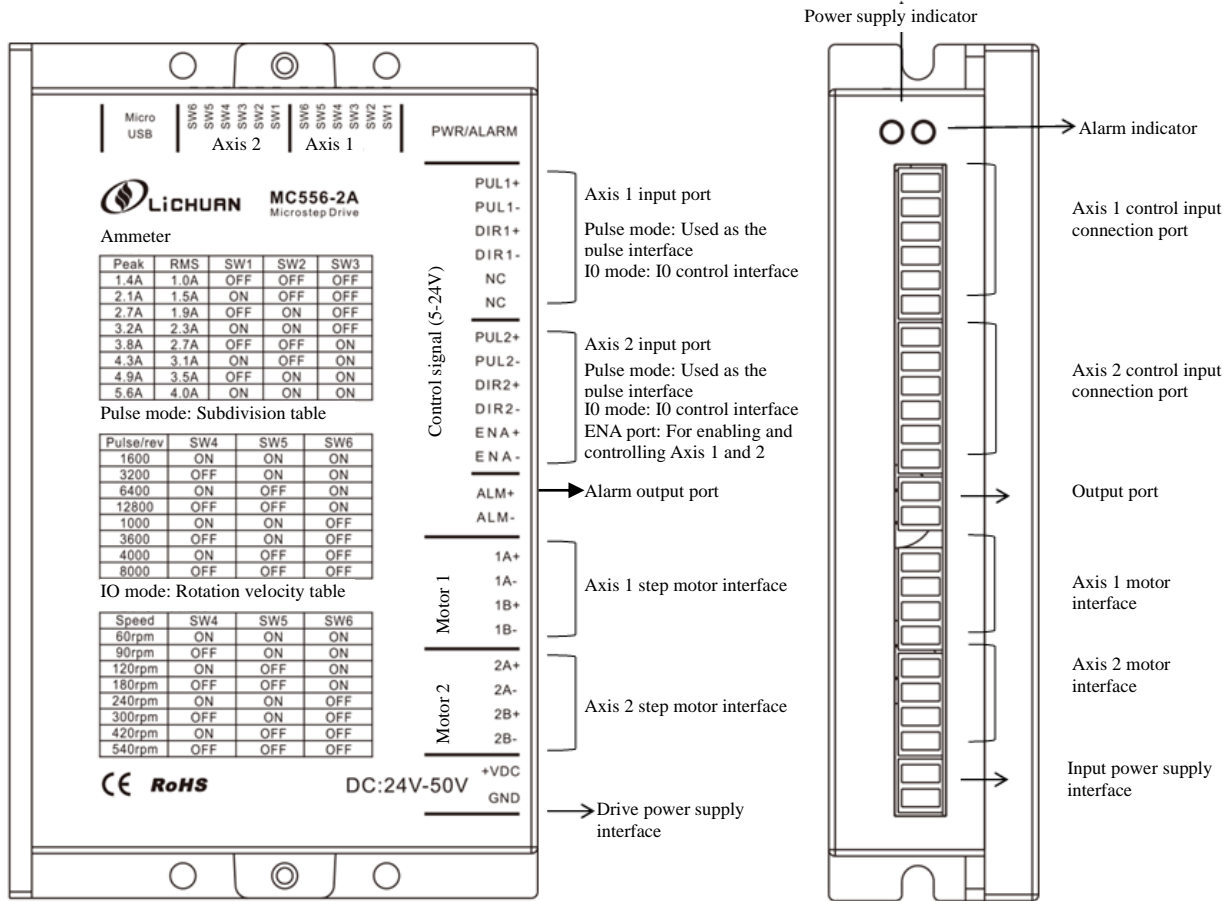


Drive mounting dimensions

Fig. 1 Drive mounting dimensions

Chapter II Description of Product Function

2.1 Description of terminal function



Drive function interfaces

2.1.2 Control terminal

Terminal name	Description
PUL1+	Axis 1 - External pulse mode: as the pulse signal input, signal voltage: 5V-24V; Pulse input mode: pulse + direction (as the pulse port), dual-pulse (as the CW port); The effective edge of the pulse is adjustable, and the default rising edge of the pulse is effective; In order to reliably respond to the pulse signal, the pulse width should be higher than 2.5 μ s. Axis 1 - IO spontaneous pulse mode: the control end for motor startup, the velocity can be adjusted through SW4-SW6.
PUL1-	
DIR1+	Axis 1 - External pulse mode: as the direction port input, signal voltage: 5V-24V; Pulse input mode: pulse + direction (as the direction port), dual-pulse (as the CW port); High/low level signal. In order to ensure the reliable commutation of the motor, the generated direction signal should be at least 5 μ s prior to the pulse signal. Axis 1 - IO spontaneous pulse mode: the direction signal control end for motor direction switching.
DIR1-	
NC	Not connected
NC	Not connected
PUL2+	Axis 2 - External pulse mode: as the pulse signal input, signal voltage: 5V-24V; Pulse input mode: pulse + direction (as the pulse port), dual-pulse (as the CW port); The effective edge of the pulse is adjustable, and the default rising edge of the pulse is effective; In order to reliably respond to the pulse signal, the pulse width should be higher than 2.5 μ s. Axis 2 - IO spontaneous pulse mode: the control end for motor startup, the velocity can be adjusted through SW4-SW6.
PUL2-	
DIR2+	Axis 2 - External pulse mode: as the direction port input, signal voltage: 5V-24V; Pulse input mode: pulse + direction (as the direction port), dual-pulse (as the CW port); High/low level signal. In order to ensure the reliable commutation of the motor, the generated direction signal should be at least 5 μ s prior to the pulse signal. Axis 2 - IO spontaneous pulse mode: the direction signal control end for motor direction switching.
DIR2-	
ENA+	Enabling the control signal, which, as an input signal, is used to enable or disable the output of Drive Axis 1 and 2. When the ENA is connected to a low level (or the internal optocoupler is connected), the drive will cut off the current of each phase of the motor to make the motor be in a free state and do not respond to the step pulse. When this function is not required, just enable signal terminal suspension. (Signal voltage: 5-24V)
ENA-	
ALM+	For alarm output signal, 24 power supply shall be connected externally; When the axis 1 or axis 2 motor alarms, the signal is output through the alarm port. (The interface is normally open by default, namely, the signal will be output during alarming, which can be set to normally closed by changing the parameter PA-25 to 1 through software communication, namely, the signal will be disconnected during alarming.)
ALM-	

2.1.3 Motor winding terminal

Terminal name	Description
1A+	1-axis motor A / B Phase winding interface Motor commutation mode: A /B phase winding commutation, A+ / A - commutation, B+ / B - commutation; All three modes can change the direction of the motor.
1A-	
1B+	
1B-	
2A+	2-axis motor A / B Phase winding interface Motor commutation mode: A /B phase winding commutation, A+ / A - commutation, B+ / B - commutation; All three modes can change the direction of the motor.
2A-	
2B+	
2B-	

2.1.4 Power supply terminal

Terminal name	Description
+VDC	Voltage input terminal: DC24-50V supported Recommended power supply: 36V, 10A or 48V, 6A or higher
GND	

2.2 Dial function description

2.2.1 Current setting

PEAK (peak current)	RMS (root-mean-square current)	SW1	SW2	SW3
1.4A	1.0A	OFF	OFF	OFF
2.1A	1.5A	ON	OFF	OFF
2.7A	1.9A	OFF	ON	OFF
3.2A	2.3A	ON	ON	OFF
3.8A	2.7A	OFF	OFF	ON
4.3A	3.1A	ON	OFF	ON
4.9A	3.5A	OFF	ON	ON
5.6A	4.0A	ON	ON	ON

2.2.2 Subdivision setting (external pulse mode)

Subdivision	SW4	SW5	SW6
1600	ON	ON	ON
3200	OFF	ON	ON
6400	ON	OFF	ON
12800	OFF	OFF	ON
1000	ON	ON	OFF
3600	OFF	ON	OFF
4000	ON	OFF	OFF
8000	OFF	OFF	OFF

2.2.3 Velocity setting (under IO spontaneous pulse mode)

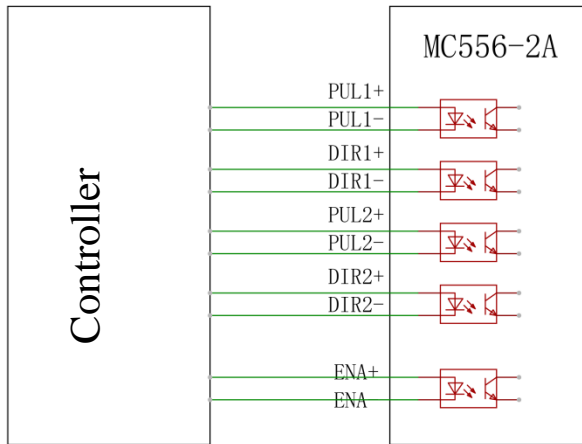
Velocity	SW4	SW5	SW6
60rpm	ON	ON	ON
90rpm	OFF	ON	ON
120rpm	ON	OFF	ON
180rpm	OFF	OFF	ON
240rpm	ON	ON	OFF
300rpm	OFF	ON	OFF
420rpm	ON	OFF	OFF
540rpm	OFF	OFF	OFF

Chapter III Wiring and Control Description

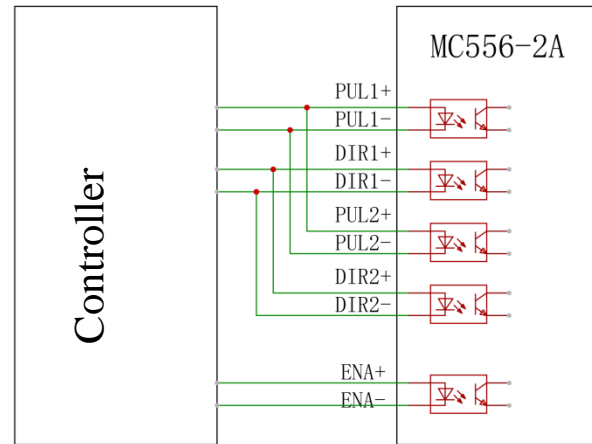
3.1 External pulse control mode

The control mode parameter PA-014 is set to 0 (Drive default: 0; 0: Position mode, 1: IO spontaneous pulse control mode)

3.1.1 Differential control wiring



Two-axis independent control wiring mode



Two-axis synchronous control wiring mode

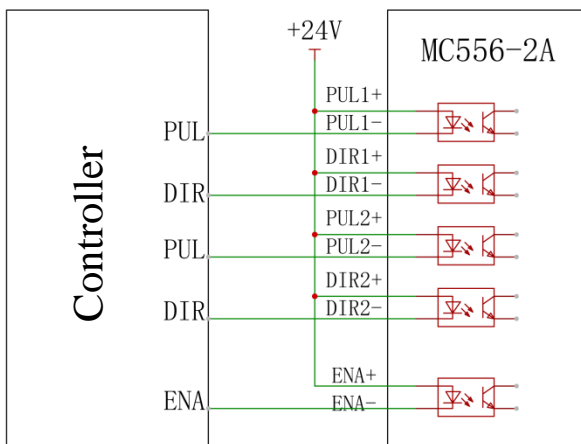
The differential input signal is generally based on the input connection for CNC system or motion controllers and motion control board cards. Signal voltage: 5V output.

Independent control mode: The independent motion control of Axis 1 and 2 motors can be allowed through two pulse-direction axis groups;

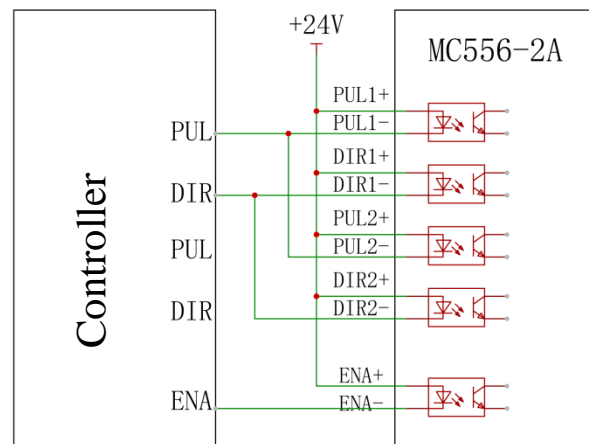
Synchronous control mode: The synchronous control of Axis 1 and 2 can be allowed through one pulse - direction group connected in parallel to Axis 1 and 2 control ports.

Note: Axis-1 and 2 motors are controlled at the same time by enabled ports and cannot be controlled separately; Both Axis 1 and 2 motors are subject to free conditions at the same time after being enabled.

3.1.2 Collector NPN control wiring



Two-axis independent control wiring mode



Two-axis synchronous control wiring mode

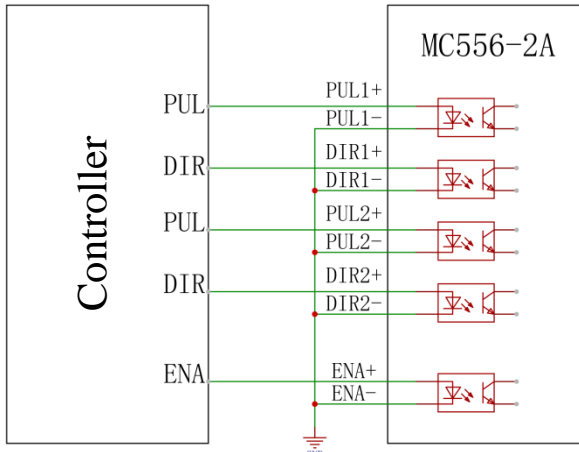
The collector NPN signal input is generally related to PLC or SCM output signals. The control signal from NPN upper computer output is related to OV output.

Independent control mode: The independent motion control of Axis 1 and 2 motors can be allowed through two pulse-direction axis groups;

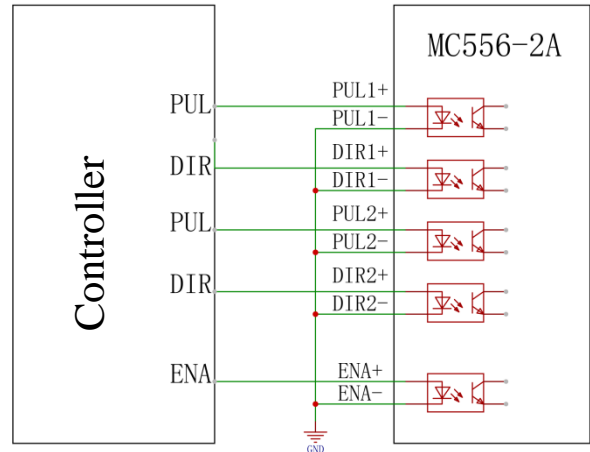
Synchronous control mode: The synchronous control of Axis 1 and 2 can be allowed through one pulse - direction group connected in parallel to Axis 1 and 2 control ports.

Note: Axis-1 and 2 motors are controlled at the same time by enabled ports and cannot be controlled separately; Both Axis 1 and 2 motors are subject to free conditions at the same time after being enabled.

3.1.3 Collector PNP control wiring



Two-axis independent control wiring mode



Two-axis synchronous control wiring mode

The collector PNP signal input is generally related to PLC or SCM output signals. The control signal from PNP upper computer output is related to 24V output.

Independent control mode: The independent motion control of Axis 1 and 2 motors can be allowed through two pulse-direction axis groups;

Synchronous control mode: The synchronous control of Axis 1 and 2 can be allowed through one pulse - direction group connected in parallel to Axis 1 and 2 control ports.

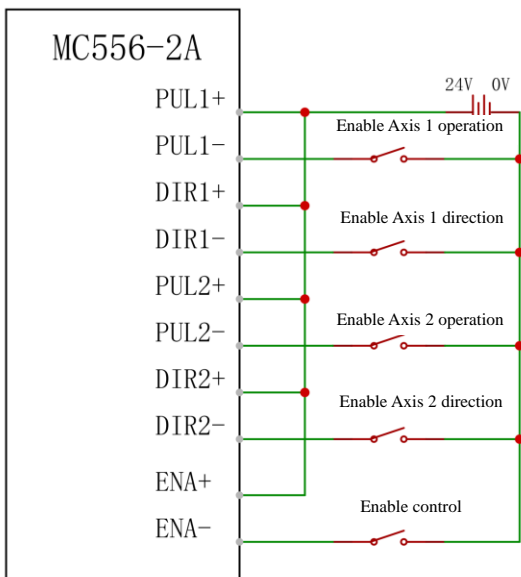
Note: Axis-1 and 2 motors are controlled at the same time by enabled ports and cannot be controlled separately; Both Axis 1 and 2 motors are subject to free conditions at the same time after being enabled.

3.2 IO spontaneous pulse control mode

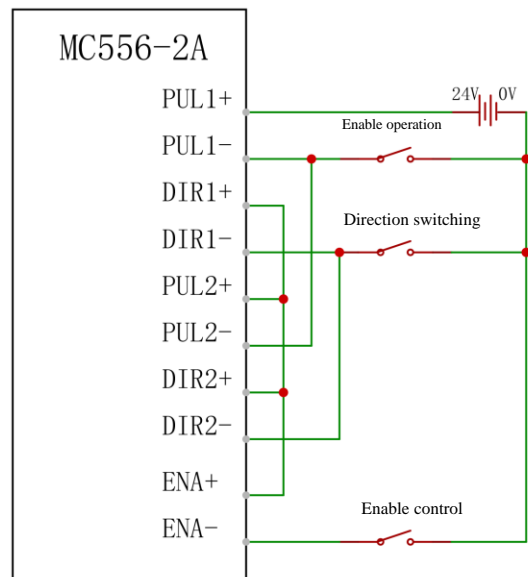
The control mode parameter PA-014 is set to 1 (Drive default: 0; 0: Position mode, 1: IO spontaneous pulse control mode) ;

The motor operation is dependent on the velocity settings.

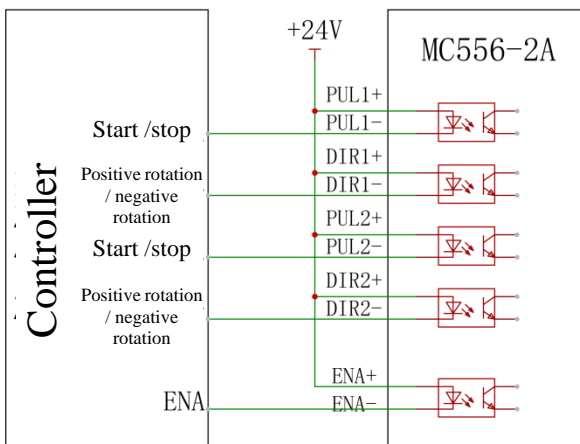
3.2.1 Collector NPN control wiring



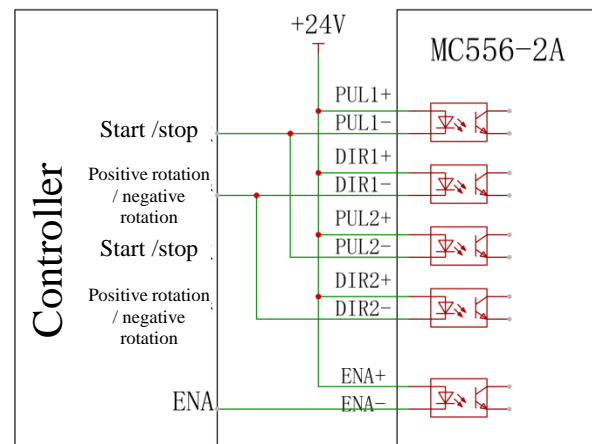
Two-axis independent switch control wiring mode



Two-axis synchronous switch control wiring mode



Two-axis independent PLC control wiring mode



Two-axis synchronous PLC control wiring mode

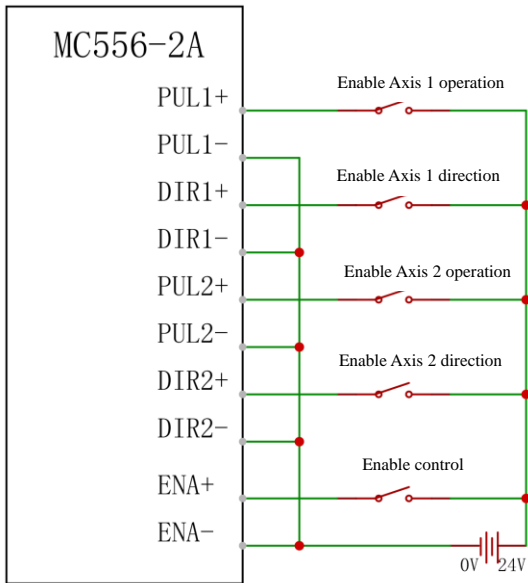
The collector NPN signal input is generally related to PLC or SCM output signals. The control signal from NPN upper computer output is related to OV output. It can also be controlled with an external switch.

Independent control mode: The independent start / stop control of Axis 1 and 2 motors can be allowed through two external starting direction signals;

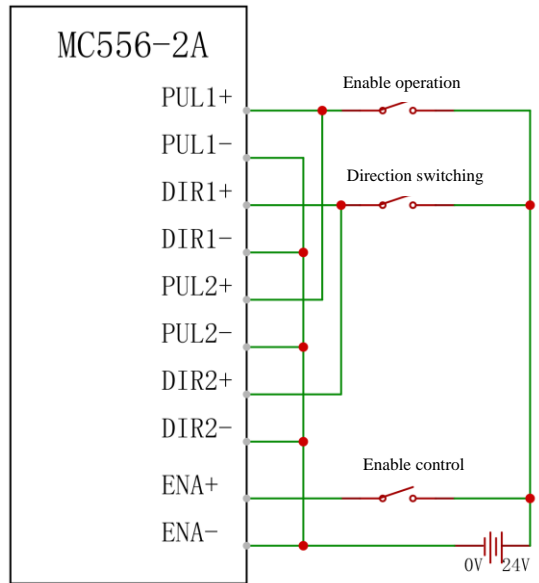
Synchronous control mode: The synchronous start / stop control of Axis 1 and 2 can be allowed through one starting- direction group connected in parallel to Axis 1 and 2 control ports.

Note: Axis-1 and 2 motors are controlled at the same time by enabled ports and cannot be controlled separately; Both Axis 1 and 2 motors are subject to free conditions at the same time after being enabled.

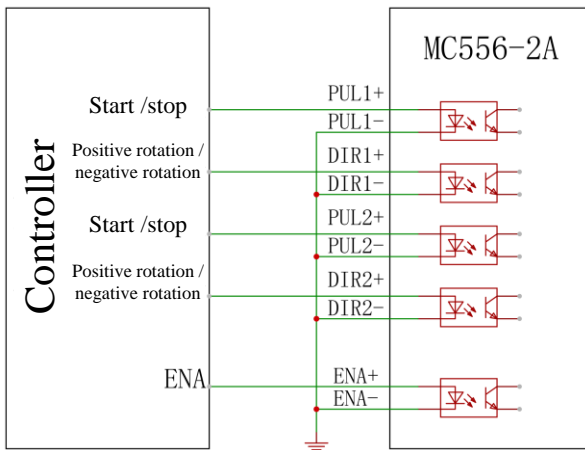
3.2.2 Collector PNP control wiring



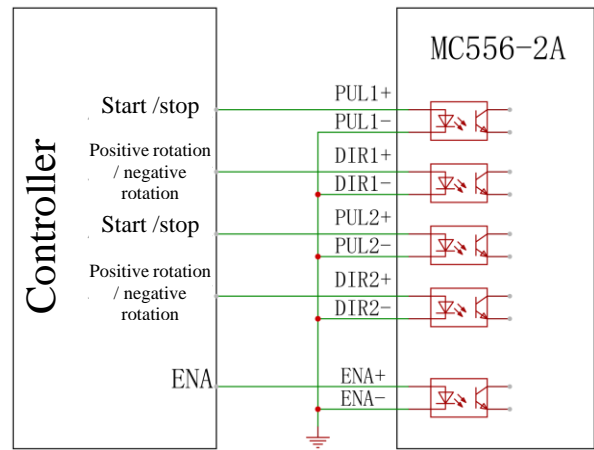
Two-axis independent switch control wiring mode



Two-axis synchronous switch control wiring mode



Two-axis independent PLC control wiring mode



Two-axis synchronous PLC control wiring mode

The collector PNP signal input is generally related to PLC or SCM output signals. The control signal from PNP upper computer output is related to 24V output. It can also be controlled with an external switch.

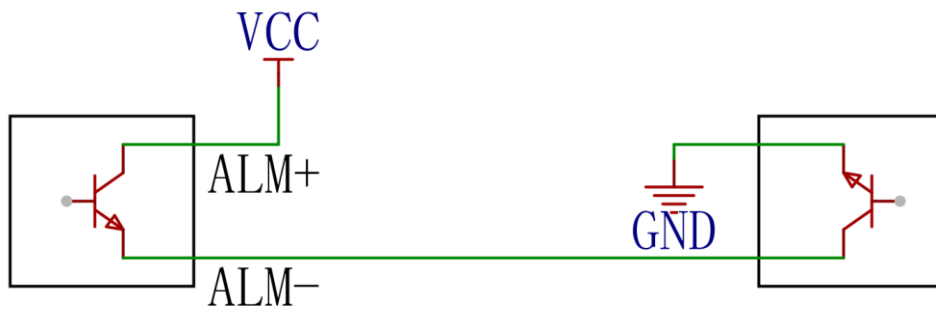
Independent control mode: The independent start / stop control of Axis 1 and 2 motors can be allowed through two external starting direction signals;

Synchronous control mode: The synchronous start / stop control of Axis 1 and 2 can be allowed through one starting- direction group connected in parallel to Axis 1 and 2 control ports.

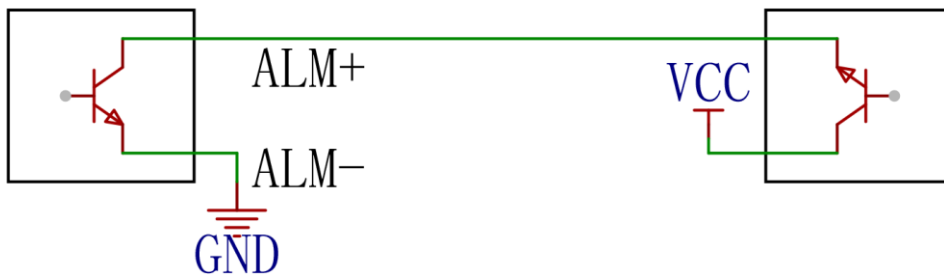
Note: Axis-1 and 2 motors are controlled at the same time by enabled ports and cannot be controlled separately; Both Axis 1 and 2 motors are subject to free conditions at the same time after being enabled.

3.3 Alarm output

High level for alarm output



Low level for alarm output



Chapter IV Parameter Description

No.	Register address	Parameter description	Default value	Parameter range	Unit	Property
PA_00	0	Axis 1 current setting	1400	100~6000	mA	R/W/S
PA_01	1	Axis 1 PPR	8000	200~51200	p	R/W/S
PA_02	2	Axis 1 semi-flow time	400	0~15000	ms	R/W/S
PA_03	3	Axis 1 semi-flow ratio	50	0~100	%	R/W/S
PA_04	4	Determination time of Axis 1 phase loss	100	0~1000	ms	R/W/S
PA_05	5	Fault detection enabling	11	3~255		R/W/S
PA_06	6	Axis 1 filtering level	5	0~10	$2^0 \sim 2^{10}$	R/W/S
PA_07	7	Positive direction level of Axis 1	0	0~1	0: Positive direction; 1: Negative direction	R/W/S
PA_08	8	Enabling level	1	0~1	0: Normally closed, 1: Normally open	R/W/S
PA_09	9	Axis 1 Current Loop Kp	220	50~5000		R/W/S
PA_10	10	Axis 1 Current Loop Ki	30	1~500		R/W/S
PA_11	80	Effective edge setting of pulse	0	0~1	0: Rising edge, 1: Falling edge	R/W/S
PA_12	81	Pulse input mode	1	0~1	0: Dual-pulse, 1: Pulse + direction	R/W/S
PA_13	82	Control mode	1	0~1	0: Spontaneous pulse, 1: External pulse	R/W/S
PA_14	112	Axis 1 default velocity under velocity mode	60	0~3000	rpm	R/W/S
PA_15	113	Axis 1 acceleration time under velocity mode	200	1~32767	ms	R/W/S
PA_16	114	Axis 1 deceleration time under velocity mode	100	1~32767	ms	R/W/S
PA_17	256	Axis 2 current setting	1400	100~6000	mA	R/W/S
PA_18	257	Axis 2 PPR	8000	200~51200	p	R/W/S
PA_19	258	Axis 2 semi-flow time	400	0~15000	ms	R/W/S

PA_20	259	Axis 2 semi-flow ratio	50	0~100	%	R/W/S
PA_21	260	Determination time of Axis 2 phase loss	100	0~1000	ms	R/W/S
PA_22	261	Control method under velocity mode	0	0~1		R/W/S
PA_23	262	Axis 2 filtering level	5	0~10		R/W/S
PA_24	263	Positive direction level of Axis 2	0	0~1	0: Positive direction; 1: Negative direction	R/W/S
PA_25	264	Logic setting of alarm output port	1	0~1	0: Normally closed, 1: Normally open	R/W/S
PA_26	265	Axis 2 Current Loop Kp	220	50~5000		R/W/S
PA_27	266	Axis 2 Current Loop Ki	30	1~500		R/W/S
PA_28	368	Axis 1 default velocity under velocity mode	60	0~3000	rpm	R/W/S
PA_29	369	Axis 1 acceleration time under velocity mode	200	1~32767	ms	R/W/S
PA_30	370	Axis 1 deceleration time under velocity mode	100	1~32767	ms	R/W/S
PA_31	12	Saving EEPROM parameters	0	1 effective		R/W
PA_33	250	Clearing EEPROM parameters	0	1 effective		R/W
PA_34	64	Axis 1 input pulse number, H 16-bit	0	100~6000	65536p	R
PA_36	65	Axis 1 input pulse number, L 16-bit	0	200~51200	p	R
PA_37	66	Axis 2 input pulse number, H 16-bit	0	0~15000	65536p	R
PA_38	67	Axis 2 input pulse number, L 16-bit	0	0~100	p	R
PA_39	68	Axis 1 input pulse velocity	0	0~1000	rpm	R
PA_40	69	Axis 2 input pulse velocity	0	3~255	rpm	R
PA_41	70	Bus voltage	0	0~10	0.1V	R
PA_42	255	Software version	0	0~1		R

Chapter V Troubleshooting

Description and handling method of alarm indicator

Number of flashes	Description	Troubleshooting
1 green and 1 red	Axis 1 overcurrent	<ol style="list-style-type: none"> 1. Motor line power line short circuit or motor fault; 2. Incorrect phase sequence of motor power line, check the phase sequence;
2 green and 1 red	Axis 2 overcurrent	<ol style="list-style-type: none"> 3. Incorrect set motor model. Check the motor model; 4. Too heavy load, first check the no-load operation for being normal; 5. Too high set gain parameter, reduce the gain parameter; 6. Internal failure of drive, send it back to the factory for maintenance.
3 green and 2 red	Overvoltage	<ol style="list-style-type: none"> 1. Check for too high power supply voltage, reduce the voltage or replace the power supply if necessary; 2. Internal fault of drive, sent it back to the factory for maintenance.
3 green and 3 red	Undervoltage	<ol style="list-style-type: none"> 1. Check the power supply voltage for being low, reduce the voltage or replace the power supply; 2. Internal fault of drive, sent it back to the factory for maintenance.
1 green and 4 red	Axis 1 phase loss	<ol style="list-style-type: none"> 1. Check the motor power line for being disconnected and the plug for loose insertion;
2 green and 4 red	Axis 2 phase loss	<ol style="list-style-type: none"> 2. Replace the motor and check the motor for malfunction; 1. Motor phase sequence error. Check the motor power line for incorrect connection; 2. Internal fault of drive, sent it back to the factory for maintenance.
3 green and 8 red	EEPROM	Initialize the parameters and restart the device to check for alarms. If the alarms still occur, send it back to the factory for maintenance.



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