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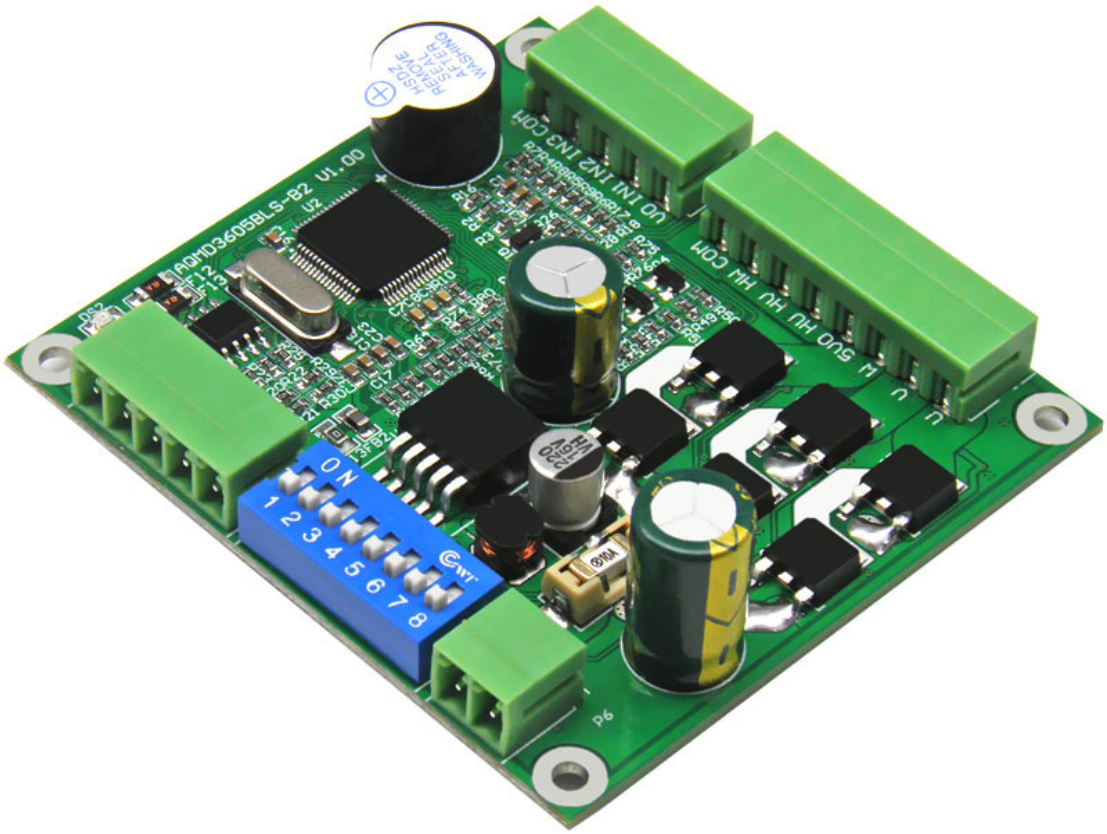
User guide

AQMD3605BLS-B2

9V–36V 5AHigh performance brushless DC motor driver/controller

UM21032301 V0.91 Date: 2021/03/23 **User Manual**

category	content
Keywords	Brushless DC motor, driver, speed regulation, speed stabilization, potentiometer,RS485
summary	AQMD3605BLS-B2User Manual



Revision History

Version	date	reason
V0.90	2021/3/23	Create documents;

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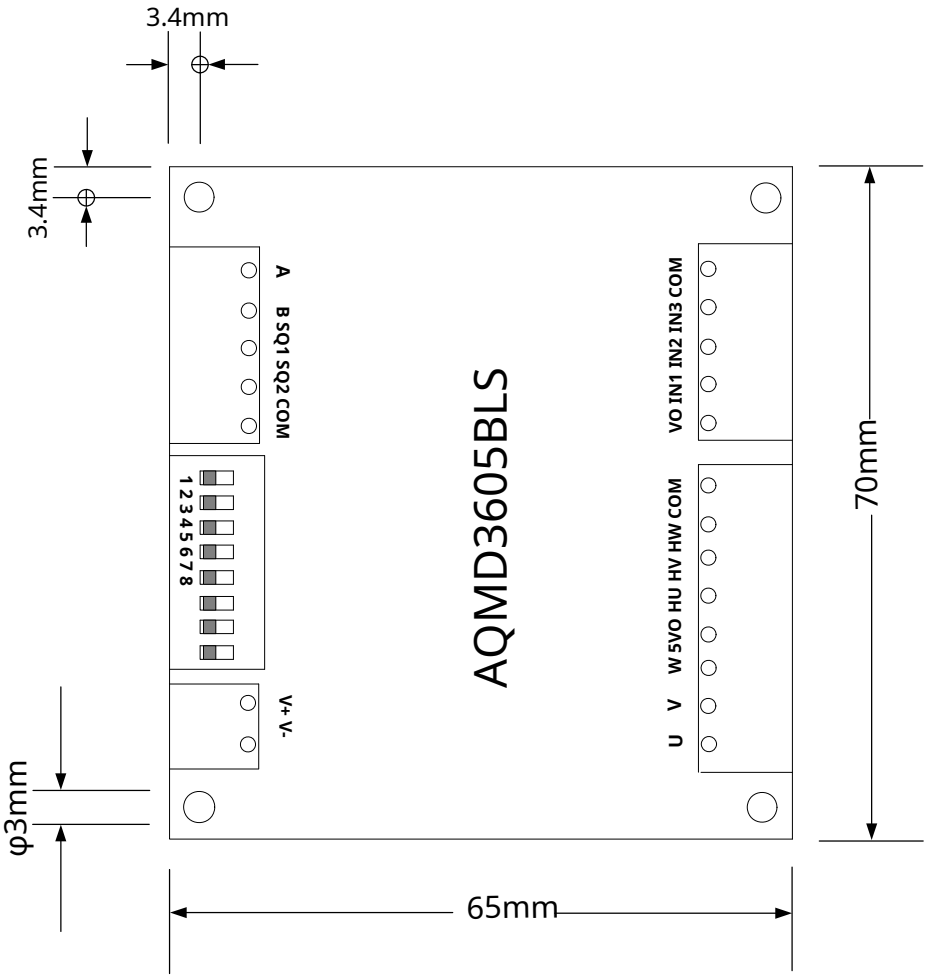
1. AQMD3605BLS-B2DC sensorless brushless motor driver features

- Support voltage9V~36V; Rated output current5A; Large output current7A(non-current doubler)/10A(current doubler) Supports duty cycle speed regulation
- (voltage regulation), torque control (current stabilization), speed closed-loop control (speed stabilization), position closed-loop control (angle, distance control)
and other speed regulation modes
- Support potentiometer, analog signal, logic level, switch quantity,PWM, frequency, pulse,RS485Various input signals
- Support analog signal voltage range configuration and logic level voltage configuration, analog signal support0~3.3VVoltage range, logic level can support0/3.3/5/12/24VEqual voltage; support analog signal linearity adjustment and logic level threshold configuration
- 485Common mode voltage protection, supportRS485Multi-machine communication, supportMODBUS-RTUCommunication protocol, convenient for various controllers (such as PLC)Communication control, support communication interruption shutdown protection Support acceleration and deceleration buffer time and acceleration and deceleration
- acceleration control, can automatically accelerate and decelerate within the specified stroke and accurately locate the motor currentPIDRegulation control, current control
- accuracy0.1A, Maximum starting/load current and braking (brake) current can be configured separately; support motor overload and stall current limiting to prevent overcurrent from damaging the motor
- Support motor phase sequence learning and Hall error protection
- Support motor forward and reverse limit, can connect two limit switches for forward and reverse limit respectively
- Support motor speed measurement, support motor stall detection/stall limit stop Support fault alarm
-
- Supports internal temperature monitoring of the driver, and configurable overheat protection temperature
- Support driver power supply voltage monitoring, configurable overvoltage/undervoltage shutdown monitoring value
- Support double current output, high torque output during startup and heavy load
- 18kHzofPWMFrequency, motor speed regulationPWMVery small noisePWMDead
- zone, only0.5us,PWMEffective Range0.1%~100% Signal interface overvoltage
- protection, the signal interface can withstand a maximum of25VVoltage usageARM
- Cortex-M3@72MHzprocessor

Scope of application

-Scientific research, production, on-site control

1.1Product size



picture1.1Product size definition

Driver dimensions as shown in the figure1.1Dimensions are70mm×65mm×21mmThe mounting hole diameter is3mm, the distance from the center of the mounting hole to the side is3.4mm.

1.2Technical Parameters

surface1.1 AQMD3605BLS-B2Motor drive technical parameters

project	parameter	Remark
Power input voltage	DC 8V~40V	Do not connect the positive and negative poles of the power supply in reverseOtherwise it may burn Fuse. Driver and user control without isolation When connecting the controller, do not share the same ground with the power supply. Cause Analysis See9.1Festival.
Large output current	7A(non-current doubler)/10A(current doubled)	Do not short-circuit the motor output interfaceOtherwise it may damage Bad drive.

Rated output current	5A	
Large soft braking current	3A	
Hall sensor interface output voltage	5V	
Completion/fault signal output voltage	3.3V	
Motor rated current setting range	0.5A~7A	Please configure the rated current parameter of the drive to match The actual rated current of the motor is consistentOtherwise it may lead to Causes slow response, unstable speed regulation or burnt fuse Silk and other consequences.
Current multiplier setting range	1.00~2.00	0Disable current doubler output
Current doubling time setting range	0.1S~99.9S	0Disable current doubler output
Load current setting range	0.5A~7A, And does not exceed the rated current1.5times	
Motor current detection accuracy	0.2A	
Current measurement resolution	0.04A	
Steady flow control accuracy	0.1A	
Temperature effective detection range	- 40℃~125℃	
Temperature detection error	±10℃	Can be corrected by configuring temperature calibration coefficient
Instantaneous overcurrent shutdown current setting range	0~25A	When an abnormally large current appears at the motor interface, the driver The actuator will1msInternal shutdown output
Overtemperature shutdown/overtemperature current limiting temperature setting range	- 40℃~125℃	
Single-ended analog signal input voltage range	Measuring range0~3.3V	Port withstand voltage25V; The measurement voltage range is configurable, It can also be configured as0~1.5Vwait
Differential analog signal input voltage range	Measuring range -3.3V～ +3.3V	Port withstand voltage25V; The measurement voltage range is configurable, It can also be configured as -2V~+2V
Logic level voltage range	0V~24V	High and low level thresholds are configurable, threshold range 0~3.3V, not including0and3.3V
PWM/Pulse input interface supports voltage	0V~24V	$V_{IH} \geqslant 2.15V, 0 \leqslant V_{IL} \leqslant 1.15V$
PWMInput signal supported frequency	Support scope100Hz~10kHz, 100Hz~1kHzWhen the resolution0.1%; 1kHz~10kHzWhen the resolution0.1%~1%	Frequency range below this will not be captured PWMsignal; above this range a capture will occur PWMLow resolution.
Frequency input signal support range	0~10kHz	
5V0Power supply high output current	200mA	
OutputPWMfrequency	18kHz	
OutputPWMResolution	1/1000	
OutputPWMSmall effective pulse width	500ns	
OutputPWMEffective Range	0.1%~100.0%	
PWMSpeed regulation modePWMSetting range	- 100.0%~0,0~100.0%	

Speed closed loop control adjustable range	- 3276.8Hz~3276.7 Hz	unitHzis the motor commutation frequency (number of commutations per second), Motor speed = commutation frequency / number of motor poles *20
Position closed loop control adjustable range	speed0.1~3276.7 Hz Location-2147483648~2147483647	
Real-time commutation frequency optimal measurement range	10Hz~4000Hz	unitHzis the motor commutation frequency, the motor commutation frequency If the rate is lower than this range, no measurement value will be displayed.
Real-time commutation frequency display range	- 32768Hz~32767Hz	When the commutation frequency is -3276.7Hz~3276.7Hz The resolution is within the range0.1Hz
Motor speed indication range	1~655340 RPM	When the commutation frequency is -3276.7Hz~3276.7Hz When the speed is within the range, the resolution is1RPM, exceeding The resolution of this range is10RPM
Stall protection time setting range	0.1s~25.5sor without downtime	
Duty cycle speed regulation mode start response time	Rated current and maximum load current7AThe response time is about0.1s	Test conditions: Use24V60WThe motor is unloaded. PWMDepend on0%Adjust to100%Time required.
Duty cycle speed regulation mode forward and reverse switching response time	Rated current and maximum load current7Ahour, Response time approx.0.3s	Test conditions: Use24V60WThe motor is unloaded. existPWMfor100%Status brake and by0Adjust to -100%Time required.
Closed-loop speed regulation mode start-up response time	Rated current and maximum load current7Ahour, Response time approx.0.3s	Test conditions: Use24V60WThe motor is unloaded. Speed by0Reach the set speed90%Time required.PIDThe parameters are configured appropriately, the acceleration 6500Hz/s.
Closed-loop speed regulation mode forward and reverse switching response time between	Rated current and maximum load current7Ahour, Response time approx.0.5s	Test conditions: Use24V60WThe motor is unloaded. The speed is switched from forward speed to reverse speed setting Speed90%Time required.PIDThe parameters are configured appropriately, the acceleration6500Hz/s.
Position closed loop control accuracy	Acceleration500Hz/shour,1Pulse error Difference; Acceleration2000Hz/shour,2Pulse error Errors are not cumulative.	Test conditions: Use24V60WThe motor is unloaded. Error occurs without correction mode.PIDParameter configuration suitable.
Braking response time	Usually0.1s~0.3s	Test conditions: no load, specific time and motor speed It is related to factors such as kinetic inertia.
485Supported baud rates	1200~115200bps	
Signal port withstand voltage	IN1,IN2,IN3,SQ1,SQ2Withstand voltage0V~+25V; HU,HV,HWWithstand voltage4.9V~+8.2V; VO Withstand voltage0~+3.6V; 5V0,COM Withstand voltage30V~+30V; 485-A,485-B Pressure resistance0~+5.5V;	Driver connected to user controller without isolation When (especially with485-A,485-BorVOport connected)Do not share the same ground with the power supply, cause analysis see9.1 Festival.
Operating temperature	- 25℃~80℃	

1.3Principle Overview

This driver uses leading motor current precision detection technology, inductive brushless motor self-speed detection, inductive brushless motor rotation position detection, regenerative current constant current braking (or braking) technology and powerfulPIDThe regulation technology can perfectly control the motor's smooth forward and reverse rotation, commutation and braking, real-time regulation of output current to prevent overcurrent, precise control of motor speed and rotation position, and short motor response time and small recoil force.

1.3.1Motor acceleration and deceleration control

The soft start mode with automatic current adjustment and acceleration control enables the motor to start quickly and smoothly with little recoil. It supports acceleration and deceleration time and acceleration and deceleration configuration.

1.3.2Motor brake control

The energy consumption braking mode with automatic current adjustment can shorten the motor braking time without strong impact and vibration.
Set.

1.3.3Motor commutation control

The process of the motor's forward and reverse switching is controlled internally by the driver, which automatically performs deceleration, soft braking, and soft start control. No matter how frequently the commutation signal changes, it will not cause damage to the driver or motor.

1.3.4Motor speed control

The speed and rotation position are detected by Hall signal.PIDThe closed-loop control is performed by adjusting the algorithm, and supports two steady-speed control algorithms: speed closed-loop control and time-position closed-loop control. The speed closed-loop method has the characteristics of stable rate control and small overshoot at high speed, but the speed control may be unstable at low speed; the time-position closed-loop control method is suitable for the control requirements of multiple drivers controlling multiple motors to rotate the same angle in the same time, and is also suitable for ultra-low speed control.

1.3.5Motor position control

The rotation position is detected by the Hall signal, usingPIDThe adjustment algorithm performs closed-loop position control and uses energy-consuming braking to decelerate.

1.3.6Motor torque control

Since the motor torque and current are approximately linearly related, this driver uses a steady-current output control method to achieve motor torque control. The user controls the motor torque by adjusting the output current.

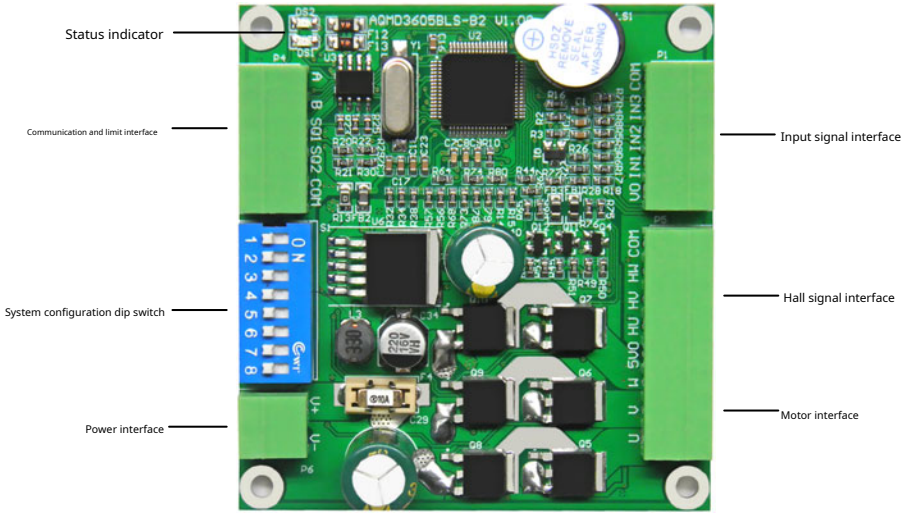
1.3.7Motor overload and stall protection

When the motor is overloaded, the driver will limit the output current to effectively protect the motor; when the motor is stalled, the driver can detect this state and brake the motor.

1.3.8Internal interference suppression

In order to ensure the accuracy of motor loop current measurement, the drive circuit and the control circuit are coupled through interference attenuation and consumption and transient interference suppression, which can effectively ensure that the control circuit is not affected by the interference of the drive circuit.

2.Interface Definition



picture2.1AQMD3605BLS-B2Motor driver interface definition Note: The power interface and motor interface wiring must not be connected together, nor can they be connected together with the input signal, Hall signal, limit or communication interface, otherwise the drive may be damaged.

2.1System configuration dip switch

Before using this driver, you must first configure the motor's rated current, signal source selection, and operating mode. The DIP switch can be used to configure the motor's rated current, signal source, and operating mode in digital/analog signal control mode, as well as485Slave address under communication control mode.

By configuring the rated current of the motor, on the one hand, the maximum load current of the motor is set. When the motor is overloaded or stalled, the driver will stabilize the output current to the rated current to effectively protect the motor; on the other hand, it can make the speed regulation of the motor with the corresponding rated current more stable.

By selecting the signal source, it can support different control signals used by users. This driver can support potentiometers, analog signals, switch quantities, logic levels andPWM/Frequency/pulse etc. input signals.

By configuring the working mode, you can configure different motor speed regulation methods or learn the motor phase sequence and timing. For a newly connected motor, you need to learn the motor phase sequence before you can use it; by selecting different speed regulation methods, you can meet different application needs of users; by learning the motor stroke, users can use potentiometers, analog signals,PWMOr frequency signal to adjust the rotation position of the motor within a fixed stroke.

The system configuration dip switch is shown in the figure2.2As shown.ON, below isOFF. From left to right are1-8Bit.

picture2.2System configuration dip switch

Among them8The bit is the control mode selection bit.8PositionOFFWhen , it is the potentiometer/analog signal control mode; when

No.8PositionONWhenRS-485Communication control mode.

Note: When using the DIP switch to configure parameters, please turn off the power supply of the drive before configuring, and then power it on after configuration.

2.1.1Function definition of each bit of the DIP switch under digital/analog signal control mode

The functions of the DIP switches in digital/analog signal control mode are defined as shown in the table below:2.1shown.

surface2.1Function definition of each bit of the DIP switch under digital/analog signal control mode

No.1-3Bit	No.4-5Bit	No.6-7Bit	No.8Bit
Motor rated current configuration	Signal source selection	Working mode configuration	Control mode bit, digital/analog signal Please dialOFF

2.1.2Motor rated current configuration under digital/analog signal control mode

The motor rated current configuration table under digital/analog signal control mode is shown in the table2.2shown.

surface2.2Motor rated current configuration table under digital/analog signal control mode

No.1Bit	No.2Bit	No.3Bit	No.8Bit	Motor rated current
OFF	OFF	OFF	OFF	use485The configured rated current, default4.9A
ON	OFF	OFF	OFF	1A
OFF	ON	OFF	OFF	2A
ON	ON	OFF	OFF	3A
OFF	OFF	ON	OFF	4A
ON	OFF	ON	OFF	5A
OFF	ON	ON	OFF	6A
ON	ON	ON	OFF	7A

Note: The configuration of the motor rated current should be consistent with the actual rated current of the motor, otherwise it may lead to unstable speed regulation, slow response, fuse burnout or even more serious consequences. The actual rated current of the motor can be obtained from the motor nameplate label, data manual, etc.

2.1.3Selection of signal source under digital/analog signal control mode

surface2.3Signal source selection table under digital/analog signal control mode

No.4Bit	No.5Bit	No.8Bit	Signal Source
OFF	OFF	OFF	Potentiometer
ON	OFF	OFF	analog signal
OFF	ON	OFF	PWM/Frequency/Pulse
ON	ON	OFF	Built-in programs

In digital/analog signal control mode, the signal source can be selected as potentiometer, analog signal,PWM/Frequency/pulse or built-in program.

When the signal source is a potentiometer, use the potentiometer for speed regulation, torque control or position adjustment within a fixed stroke. It supports single potentiometer, dual potentiometer independent and dual potentiometer coordinated control. For the usage of the potentiometer, see3.1.3Section.

When the signal source is an analog signal, use the analog signal for speed regulation, torque control or position adjustment within a fixed stroke. It supports single-ended analog signals, differential analog signals, dual single-ended analog signals independent and dual single-ended analog signals coordinated control. For the usage of analog signals, see3.1.4Section.

When the signal source isPWM/Frequency/Pulse, usePWM/Frequency signal for speed regulation, torque control or fixed stroke

Position adjustment, use pulse signals for speed, torque increment control or position step control. See the usage of pulse signals for details. 3.1.5Section.

When the signal source is a built-in program, the working mode can be configured as motor learning, stroke learning and preset speed control.2.1.4Section.

2.1.4Configuration of working mode under digital/analog signal control mode

The working mode configuration table under digital/analog signal control mode is shown in the table2.4shown.

surface2.4Working mode configuration table under digital/analog signal control mode

No.4Bit	No.5Bit	No.6Bit	No.7Bit	Working Mode
DifferentON		OFF	OFF	Duty cycle speed regulation
		ON	OFF	Torque control
		OFF	ON	Speed closed loop control
		ON	ON	Position closed loop control
At the same timeON		OFF	OFF	Motor Learning
		ON	OFF	Study Tour
		OFF	ON	Preset speed control
		ON	ON	reserve

In digital/analog signal control mode, when the signal source is a potentiometer, analog signal orPWM/When frequency/pulse is selected, the working mode can be configured as duty cycle, torque, speed closed loop and position closed loop control.

The duty cycle speed regulation method adjusts the motor speed by changing the equivalent output voltage. It has the characteristics of fast response, but the speed changes to a certain extent due to load changes, and the torque during stall is related to the duty cycle.

The torque control mode changes the motor torque by adjusting the output current. The torque control mode supports two modes: torque control only and torque and speed control at the same time. In the torque control mode, when the load torque is less than the motor torque, the motor speed will eventually reach the maximum speed. In the torque and speed control mode, in addition to adjusting the motor torque, you can also adjust the motor

The final speed reached.

Speed closed loop control methodPIDThe speed regulation algorithm is used to control the motor at a steady speed. The speed regulation algorithm supports speed closed-loop control and time-position closed-loop control. The former directly adjusts the motor speed, and has the characteristics of small overshoot and smooth speed regulation at high speed, but at low speed, uneven speed regulation may occur; the latter controls the motor rotation position by calculating the position that the motor should rotate over time, thereby indirectly controlling the motor at a steady speed. This method can meet the requirements of multiple drives for synchronous control of the rotation positions of multiple motors and the requirements of ultra-low speed steady speed control, but the speed regulation has a certain overshoot.

Position closed loop control usePIDThe adjustment algorithm is used to control the motor rotation position. When the target position is given, the driver will automatically calculate the target real-time speed of the current rotation position during the motor operation and adjust it according to the configured acceleration, deceleration and maximum speed, so that the motor can accurately rotate to the target position according to the configured speed and acceleration parameters.

When the signal source is a built-in program, the working mode can be configured as motor learning, stroke learning and preset speed control. Motor learning is used to learn the motor phase sequence. Motor learning should be performed before connecting the motor for the first time. The operating steps of motor learning are shown in3.1.2Section.

Stroke learning is used to learn the total stroke pulse number of the motor in a fixed stroke, which is convenient for accelerating the reciprocating motion of the motor in a fixed stroke. The operation steps of stroke learning are shown in3.1.6Section.

The preset speed control mode saves the forward and reverse speeds in the driver, and controls the start and stop and forward and reverse rotation of the motor only through switches or logic levels. This control mode supports duty cycle, torque, speed closed loop, and position closed loop control.

For details, see3.1.7Section.

2.1.5 485Configuration of DIP switches in communication control mode

485The function definitions of the DIP switches in communication control mode are as shown in the table2.5shown.

surface2.5Function definition of each bit of the DIP switch in serial communication control mode

No.1-7Bit	No.8Bit
Slave Address	Control mode bit,485For communication control, please dialON

The device slave address decoding table is shown in the table2.6As shown (i.e. binary mode).

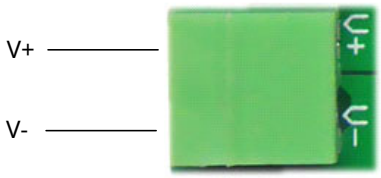
surface2.6Dip switch1-7Slave address decoding table corresponding to bits

No.1Bit	No.2Bit	No.3Bit	No.4Bit	No.5Bit	No.6Bit	No.7Bit	Decoded value
OFF	OFF	OFF	OFF	OFF	OFF	OFF	0x01
ON	OFF	OFF	OFF	OFF	OFF	OFF	0x02
OFF	ON	OFF	OFF	OFF	OFF	OFF	0x03
ON	ON	OFF	OFF	OFF	OFF	OFF	0x04
OFF	OFF	ON	OFF	OFF	OFF	OFF	0x05
ON	OFF	ON	OFF	OFF	OFF	OFF	0x06
OFF	ON	ON	OFF	OFF	OFF	OFF	0x07
...							...
ON	ON	ON	ON	ON	ON	ON	0x80

Note: In potentiometer/analog signal control mode, the slave address of the device is0x01,485The communication baud rate is 9600bps, check mode is even check, stop bit is1Bit.

2.2Power interface

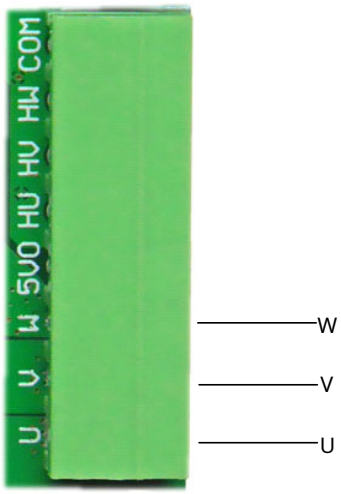
The signal definition of the power interface is shown in the figure2.3shown.V+is the positive pole of the power supply,V-The negative pole of the power supply, the power interface supports a voltage range ofDC9V~36V.



picture2.3Power interface signal definition

2.3Motor interface

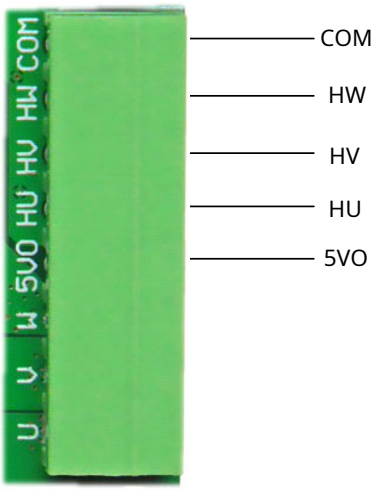
The definition of the motor interface is shown in the figure2.4shown.U,V,WWith motorU,V,WThe phase lines are connected (the connection can be made in any order; when the order of the motor phase lines is changed, the motor needs to be relearned).



picture2.4Motor interface signal definition

2.4Hall signal interface

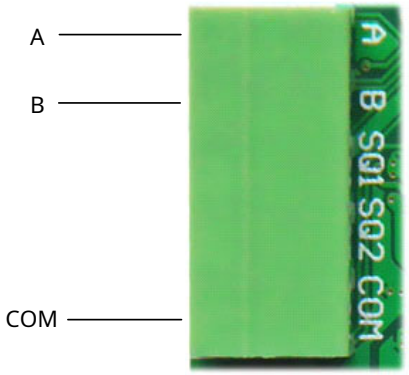
The Hall signal interface definition is as shown in the figure2.5As shown,COMConnect to the negative pole of the Hall sensor.5VOConnect to the positive electrode of the Hall sensor.HW,HV,HUConnect the three Hall signal wires of the Hall sensor respectively (the positive and negative poles of the power supply of the motor Hall sensor must be connected correctly, and the Hall position signalHW,HV,HUThe connections may not be made in sequence. When the wiring sequence of the Hall position signal is changed, the motor needs to be relearned).



picture2.5Hall signal interface definition

2.5Communication interface

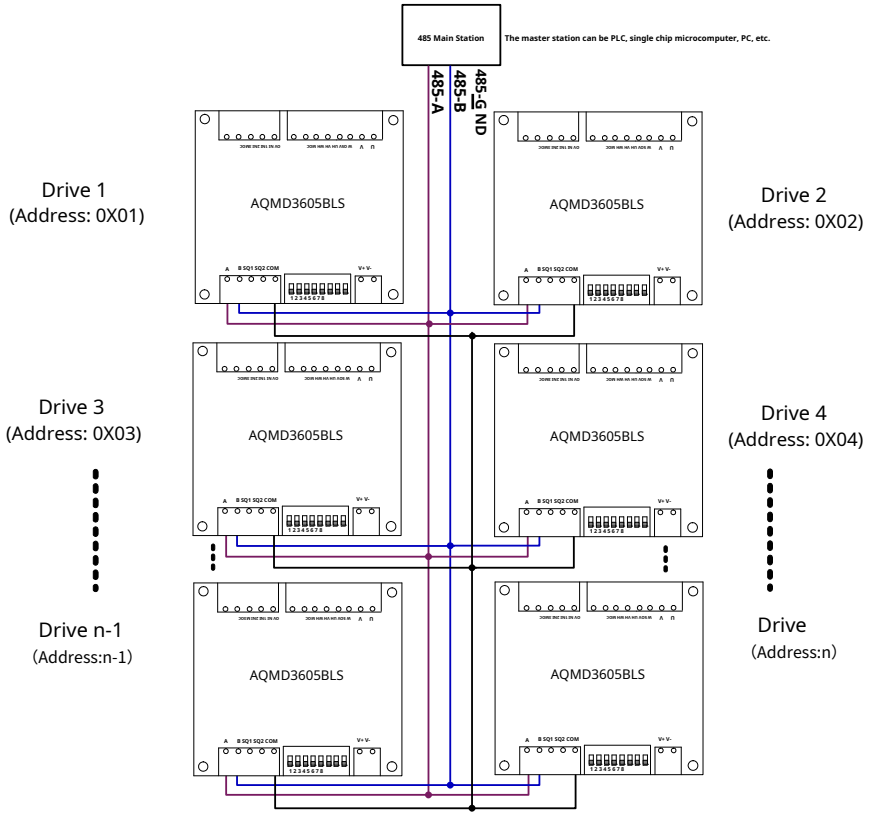
Communication interface supportRS485Communication, signal definition is as shown in the figure2.6shown.A,BForRS485Two differential signalsAandB.COMFor signal ground.Acatch485Signal line of the master stationA,Bcatch485Signal line of the master stationB.



picture2.6 485Communication interface signal definition

This driver supports multi-site communication, that is, multiple drivers485Communication lineAA,BBAfter being connected in parallel with a 485To make the signal more stable, each driverCOMAfter connecting with485The master station can be connected to the signal ground of the master station.PLC, MCU orPCMachine, etc.485The master station operates each drive independently through the different address bit identifications set for each drive.

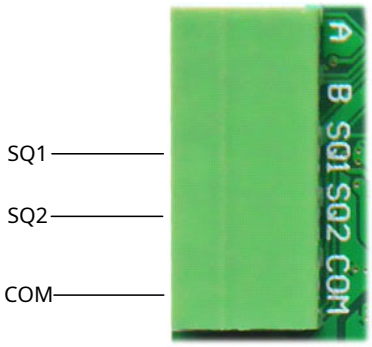
RS485The schematic diagram of multi-site communication is shown in the figure2.7All drives485Signal lineA,BAfter being connected in parallel485Main Station485Signal lineA,BThe address set for each driver connected in parallel should be unique and cannot be the same as other drivers. The configuration method of the driver address is shown in the table.2.6.485The master station specifies which drive to operate through the address byte in the communication frame. Only the drive with the same address as the address specified in the communication frame will respond to the master station's request (see How to configure the slave station address2.1.5If the communication line is long,485Signal lines are connected in parallel120ΩThe terminal resistance is used to eliminate the interference caused by reflection in the communication line.



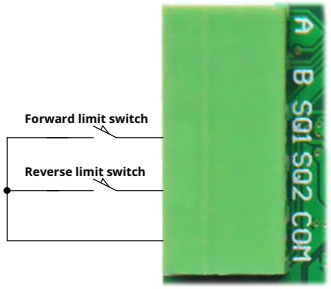
picture2.7 RS485Multi-site communication wiring diagram

2.6Limit interface

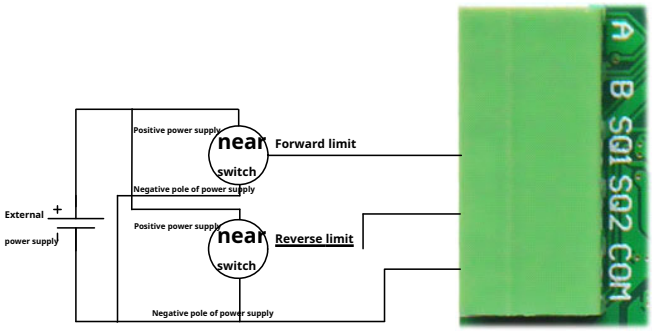
The limit interface signal definition is as shown in the figure2.8The limit interface is used to limit the travel of the mechanical device. Two limit switches can be connected to limit the forward and reverse rotation respectively. The default support is normally open contact limit, which can be485Configured as normally closed contact limit. COMIt is the common terminal of the two limit switches and is connected toSQ1andCOMThe limit switch between the two limits the forward rotation of the motor. SQ2andCOMThe limit switch limits the motor's reverse rotation, as shown in the figure2.9As shown; if using5VPhotoelectric proximity switch or 5VMetal proximity switch as limit switch (driver only supports NPNNormally open/normally closed output proximity switch), then the positive pole of the proximity switch power supply can be connected to the Hall signal interface5VOThe negative pole of the power supply is connected toCOMIf you use more than5VIf the proximity switch is used as a limit switch, an external power supply is required to power the proximity switch.



picture2.8Limit interface signal definition



picture2.9Limit switch connection



picture2.10How to connect the proximity switch as a limit switch

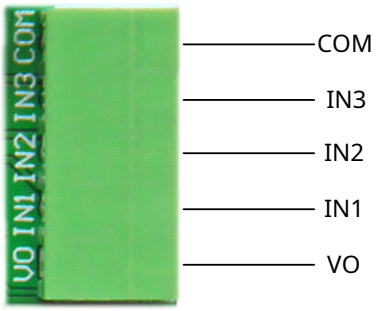
The limit interface trigger level and polarity are configurable (see how to configure the limit interface polarity).6.3.5Sections0x0080Register description), when the trigger mode is level trigger, the motor stops when the limit is triggered, and the motor resumes after the limit is removed; when the trigger mode is edge trigger, the motor stops at the moment of limit trigger, and the motor remains stopped after the limit is removed until the reverse signal is given and the motor starts to rotate. The limit interface trigger logic is shown in the table2.7shown.

surface2.7Limit interface trigger logic

Limit trigger polarity	Motor rotation direction	SQ1state	SQ2state	Limitation
Low level/closed	Forward	Low level/switch closed	Any	Forward limit stop
		High level/switch off	Any	No Action
		High level → Low level → High level /Switch closes once and then opens	Any	The motor pauses for a while. Continue forward
	Reversal	Any	Low level/switch closed	Reverse limit stop
		Any	High level/switch off	No Action
		Any	High level → Low level → High level /After the switch is closed disconnect	The motor pauses for a while. Continue to reverse
High level/disconnect	Forward	Low level/switch closed	Any	No Action
		High level/switch off	Any	Forward limit stop
		Low level → High level → Low level / The switch opens and then closes	Any	The motor pauses for a while. Continue forward
	Reversal	Any	Low level/switch closed	No Action
		Any	High level/switch off	Reverse limit stop
		Any	Low level → High level → Low level /After the switch is disconnected closure	The motor pauses for a while. Continue to reverse
Falling edge/closing moment between	Forward	Low level/switch closed	Any	Forward limit stop
		High level/switch off	Any	No Action
		High level → Low level → High level /Switch closes once and then opens	Any	Forward limit stop and hold hold
	Reversal	Any	Low level/switch closed	Reverse limit stop
		Any	High level/switch off	No Action
		Any	High level → Low level → High level /After the switch is closed disconnect	Reverse limit stop and maintain hold
Rising edge/off instant between	Forward	Low level/switch closed	Any	No Action
		High level/switch off	Any	Forward limit stop
		Low level → High level → Low level / The switch opens and then closes	Any	Forward limit stop and hold hold
	Reversal	Any	Low level/switch closed	No Action
		Any	High level/switch off	Reverse limit stop
		Any	Low level → High level → Low level /After the switch is disconnected closure	Reverse limit stop and maintain hold

2.7Input signal interface

The definition of the input signal interface is shown in the figure2.11As shown in the table, the functions of each signal port are as shown in the table2.8shown.



picture2.11Potentiometer/analog signal interface signal definition

Table 2.8 Functions of each signal port

Speed regulation mode	Function of the port				
	VO	IN1	IN2	IN3	COM
Single potentiometer duty cycle speed control Single potentiometer torque control Single potentiometer closed loop speed control/	For potentiometer electricity	Connect potentiometer to adjust motor speed	Control motor positive change	Control motor reverse	Potentiometer Power Ground
Single potentiometer position control (electric Flat trigger)	For potentiometer electricity	Connect potentiometer to set motor Rotation position	Signal latch	Emergency Stop	Potentiometer Power Ground
Single potentiometer position control (along trigger)	For potentiometer electricity	Connect potentiometer to adjust motor speed	Control motor positive change	Control motor reverse	Potentiometer Power Ground
Dual potentiometers with independent duty cycle Speed Control Dual potentiometer independent closed loop adjustment speed	For potentiometer electricity	Connect potentiometer1Align the motor Speed adjustment	Connect potentiometer2right Motor reverse adjustment speed	Controlling the motor direction	Potentiometer Power Ground
Dual potentiometer independent torque control system	For potentiometer electricity	Connect potentiometer1Adjustment motor Torque	Connect potentiometer2right Motor speed regulation	Controlling the motor direction	Potentiometer Power Ground
Dual potentiometer position independent control system	For potentiometer electricity	Connect potentiometer1Setting the motor Rotation position	Connect potentiometer2right Motor speed regulation	Emergency Stop	Potentiometer Power Ground
Dual Potentiometer Coordinated Duty Cycle Speed Control Dual potentiometer coordinated torque control system Dual potentiometers for closed-loop regulation	For potentiometer electricity	Connect potentiometer1Control Motor Direction and speed	Connect potentiometer2set up Center point reference Voltage	Emergency Stop	Potentiometer Power Ground

speed					
Dual potentiometer position coordinated control system	For potentiometer electricity	Connect potentiometer1Setting the motor Rotation position	Connect potentiometer2set up Center point position	Emergency Stop	Potentiometer Power Ground
Single-ended analog signal duty cycle Speed Control Single-ended analog signal torque control system Single-ended analog signal closed loop modulation speed (Level Trigger)	Fault signal input out	Connect analog signal control circuit Machine speed	Control motor side Towards	stop	Signal Ground
Single-ended analog signal duty cycle Speed Control Single-ended analog signal torque control system Single-ended analog signal closed loop modulation speed (Edge Trigger)	Fault signal input out	Connect analog signal control circuit Machine speed	Control motor positive change	Control motor reverse	Signal Ground
Single-ended analog signal position control system (Level Trigger)	Complete signal input out	Control the motor rotation position	Signal latch	Emergency Stop	Signal Ground
Single-ended analog signal position control system (Edge Trigger)	Complete signal input out	Control the motor rotation position	Control motor positive change	Control motor reverse	Signal Ground
Differential analog signal duty cycle Speed Control Differential analog signal torque control system Differential analog signal closed loop modulation speed	Fault signal input out	Connect differential analog signals to control motor direction and speed		stop	Signal Ground
Differential analog signal position control system	Complete signal input out	Connect differential analog signal to control motor rotation position		Emergency Stop	Signal Ground
Dual single-ended signals with independent duty Ratio speed regulation Dual single-ended analog signals independent	Fault signal input out	Connect analog signal1For motor Forward speed regulation	Connect analog signal2 Reverse the motor Speed Control	Controlling the motor direction	Signal Ground

Closed loop speed regulation					
Dual single-ended analog signals independent Torque control	Fault signal input out	Connect analog signal1Control Electric Machine torque	Connect analog signal2 Motor speed control	stop	Signal Ground
Dual single-ended analog signals independent Position Control	Complete signal input out	Connect analog signal1Control Electric Machine rotation position	Connect analog signal2 Motor speed control	Emergency Stop	Signal Ground
Dual single-ended signal coordination duty Ratio speed regulation Dual single-ended analog signal coordination Torque control Dual single-ended analog signal coordination Closed loop speed regulation	Fault signal input out	Connect analog signal1Control Electric Machine direction and speed	Connect analog signal2 Set midpoint parameter Test voltage	stop	Signal Ground
Dual single-ended analog signal coordination Position Control	Complete signal input out	Connect analog signal1Control Electric Machine rotation position	Connect analog signal2 Set midpoint Place	Emergency Stop	Signal Ground
PWMSignal duty cycle modulation speed PWMSignal torque control PWMSignal closed loop speed regulation (Level Trigger)	Fault signal input out	catchPWMSignal control circuit Machine speed	Control motor side Towards	Emergency Stop	Signal Ground
PWMSignal duty cycle modulation speed PWMSignal torque control PWMSignal closed loop speed regulation (Edge Trigger)	Fault signal input out	catchPWMSignal control circuit Machine speed	Control motor positive change	Control motor reverse	Signal Ground
PWMSignal position control	Complete signal input out	catchPWMSignal control circuit Machine rotation position	Signal latch	Emergency Stop	Signal Ground
Frequency signal duty cycle speed regulation Frequency signal torque control Frequency signal closed loop speed regulation (Level Trigger)	Fault signal input out	Connect frequency signal control circuit Machine speed	Control motor side Towards	Emergency Stop	Signal Ground
Frequency signal duty cycle speed regulation Frequency signal torque control Frequency signal closed loop speed regulation (Edge Trigger)	Fault signal input out	Connect frequency signal control circuit Machine speed	Control motor positive change	Control motor reverse	Signal Ground

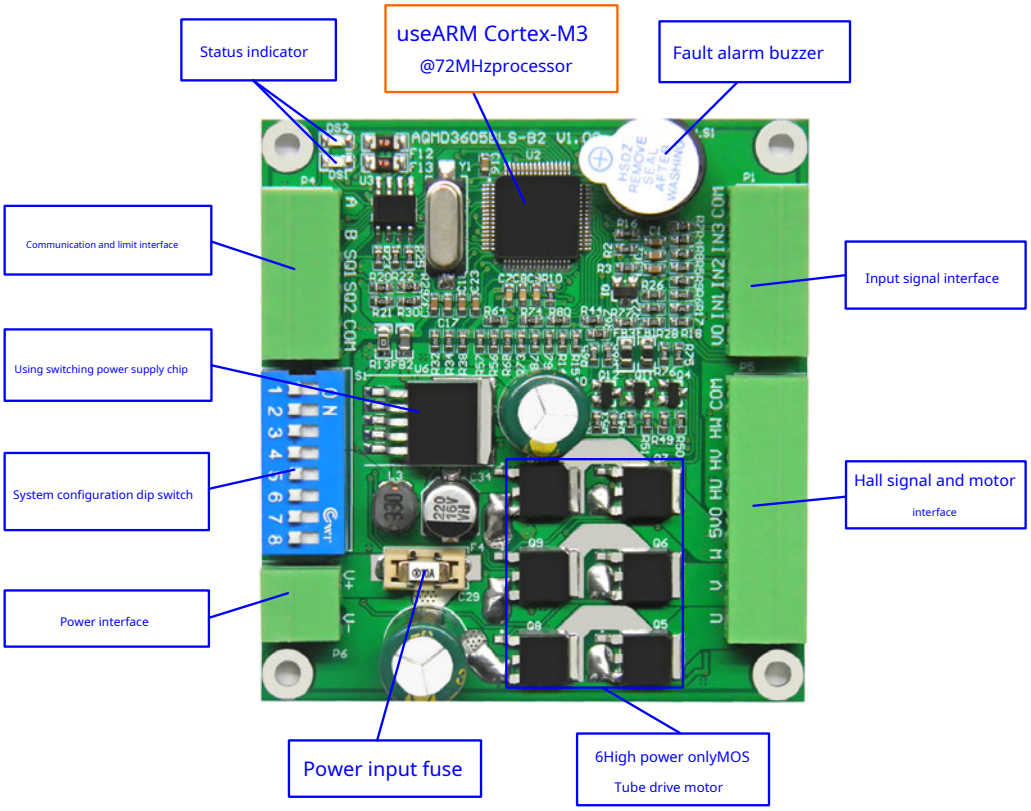
Frequency signal position control	Complete signal input out	Connect frequency signal control circuit Machine rotation position	Signal latch	Emergency Stop	Signal Ground
Pulse signal duty cycle speed regulation Pulse signal torque control Pulse signal closed loop speed regulation (Level Trigger)	Fault signal input out	Connect pulse signal control circuit Machine speed increment	Control speed increase Quantity direction	Emergency Stop	Signal Ground
Pulse signal duty cycle speed regulation Pulse signal torque control Pulse signal closed loop speed regulation (Edge Trigger)	Fault signal input out	Connect pulse signal control circuit Machine speed increment	Control motor increase The direction of the quantity is positive Towards	Control motor increment Direction is reverse	Signal Ground
Pulse signal position control	Complete signal input out	Connect pulse signal control circuit Machine step amount	Control motor steps Direction	Emergency Stop	Signal Ground
Preset speed control (double key control System method)	Failure/Completion Letter Output	Control motor forward	Control motor reverse change	stop	Signal Ground
Preset speed control (single-touch System method)	Failure/Completion Letter Output	Forward→Reverse→Forward change...	Reverse → Forward → Reverse...	stop	Signal Ground

2.8Status indicator

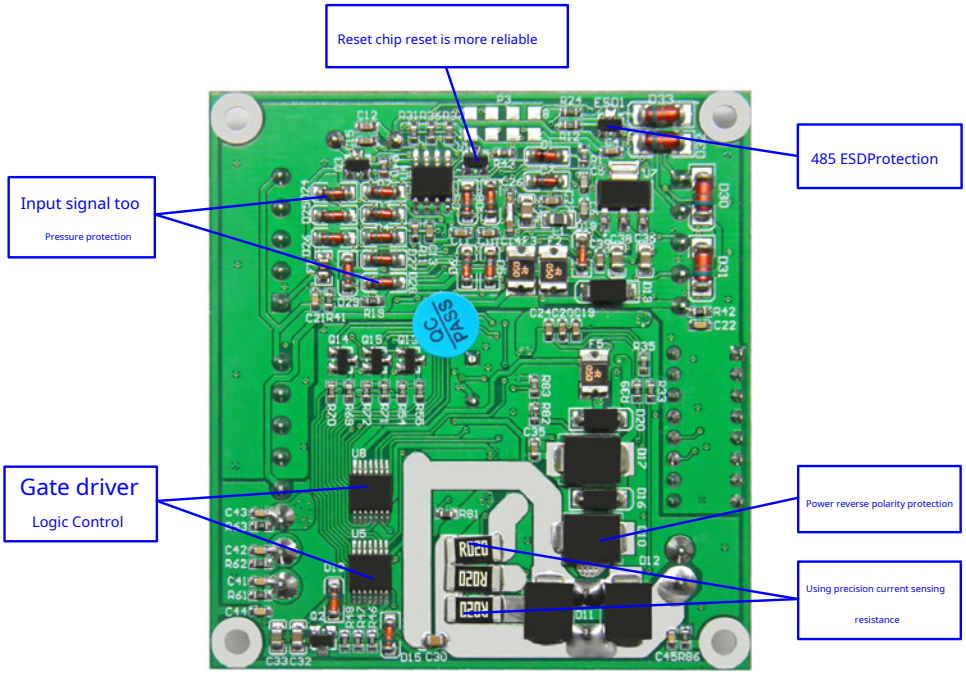
When the green indicator light of the drive0.5HzWhen the green indicator light flashes slowly at a frequency of2HzWhen the red indicator light flashes at a faster frequency, it means the driver is in communication state; when the red indicator light flashes alone, it means the driver is in fault state.

2.9Internal structure of the drive

1. Internal front structure of the drive



2.Internal structure of the drive



3.How to use

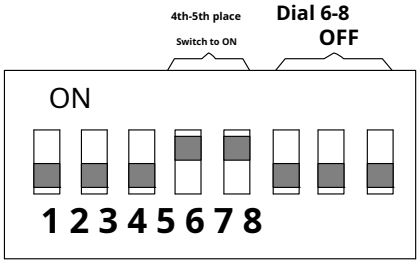
3.1Usage under digital/analog signal control mode

3.1.1Basic operation steps

Before powering on the driver, you should first configure the rated current parameters of the motor, then connect the motor and power supply. If it is the first time to use the motor, you need to learn the motor before using it. Then configure the relevant parameters according to the parameters required by the corresponding control method.485 Communication configuration parameters, the DIP switch should be configured as485After configuring the relevant parameters in the communication control mode, configure the DIP switches and wiring according to the requirements of the corresponding control mode. The specific operation steps are as follows.

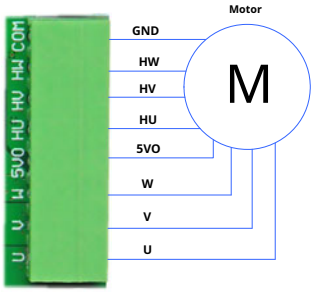
1)Disconnect the power supply of the drive. Use the DIP switch to configure the motor rated current to be consistent with or slightly higher than the actual rated current of the motor (see Table for how to configure the motor rated current2.2)The rated current of the motor can be obtained from the nameplate or data sheet of the motor. If the rated current of the motor cannot be determined, it can be estimated by dividing the rated power of the motor by the rated voltage and then by the motor efficiency.12VMotor, efficiency is desirable50%,for24VAnd above voltage motor, efficiency is desirable70%.

2)For the first use of the motor, or when the motor phase line or the H signal line wiring sequence is changed, the signal source should be configured as the built-in program and the working mode should be configured as motor learning using the DIP switch (see Table 1 for how to configure the signal source and working mode).2.3and table2.4), as shown in the figure3.1shown.



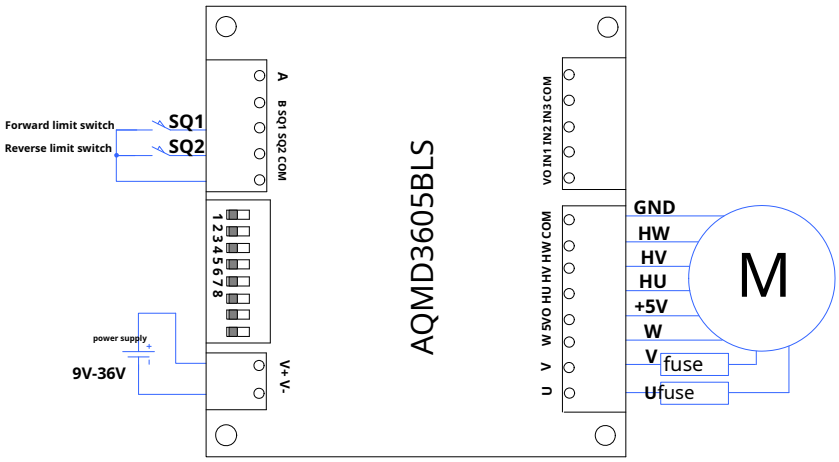
picture3.1DIP switch configuration for motor learning

3)The motorU,V,WThe three-phase power line is connected to the driver motor interfaceU,V,W, connect the positive and negative poles of the motor's Hall sensor power line (usually the positive pole is red and the negative pole is black, refer to the relevant information of the motor for details) to the Hall signal interface of the driver respectively5VOandCOMThe three Hall position signal lines of the Hall sensor are connected to the Hall interface of the driver.HU,HV,HW, as shown in the figure3.2shown.



picture3.2Motor wiring diagram

4)Connect the positive and negative poles of the power supply to the driver power interface.V+andV-, as shown in the figure3.3As shown, turn on the power supply (Note: the voltage of the power supply should be consistent with the rated voltage of the motor, and the current it can provide should be greater than the rated current of the motor). If the working mode has been configured as motor learning, the driver will immediately enter the learning state. Each time a phase is learned, the driver will make a short "beep". After learning is completed, if there is a long "beep", it means that the learning is successful. If there are three consecutive "beeps", it means that the learning has failed. Please check whether the motor wiring is correct and whether the motor is the type supported by the driver.



picture3.3Power supply and motor wiring diagram

5)After the motor learning is completed, turn off the power supply of the driver and use the DIP switch to configure the required parameters and working mode again.485 Communication configuration parameters, the DIP switch should be configured as485Communication mode, after power on,485Configure the required parameters in the communication mode (see the parameter configuration requirements of various control modes for details).4 After that, turn off the power of the driver again and use the DIP switch to configure the working mode of the required parameters again.

6)Wiring should be done according to the wiring method required by the corresponding control mode (see the wiring method of various control modes for details).4 Chapter), then turn on the power supply and the drive can work.

3.1.2Motor Learning

When you connect a new motor, you need to learn the motor phase sequence before using it for the first time (see How to configure the working mode for motor learning).2.1.4The steps of motor phase sequence learning are as follows:

1)Cut off the power supply of the driver and put the motor in a no-load state;

2)The motorU,V,WPhase wire connected to the motor interface of the driveU,V,W, connect the positive and negative poles of the motor's Hall power supply to the Hall signal interface of the driver5V0andCOM, the Hall sensor signal of the motorHU,HV,HWConnected to the driver Hall signal interfaceHU,HV,HW;

3)Via driver DIP switchSW1~SW3Configure the rated current that is consistent with the actual rated current of the motor. If the rated current of the motor cannot be determined,SW1~SW3All availableON;

4)Set the driver DIP switchSW4~SW5Dial toON,SW6~SW8Dial toOFF, that is, the working mode is configured as motor learning;

5)Connect the power of the driver and wait for the motor phase sequence learning to be completed. During the learning process, the working indicator light and the fault indicator light will flash alternately. The driver will emit a short beep each time it tests a phase. After the learning is completed, if you hear a short beep, If you hear a long beep, it means the learning is successful. If you hear three short beeps, it means the learning has failed. If the learning fails, please check whether the motor wiring is correct and connected firmly, or whether the motor is connected to the driver.

Supported types;

6)Cut off the power supply of the drive, reconnect as needed and use the DIP switch to configure the required working parameters. For the wiring and configuration methods under various control modes, refer to the3chapter.

3.1.3How to use potentiometer

The usage of the potentiometer can be configured as single potentiometer speed control, dual potentiometer independent speed control and dual potentiometer coordinated speed control (see how to select the signal source as the potentiometer2.1.3For instructions on how to configure the potentiometer, see6.3.5Sections0x0082register description).

Single potentiometer speed control uses a single potentiometer to adjust the motor speed, controls the motor direction and start and stop through switches or logic levels, and limits the forward and reverse rotation through limit switches. For the wiring and configuration methods of single potentiometer speed control, see4.1.1Section.

Single potentiometer position control uses a single potentiometer to adjust the motor rotation position, latches the position signal and controls the motor emergency stop through switches or logic levels, and limits the forward and reverse rotation through limit switches. For the wiring and configuration methods of single potentiometer position control, see4.1.2Section.

Dual potentiometer independent speed control uses two potentiometers to adjust the speed of the motor's forward and reverse rotation separately (torque and speed are controlled separately in torque control mode), controls the motor start and stop and direction through switches or logic levels, and limits the forward and reverse rotation through limit switches. The wiring and configuration methods of dual potentiometer independent speed control are shown in4.1.3Section.

The dual potentiometer independent position control uses one potentiometer to adjust the rotational position of the motor, and the other potentiometer to adjust the motor speed. The motor emergency stop is controlled by a switch or logic level, and the forward and reverse limit is set by the limit switch. The wiring and configuration method of the dual potentiometer independent position control is shown in4.1.7Section.

The dual potentiometer coordinated speed regulation uses two potentiometers to control the speed and direction of the motor, and the limit switch is used to limit the forward and reverse rotation. The wiring and configuration method of the dual potentiometer coordinated speed regulation can be found in4.1.5Section.

The dual potentiometer coordinated position control uses one potentiometer to set the midpoint of the stroke, and the other potentiometer to adjust the motor rotation position. The motor emergency stop is controlled by a switch or logic level, and the forward and reverse limit is set by the limit switch. The wiring and configuration method of the dual potentiometer independent position control is shown in4.1.7Section.

3.1.4Usage of analog signals

The type and usage of analog signals can be configured as single-ended analog signal speed control, differential analog signal speed control, dual single-ended analog signal independent speed control, and dual single-ended analog signal coordinated speed control (see How to select the signal source as analog signal2.1.3For details on how to configure the analog signal type, see6.3.5Sections0x0084register description).

Single-ended analog signal speed control uses a single-ended analog signal to control the motor speed, controls the motor direction and stop through switch quantity or logic level, and limits the forward and reverse rotation through limit switches. For the wiring and configuration methods of single-ended analog signal speed control, see4.2.1Section.

Single-ended analog signal position control uses a single-ended analog signal to adjust the motor rotation position, latches the position signal and controls the motor emergency stop through switches or logic levels, and limits the forward and reverse rotation through limit switches. For the wiring and configuration methods of single-ended analog signal position control, see4.2.2Section.

Differential analog signal speed control uses differential analog signals to control the direction and speed of the motor, controls the emergency stop of the motor through switch quantity or logic level, and limits the forward and reverse rotation through limit switches.
4.2.4Section.

Differential analog signal position control uses differential analog signals to control the direction and speed of the motor, controls emergency stop through switch quantity or logic level, and limits forward and reverse rotation through limit switches.4.2.6 Section.

Dual single-ended analog signal independent speed control uses two single-ended analog signals to control the forward and reverse speed of the motor separately (torque and speed are controlled separately in torque control mode), controls the start and stop and direction of the motor through switch quantity or logic level, and limits the forward and reverse rotation through limit switches. The wiring and configuration methods of dual single-ended analog signal independent speed control are shown in4.2.9Section.

Dual single-ended analog signal independent position control uses one analog signal to adjust the rotation position of the motor, and the other analog signal to adjust the motor speed. The motor emergency stop is controlled by a switch or logic level, and the forward and reverse limit is set by the limit switch. The wiring and configuration method of dual single-ended analog signal independent position control is shown in4.2.10Section.

The dual single-ended analog signal coordinated speed regulation uses two single-ended analog signals to control the speed and direction of the motor, and the forward and reverse limit is set by the limit switch. The wiring and configuration method of the dual single-ended analog signal coordinated speed regulation is shown in4.2.7Section.

Dual single-ended analog signal coordinated position control uses one analog signal to set the stroke midpoint, and the other analog signal to adjust the motor rotation position. The motor emergency stop is controlled by a switch or logic level, and the forward and reverse limit is set by the limit switch. The wiring and configuration method of dual single-ended analog signal independent position control is shown in4.2.8Section.

3.1.5 PWM/Frequency/Pulse Signal Usage

The type and usage of the pulse signal can be configured asPWMSignal speed control, frequency signal speed control and pulse signal (counting mode) speed control (how to select the signal sourcePWM/Pulse2.1.3For details on how to configure the pulse signal type, see6.3.5 Sections 0x0083register description).

PWMSignal speed regulation adjusts the speed of the motor by changing the duty cycle of the input pulse signal, controls the direction of the motor and emergency stop through switch quantity or logic level, and limits the forward and reverse rotation through limit switches.PWMFor the wiring and configuration of signal speed regulation, see4.3.1Section.

Frequency signal speed regulation adjusts the motor speed by changing the frequency of the input pulse signal, controls the motor direction and emergency stop through switch quantity or logic level, and limits the forward and reverse rotation through limit switches. 4.3.4Section.

Pulse signal speed control controls the speed and direction of the motor by combining the number of pulses generated with the switch value or logic level, and limits the forward and reverse rotation through the limit switch (see the wiring and configuration method of pulse signal speed control for details).4.3.7Section)

3.1.6Study Tour

When using potentiometers, analog signals,PWMWhen the signal or frequency signal adjusts the rotation position of the motor within the specified stroke, we can measure the total stroke of the motor through motor stroke learning (see how to configure the working mode to stroke learning).2.1.4 The steps of itinerary learning are as follows:

1)Make sure the power supply, motor and driver are connected correctly, and the driver has successfully learned the motor;

2)Disconnect the power supply of the drive;

3)Connect a limit switch to the driveSQ1andCOM(If it is a proximity switch, please refer to the figure for the connection method.2.10)Install it in the forward direction of the motor and connect another limit switch to the driverSQ2andCOMThe timer is installed in the reverse direction of the motor;

4)Set the DIP switchSW4~SW6Dial toON,WillSW7~SW8Dial toOFF, that is, the working mode is configured as trip learning;

5)Turn on the driver power supply and wait for the driver to complete learning. During learning, the working indicator light and the fault indicator light will flash alternately; the device driven by the motor will first move toward the limit switch.SQ2Move in the direction when the limit switchSQ2After the trigger, the driver determines the starting point of the stroke, and the driver will make a short beep; then the device driven by the motor will move toward the limit switch.SQ1Move in the direction when the limit switchSQ1After the trigger, the driver determines the end position of the stroke, and the driver will beep again. The stroke value will be automatically writtenModbusof 0x00A2-0x00A3Registers (For other registers related to stroke control, see6.3.6), the motor will stop rotating and the stroke learning is completed;

6)Disconnect the power supply of the drive, rewire as needed and use the DIP switches to configure the required working parameters.

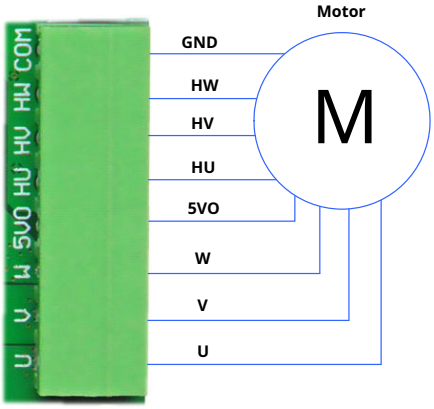
3.1.7Preset speed control

When the motor speed does not need to be adjusted and the motor start/stop and forward/reverse rotation are controlled only by switches or logic levels, we can use the preset speed mode (see how to configure the working mode to the preset speed control mode).2.1.4By presetting the speed register (see 6.3.7Section)0x00B2and0x00B3Configure the forward and reverse speeds separately, by0x00B0Register configuration speed control mode (can be configured as duty cycle speed control, torque control, speed closed loop control, position closed loop control), through0x00B1Configure the operation mode, whether it is a single button (or a single control signal) to control forward and reverse or two buttons (or two control signals) to control forward and reverse respectively. See the wiring and configuration method of the preset speed control mode.4.4Section.

3.2 485How to use in communication control mode

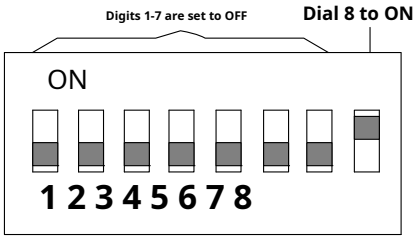
Before using the driver, you should first configure the rated current parameters of the motor. If it is the first time to use the motor, you need to learn the motor first, and then configure the relevant parameters according to the parameters required by the corresponding control method. The specific steps are as follows:

1)Disconnect the power supply to the drive.U,V,WThe three-phase power line is connected to the driver motor interfaceU,V, W, connect the positive and negative poles of the motor's Hall sensor power line (usually the positive pole is red and the negative pole is black, refer to the relevant information of the motor for details) to the Hall signal interface of the driver respectively5VOandCOMThe three Hall position signal lines of the Hall sensor are connected to the Hall interface of the driver.HU,HV,HW, as shown in the figure3.4shown.



picture3.4Motor wiring diagram

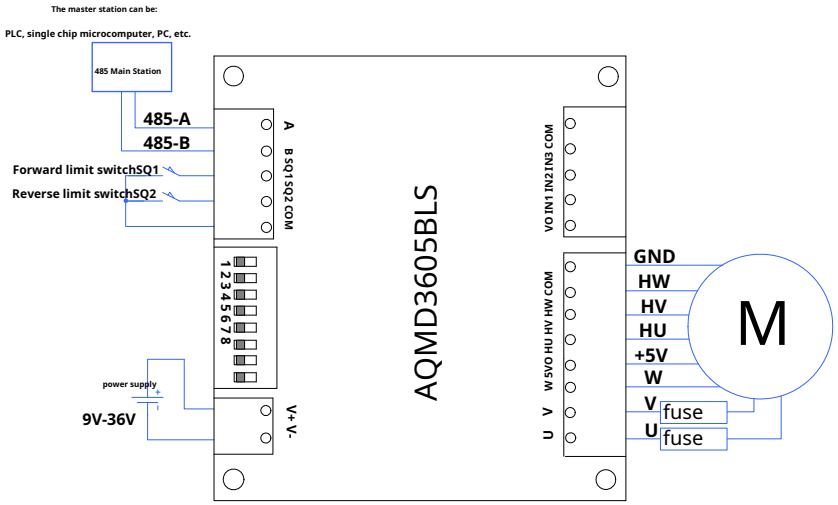
2)Set the DIP switch to1~7Dial toOFF(i.e. dial to the top),8Dial toON(ie dial down), the drive is configured as485 Communication control method, as shown in the figure3.5As shown, the slave address is configured as0x01.



picture3.5 485Communication control mode DIP switch configuration

3)Connect the positive and negative poles of the power supply to the driver power interface.V+andV-,485Master and drive485Interface according toAA,BB (In order to make the signal more stable, the driverCOMConnected to the signal ground of the master station), as shown in the figure3.6As shown, turn on the power supply (Note: the power supply voltage should be consistent with the rated voltage of the motor and can

can provide a current greater than the rated current of the motor).



picture3.6 485Communication power supply and motor wiring diagram

4)passRS485useModbus-RTUThe communication protocol communicates with the drive, and the default baud rate is9600bps, the verification mode is even parity,1If the communication parameters have been reconfigured, please use the newly configured communication parameters for communication.

5)pass0x006aand0x006bRegister (see6.3.4The rated current and maximum load current of the motor are configured in the following sections. The configured rated current of the motor should be consistent with or slightly higher than the actual rated current of the motor. The maximum load current can be used to configure the maximum load/locking torque of the motor. If there is no requirement, it is usually the same as the rated current configuration. The rated current of the motor can be obtained from the nameplate or data sheet of the motor. If the rated current of the motor cannot be determined, it can be estimated by dividing the rated power of the motor by the rated voltage and then by the motor efficiency.12VMotor, efficiency is desirable50%,for24VAnd above voltage motor, efficiency is desirable70%.

6)For the first use of a motor, or when the wiring sequence of the motor phase line or the H signal line is changed, the motor should be trained first.0x00e1Register Write1Motor learning can be realized. After the driver enters the learning state, each time it learns a phase, the driver will make a short "beep" sound. After learning is completed, if there is a long "beep", it means that the learning is successful. If there are three consecutive "beeps", it means that the learning has failed. Please check whether the motor wiring is correct and whether the motor is the type supported by the driver.

7)pass0x0050~0x0053Register (see6.3.3The description of the speed control register in the subsection) can temporarily change the duty cycle speed control modePWMThe rise and fall buffer time and the acceleration and deceleration in the speed closed loop and position closed loop mode. 0x0060~0x0067Register (see6.3.4The motor control parameter configuration register description can be configured to set the default duty cycle speed control mode after power-on.PWMThe rise and fall buffer time and the acceleration and deceleration in the speed closed loop and position closed loop mode, as well as the large acceleration and deceleration and large commutation frequency.

8)By writing0x0042The register sets the output duty cycle for duty cycle speed regulation; by writing0x0043The register sets the commutation frequency (corresponding to the speed) of the motor for closed-loop speed regulation;0x0044Set the commutation frequency (corresponding to the speed) of position control,0x0045The register sets the position control mode to absolute position or relative position. 0x0046and0x0047Two registers are written with four-byte integer target position values to perform position closed-loop control.0x0046and0x0047Register or in0x0046Register Write0After operation0x0047 Registers to control the position.0x0040The register brakes the motor.0x0040~0x0047 For a detailed description of the registers, see6.3.3Section.

9)The closed-loop speed control algorithm can be0x0070The register configuration is speed closed-loop control or time-position closed-loop control. The former has the characteristics of small overshoot and smooth speed regulation at high speed, but the speed regulation may be uneven at low speed; the latter can realize the synchronous control of multiple motor rotation angles by multiple drivers, and the speed regulation is also smooth at low speed, which can meet the requirements of extremely low speed control, but there is a certain overshoot in the speed regulation process.

10)When the closed-loop speed control algorithm is speed closed-loop control,0x00c0~0x00c5Register configuration of closed loop speed regulation PID Parameters; when the closed-loop speed control algorithm is time-position closed-loop control,0x00c6~0x00cbRegister configuration closed loop speed control motor rotationPIDParameters, through0x00ba~0x00bfRegister configuration closed loop speed control motor self-lockingPID Parameters; when it is position closed loop control, it is also0x00c6~0x00cbRegister configuration position closed loop control motor rotationPID parameter,0x00ba~0x00bfWhen configuring the motor self-lockingPIDparameter. PIDIf the configuration of each parameter is too large, it may cause serious overshoot of speed or position control or even oscillation.PIDIf the parameters are configured too small, it may lead to slow adjustment and poor follow-up. They should be configured reasonablyPIDParameters to achieve the best adjustment effect. PIDFor details on parameter configuration related registers, see6.3.8introduce.

11)pass0x0080~0x0099Register (see6.3.5Section Description of System Parameter Configuration Registers) Configurable 485Limit switch trigger polarity, communication parameters, communication interruption protection time and stall stop time under communication control mode.

Note: You can also use thePCThe machine sample program is used to perform parameter configuration and speed control operations.

3.3Characteristics of various speed regulation methods

This driver can support duty cycle speed regulation, torque control, speed closed loop control and position closed loop control (see how to configure the speed regulation mode2.1.4The characteristics of various speed control methods are as follows.

3.3.1Duty cycle speed regulation

The duty cycle speed regulation method adjusts the motor speed by changing the equivalent output voltage. Duty cycle speed regulation has the characteristics of fast response, but the speed changes to a certain extent due to load changes. When the stall current does not exceed the configured large load current, the stall torque is approximately proportional to the duty cycle, which can be manifested as a small motor torque when the motor is adjusted to a low speed. This driver also supports the duty cycle rise/fall buffer time configuration to make the motor start/stop process smooth.

3.3.2Torque control

The torque control method changes the torque of the motor by adjusting the output current. The motor usually works in a stalled state. The output current of the torque control method can be adjusted arbitrarily within the configured maximum load current range.

3.3.3Speed closed loop control

Speed closed loop control methodPIDThe speed regulation algorithm is used to control the motor at a steady speed. The speed regulation algorithm supports speed closed-loop control and time-position closed-loop control. The former directly adjusts the motor speed, and has the characteristics of small overshoot and smooth speed regulation at high speed, but at low speed, uneven speed regulation may occur; the latter controls the motor rotation position by calculating the position that the motor should rotate over time, thereby indirectly controlling the motor at a steady speed. This method can meet the requirements of multiple drivers for synchronous control of the rotation positions of multiple motors and the requirements of ultra-low speed steady speed control, but the speed regulation has a certain overshoot. This driver supports closed-loop speed regulation acceleration configuration. For the use of speed closed-loop control algorithm, the acceleration configuration can be larger to make the steady speed response faster; for the use of time-position closed-loop control algorithm, too large acceleration configuration may cause serious overshoot or uneven switching of the motor rotation direction.

3.3.4Position closed loop control

Position closed loop control usePIDThe adjustment algorithm is used to control the rotation position of the motor. When the target position is given, the driver will automatically calculate the target real-time speed of the current rotation position during the operation of the motor according to the configured acceleration, deceleration and maximum speed, and adjust it, so that the motor can accurately rotate to the target position according to the configured speed and acceleration parameters. In the process of adjusting the motor position, the driver can also estimate the time required for the motor to rotate to the target position. Note that if the acceleration is configured too large or the braking current is configured too small, the driver may not be able to provide the required acceleration and cause overshoot in the position control, so the acceleration should be configured reasonably.

In the digital/analog signal control mode, the driver can adjust the motor rotation position within a fixed stroke and use pulse signals to perform step control on the motor;485Under the communication control mode, the absolute rotation position and relative rotation position of the motor can be controlled.

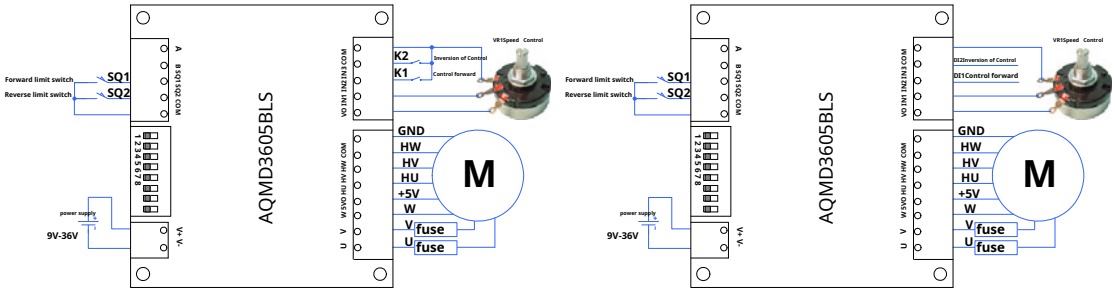
4.Connection and configuration of various control methods

4.1Connection and configuration of potentiometer speed control

The usage of the potentiometer can be configured as single potentiometer speed/position control, dual potentiometer independent speed/position control and dual potentiometer coordinated speed/position control (how to configure the usage of the potentiometer, see6.3.5Festival0x0082The wiring and configuration methods of the potentiometer for various usages are as follows.

4.1.1Single potentiometer speed control

This usage uses a potentiometer to adjust the motor speed, and uses switch quantity/logic level to control the motor forward and reverse and start and stop. The connection method of single potentiometer speed control is shown in the figure4.1PotentiometerVR1Two fixed terminationsVOandCOM, dynamic terminationIN1, when the potentiometer moving end isCOMSlideVODuring the process, the motor speed changes from low to high. When the switch quantity is used to control the forward and reverse rotation and start and stop of the motor, the switchK1catchIN2andCOMControl the motor to rotate forward; switchK2catchIN3andCOMWhen using logic level to control the motor forward and reverse rotation and start and stop,IN2Connect to logic levelDI1, control the motor to rotate forward;IN3Connect to logic levelDI2, control the motor to reverse. Limit switchSQ1andSQ2Set limits for forward and reverse rotation respectively.



picture4.1Connection method of single potentiometer speed control switch (left picture)/logic level (right picture) control method

By configuring the different types and polarities of digital signals (see6.3.5Section System Parameter Configuration Register0x0081and0x0085）, we can use different operations of potentiometers, switch quantities and logic levels to The operation method realizes the start and stop and forward and reverse control of the motor. The control logic is shown in the table4.1shown.

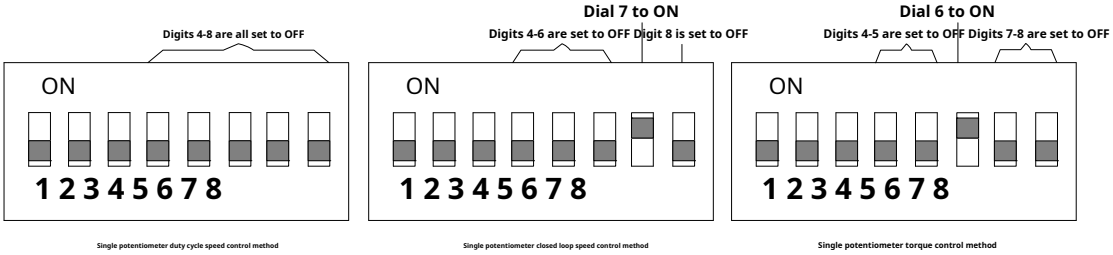
surface4.1Single potentiometer speed control logic

Digital signal type	Digital signal polarity	Functions implemented	How to operate	Wiring scheme
Switching quantity	Low level/closed (default)	Speed Control	PotentiometerVR1Speed Control	Jog
		Forward	K1closure,K2disconnect	
		Reversal	K1disconnect,K2closure	
		stop	K1,K2All disconnected	
	High level/disconnect	Speed Control	PotentiometerVR1Speed Control	
		Forward	K1disconnect,K2closure	
		Reversal	K1closure,K2disconnect	
		stop	K1,K2All closed	
	Falling edge/closing moment	Speed Control	PotentiometerVR1Speed Control	Self-insurance
		Forward	K1After closing, open.K2Always off	
		Reversal	open K1Always disconnected,K2Close and then break	

			open	
		stop	Limit or speed adjustment0Stop	
	Rising edge/disconnection moment	Speed Control	PotentiometerVR1Speed Control	
		Forward	K1After opening, close.K2Always Close combine	
		Reversal	K2After opening, close.K1Always Close combine	
		stop	Limit or speed adjustment0Stop	
Logic Level	Low level/closed (default)	Speed Control	PotentiometerVR1Speed Control	Jog
		Forward	DI1Low level,DI2High level	
		Reversal	DI1High level,DI2Low level	
		stop	DI1,DI2Both are high level	
	High level/disconnect	Speed Control	PotentiometerVR1Speed Control	
		Forward	DI1High level,DI2Low level	
		Reversal	DI1Low level,DI2High level	
		stop	DI1,DI2Both are low level	
	Falling edge/closing moment	Speed Control	PotentiometerVR1Speed Control	Self-insurance
		Forward	DI1From high level to low level,DI2 Always high	
		Reversal	DI2From high level to low level,DI1 Always high	
		stop	Limit or speed adjustment0Stop	
	Rising edge/disconnection moment	Speed Control	PotentiometerVR1Speed Control	
		Forward	DI1From low level to high level,DI2 Always low	
		Reversal	DI2From low level to high level,DI1 Always low	
		stop	Limit or speed adjustment0Stop	

In single potentiometer speed control mode, the driver supports three speed control modes: duty cycle speed control, closed loop speed control and torque control. The configuration method of the DIP switch for each speed control mode is shown in the figure.4.2As shown.1-3Configure the motor rated current (see table for how to configure the motor rated current)2.2);4-5bit configuration signal source (see Table 1 for how to configure the signal source)2.3), we configure the signal source as a potentiometer, that is4-5Dial toOFF;6-7Bit configuration working mode (how to configure the working mode see table 2.4);8We configure the control mode as digital/analog signal control mode.8Dial to OFF.

The DIP switch is turned to the upper position.ON, below isOFF. From left to right are1-8Bit.



picture4.2DIP switch configuration for single potentiometer speed control

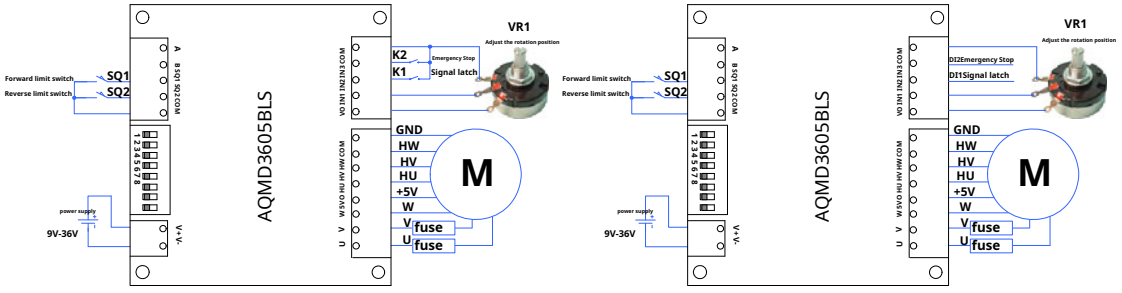
In the single potentiometer speed control mode, the reference configuration of the relevant registers is shown in the table4.2shown.

surface4.2Configuration of registers related to single potentiometer speed control mode

Register Address	Register function	value	describe
0x0080	Limit trigger polarity	0,1,2,3,4	0: Low level trigger (default) 1: High level trigger 2: Falling edge trigger 3: Rising edge trigger 4: Disable limit function
0x0081	Digital signal polarity	0,1,2,3	0: Low level trigger (default) 1: High level trigger 2: Falling edge trigger 3: Rising edge trigger
0x0082	Potentiometer Usage	0	Single potentiometer (default)
0x0085	Logic level type	0,1,2,3	0: Switch value (default) 1:0/3.3V 2:0/5V 3:0/12Vor0/24V
0x0086	Potentiometer minimum value	0	The minimum output voltage value of the potentiometer is0(default)
0x0087	Potentiometer maximum value	0x0CDF	The maximum output voltage of the potentiometer is3295mV(default)
0x008a	Logic level threshold	0x07D0	The switching logic level voltage threshold can be configured as 2000mV(default), Other logic levels are configured separately

4.1.2Single potentiometer position control (level trigger)

This usage uses a potentiometer to adjust the motor rotation position, and uses the switch value/logic level to latch the motor signal and perform emergency stop. The connection method of single potentiometer position control (level trigger mode) is shown in the figure4.3 PotentiometerVR1Two fixed terminations VOandCOM, dynamic terminationIN1, when the potentiometer moving end isCOMSlideVODuring the process, the motor rotation position changes from the starting point of the stroke to the maximum position of the stroke (the total stroke can be 0x00a2and0x00a3Registers to configure, see6.3.6(section "Reciprocating Position Control Parameter Register"). When using switch control, the switchK1catchIN2andCOMFor signal latching, switching K2catchIN3andCOMWhen the logic level is used for control,IN2Connect to logic levelDI1, latch the motor signal,IN3Connect to logic levelDI2, control the motor to stop urgently. Limit switchSQ1andSQ2Set limits on the forward and reverse rotation of the motor respectively.



picture4.3Connection method of single potentiometer position control (level trigger) switch (left picture)/logic level (right picture)

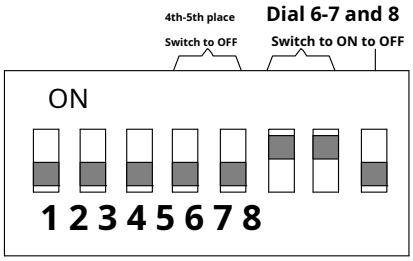
By configuring the different types and polarities of digital signals (see6.3.5Section System Parameter Configuration Register0x0081and0x0085）, we can operate the potentiometer, logic level and switch quantity differently Method to achieve motor position adjustment, signal latching and emergency stop, the control logic is shown in the table4.3shown.

surface4.3Control logic for single potentiometer position control (level trigger)

Digital signal type	Digital signal polarity	Functions implemented	How to operate	Wiring scheme
Switching quantity	Low level/closed (default)	Adjust position	PotentiometerVR1adjust	
		Signal latch	K1closure,K2disconnect	
		Emergency Stop	K2closure	
	High level/disconnect	Adjust position	PotentiometerVR1adjust	
		Signal latch	K1disconnect,K2closure	
		Emergency Stop	K2disconnect	
Logic Level	Low level/closed (default)	Adjust position	PotentiometerVR1adjust	
		Signal latch	DI1Low level,DI2High level	
		Emergency Stop	DI2Low level	
	High level/disconnect	Adjust position	PotentiometerVR1adjust	
		Signal latch	DI1High level,DI2Low level	
		Emergency Stop	DI2High level	

The configuration method of the DIP switch for single potentiometer position control is shown in the figure4.4The DIP switch1-3Configure the motor rated current (see table for how to configure the motor rated current2.2) ;4-5bit configuration signal source (how to configure the signal source see surface2.3), we configure the signal source as a potentiometer, that is4-5Dial toOFF;6-7Bit configuration working mode (how to configure the working mode see table2.4)configure the working mode as position control, that is,6-7Dial toON;8Bit Configure the control mode. We configure the control mode as digital/analog signal control mode. That is8Dial toOFF.

The DIP switch is turned to the upper position.ON, below isOFF. From left to right are1-8Bit.



picture4.4DIP switch configuration for single potentiometer position control (level trigger)

In single potentiometer position control (level trigger) mode, the reference configuration of related registers is shown in the table4.4shown.

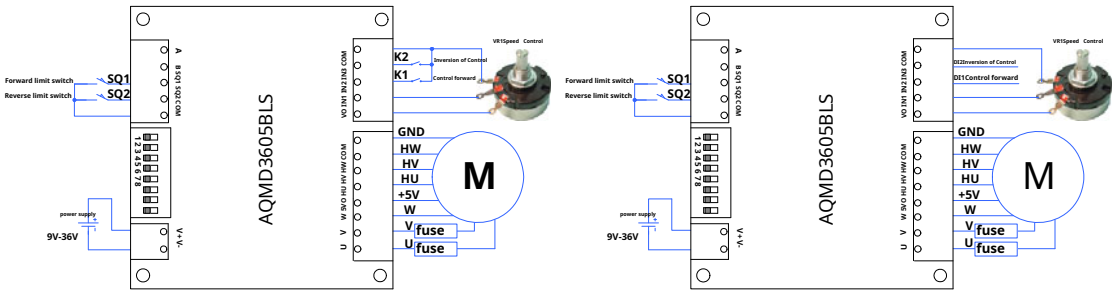
surface4.4Configuration of related registers for single potentiometer position control (level trigger) mode

Register Address	Register function	value	describe
0x0080	Limit trigger polarity	0,1,2,3,4	0: Low level trigger (default) 1: High level trigger 2: Falling edge trigger 3: Rising edge trigger 4: Disable limit function
0x0081	Digital signal polarity	0,1	0: Low level trigger (default) 1: High level trigger

0x0082	Potentiometer Usage	0	Single potentiometer (default)
0x0085	Logic level type	0,1,2,3	0: Switch value (default) 1:0/3.3V 2:0/5V 3:0/12Vor0/24V
0x0086	Potentiometer minimum value	0	The minimum output voltage value of the potentiometer is0(default)
0x0087	Potentiometer maximum value	0x0CDF	The maximum output voltage of the potentiometer is3295mV(default)
0x008a	Logic level threshold	0x07D0	The switching logic level voltage threshold can be configured as 2000mV(default), Other logic levels are configured separately
0x00a0	Position reset mode	1,2,3,4	1:SQ2Reset (default) 2:SQ1Reset 3:SQ2Reset and fine tune 4:SQ1Reset and fine tune
0x00a2-0x00a3	Total travel		The total itinerary can be obtained through itinerary learning
0x00a7	The signal to be ignored Quantification	1	neglect0.1%The following potentiometer output voltage fluctuations (default recognize) Used for filtering to eliminate motor jitter caused by interference signals
0x00a9	Current during reset	0~700	When non-zero, multiply by0.01is the maximum load current during reset, in units ofA; When it is zero, use the system parameter configuration Large load current; used to configure the torque during reset. When resetting using the motor stall detection method, here The current configuration is just enough to smoothly drag the load. The stall stop time is configured to non-zero.
0x008e	Stall stop time	0~255	Multiply the value by0.1is the stall stop time, in units of s; For motor stall detection (without limit switch When resetting the detection stroke, the stall stop time should be configured If it is non-zero, it is recommended to configure0.1~1s, in order to block the detection Test.

4.1.3Single Potentiometer Position Control (Edge Triggered)

This usage uses a potentiometer to adjust the motor speed, and controls the motor to move to the starting point or maximum stroke position through a switch/logic level. The connection method of single potentiometer position control (edge trigger) is shown in the figure4.5As shown. Among them, the potentiometerVR1Adjust the motor speed and control the motor forward and reverse rotation through switch quantity/logic level.VR1Two fixed terminationsVOand COM, dynamic terminationIN1, when the potentiometer moving end isCOMSlideVODuring the process, the motor speed changes from low to high. When using switch control, the switchK1catchIN2 andCOMDuring this time, the control motor is turned to the maximum stroke position (the total stroke can be0x00a2and 0x00a3Registers to configure, see6.3.6Section reciprocating position control parameter register), switchK2catchIN3andCOMWhen the motor is controlled by logic level,IN2Connect to logic levelDI1, control the motor to move to the maximum stroke position,IN3 Connect to logic levelDI2, control the motor to reverse to the starting point of the stroke. Limit switchSQ1andSQ2Set limits on the forward and reverse rotation of the motor respectively.



picture4.5Connection of single potentiometer position control (edge triggered) switch (left)/logic level (right)

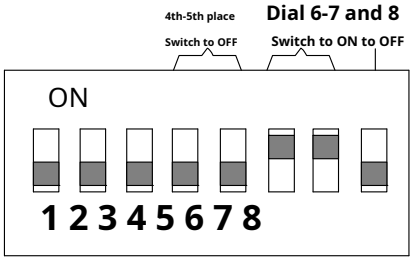
By configuring the different types and polarities of digital signals (see6.3.5Section System Parameter Configuration Register0x0081and0x0085), we can operate the potentiometer, logic level and switch quantity differently Method to achieve motor position adjustment, signal latching and emergency stop, the control logic is shown in the table4.5shown.

surface4.5Control logic for single potentiometer position control (edge triggered)

Digital signal type	Digital signal polarity	Functions implemented	How to operate	Wiring scheme
Switching quantity	Falling edge/closing moment	Adjust speed	PotentiometerVR1adjust	Self-insurance
		Transfer to Dahang Procedure	K1After closing, open.K2Always off open	
		Reverse to the start of the stroke point	K2After closing, open.K1Always off open	
		stop	When moving to the end of the stroke or limit stop	
	Rising edge/disconnection moment	Adjust speed	PotentiometerVR1adjust	
		Transfer to Dahang Procedure	K1After opening, close.K2Always Close combine	
		Reverse to the start of the stroke point	K2After opening, close.K1Always Close combine	
		stop	When moving to the end of the stroke or limit stop	
Logic Level	Falling edge/closing moment	Adjust speed	PotentiometerVR1adjust	edge
		Transfer to Dahang Procedure	DI1From high level to low level,DI2 Always high	
		Reverse to the start of the stroke point	DI2From high level to low level,DI1 Always high	
		stop	When moving to the end of the stroke or limit stop	
	Rising edge/disconnection moment	Adjust speed	PotentiometerVR1adjust	
		Transfer to Dahang Procedure	DI1From low level to high level,DI2 Always low	
		Reverse to the start of the stroke point	DI2From low level to high level,DI1 Always low	
		stop	When moving to the end of the stroke or limit stop	

The configuration method of the DIP switch for single potentiometer position control is shown in the figure4.6The DIP switch1-3Configure the motor rated current (see table for how to configure the motor rated current2.2) ;4-5bit configuration signal source (how to configure the signal source see surface2.3), we configure the signal source as a potentiometer, that is4-5Dial toOFF;6-7Bit configuration working mode (how to configure the working mode see tabJe2.4)configure the working mode as position control, that is,6-7Dial toON;8Bit Configure the control mode. We configure the control mode as digital/analog signal control mode. That is8Dial toOFF.

The DIP switch is turned to the upper position.ON, below isOFF. From left to right are1-8Bit.



picture4.6DIP switch configuration for single potentiometer position control (edge triggered)

In the single potentiometer position control (edge trigger) mode, the reference configuration of the relevant registers is shown in the table4.6shown.

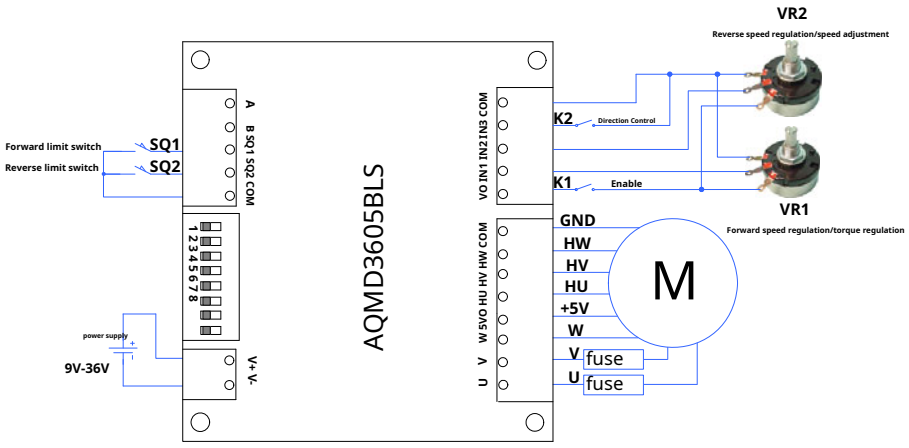
surface4.6Configuration of related registers of single potentiometer position control (edge trigger) mode

Register Address	Register function	value	describe
0x0080	Limit trigger polarity	0,1,2,3,4	0: Low level trigger (default) 1: High level trigger 2: Falling edge trigger 3: Rising edge trigger 4: Disable limit function
0x0081	Digital signal polarity	2,3	2: Falling edge trigger 3: Rising edge trigger
0x0082	Potentiometer Usage	0	Single potentiometer (default)
0x0085	Logic level type	0,1,2,3	0: Switch value (default) 1:0/3.3V 2:0/5V 3:0/12Vor0/24V
0x0086	Potentiometer minimum value	0	The minimum output voltage value of the potentiometer is0(default)
0x0087	Potentiometer maximum value	0x0CDF	The maximum output voltage of the potentiometer is3295mV(default)
0x008a	Logic level threshold	0x07D0	The switching logic level voltage threshold can be configured as 2000mV(default), Other logic levels are configured separately
0x00a0	Position reset mode	0,1,2,3,4	0: Do not reset 1:SQ2Reset (default) 2:SQ1Reset 3:SQ2Reset and fine tune 4:SQ1Reset and fine tune
0x00a2-0x00a3	Total travel		The total travel distance can be obtained through travel learning, or it can be directly assigned Place
0x00a7	The signal to be ignored	1	neglect0.1%The following potentiometer output voltage fluctuations (default

	Quantification		recognize) Used for filtering to eliminate motor jitter caused by interference signals
0x00a9	Current during reset	0~700	When non-zero, multiply by0.01is the maximum load current during reset, in units ofA; When it is zero, use the system parameter configuration Large load current; used to configure the torque during reset. When resetting using the motor stall detection method, here The current configuration is just enough to smoothly drag the load. The stall stop time is configured to non-zero.
0x008e	Stall stop time	0~255	Multiply the value by0.1is the stall stop time, in units of s; For motor stall detection (without limit switch When resetting the detection stroke, the stall stop time should be configured If it is non-zero, it is recommended to configure0.1~1s, in order to block the detection Test.

4.1.4Dual potentiometer independent speed regulation

This usage uses two potentiometers to adjust the speed of the motor forward and reverse or control the torque and speed respectively, and uses a switch to control the forward and reverse rotation and start and stop of the motor. The connection method of dual potentiometer independent speed regulation is shown in the figure4.7PotentiometerVR1One fixed end and the potentiometerVR2Then connect it to the fixed end of the switchK1One end is connected,K1The other end is connected toVOPort; PotentiometerVR1 The other fixed end ofVR2The other fixed end is connected toCOMend;VR1Dynamic TerminationIN1,VR2 Dynamic TerminationIN2,switchK2catchIN3andCOMWhen the speed regulation mode is duty cycle speed regulation or closed loop speed regulation, the potentiometerVR1Adjust the motor forward speed, potentiometerVR2Adjust the motor reverse speed.COMSlideVODuring the process, the motor speed changes from low to high; when the speed control mode is torque control, the potentiometerVR1Adjusting torque, potentiometerVR2Adjust speed, potentiometerVR1 The moving end isCOMSlideVODuring this process, the motor torque is0Change to the torque corresponding to the configured large load current, potentiometerVR2 The moving end isCOMSlideVODuring this process, the motor speed changes from low to high.K1Control motor start and stop; switchK2 Control the direction of motor rotation. Limit switchSQ1andSQ2Set limits for forward and reverse rotation respectively.



picture4.7Connection method of dual potentiometer independent speed regulation

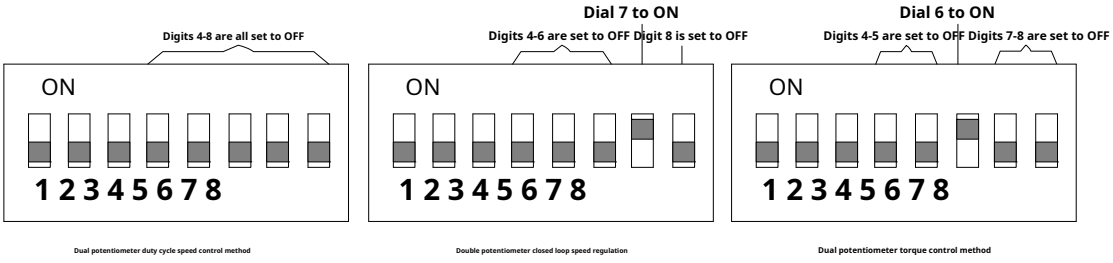
By configuring the different types and polarities of digital signals (see6.3.5Section System Parameter Configuration Register 0x0081and0x0085), we can realize the start, stop and forward and reverse control of the motor by different operation methods of potentiometer, switch value and logic level. The control logic is shown in the table4.7shown.

surface4.7Dual potentiometer independent speed control logic

Digital signal type	Digital signal polarity	Functions implemented	How to operate	Wiring scheme
Switching quantity	Low level/closed (default)	Speed Control	Under duty cycle speed regulation and closed loop mode, PotentiometerVR1Adjust the forward speed, PotentiometerVR2Adjust the reverse speed.	
			In torque control mode, PotentiometerVR1Adjustment torque, PotentiometerVR2Adjust the speed.	
		Forward	K1closure,K2disconnect	
		Reversal	K1closure,K2closure	
		stop	K1disconnect	
	High level/disconnect	Speed Control	Under duty cycle speed regulation and closed loop mode, PotentiometerVR1Forward speed regulation, PotentiometerVR2Reverse speed regulation.	
			In torque control mode, PotentiometerVR1Adjustment torque, PotentiometerVR2Adjust the speed.	
		Forward	K1closure,K2closure	
		Reversal	K1closure,K2disconnect	
		stop	K1disconnect	

In the dual potentiometer independent speed control mode, the driver supports three speed control modes: duty cycle speed control, closed loop speed control and torque control. The configuration method of the DIP switch for each speed control mode is shown in the figure.4.8As shown, the dip switch1-3Configure the motor rated current (see table for how to configure the motor rated current2.2);4-5bit configuration signal source (see Table 1 for how to configure the signal source)2.3) ,us Configure the signal source as a potentiometer, that is4-5Dial toOFF;6-7Bit configuration working mode (how to configure the working mode see table2.4),8We configure the control mode as digital/analog signal control mode.8 Dial toOFF.

The DIP switch is turned to the upper position.ON, below isOFF. From left to right are1-8Bit.



picture4.8 DIP switch configuration for dual potentiometer independent speed regulation

In the dual potentiometer independent speed control mode, the reference configuration of the relevant registers is shown in the table4.8shown.

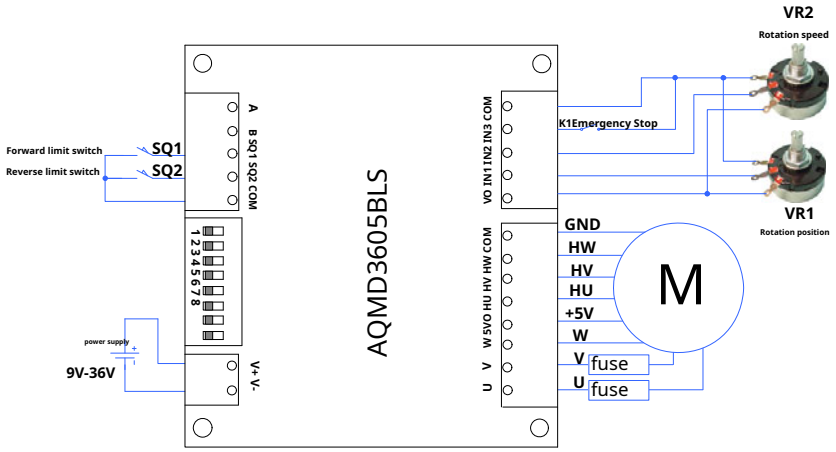
surface4.8Configuration of related registers of dual potentiometer independent speed regulation mode

Register Address	Register function	value	describe
0x0080	Limit trigger polarity	0,1,2,3,4	0: Low level trigger (default) 1: High level trigger 2: Falling edge trigger 3: Rising edge trigger 4: Disable limit function

0x0081	Digital signal polarity	0,1	0: Low level trigger (default) 1: High level trigger
0x0082	Potentiometer Usage	1	Dual potentiometer independent
0x0085	Logic level type	0,1,2,3	0: Switch value (default) 1:0/3.3V 2:0/5V 3:0/12Vor0/24V
0x0086	Potentiometer minimum value	0	The minimum output voltage value of the potentiometer is0(default)
0x0087	Potentiometer maximum value	0x0CDF	The maximum output voltage of the potentiometer is3295mV(default)
0x008a	Logic level threshold	0x07D0	The switching logic level voltage threshold can be configured as 2000mV(default), Other logic levels are configured separately

4.1.5Dual potentiometer independent position control

This usage uses one potentiometer to adjust the motor rotation position, another potentiometer to adjust the motor speed, and the switch quantity to control the motor forward and reverse rotation and start and stop. The connection method of dual potentiometer position independent control is shown in the figure4.9PotentiometerVR1Two fixed terminationsVOandCOM, dynamic terminationIN1, used to set the motor rotation position, when the potentiometer moves COMSlideVODuring the process, the motor rotation position changes from the starting point of the stroke to the maximum stroke position (the total stroke can be0x00a2and0x00a3 Registers to configure, see6.3.6Section reciprocating position control parameter register); potentiometerVR2Two fixed terminationsVOand COM, dynamic terminationIN2, used to adjust the motor speed, when the potentiometer movesCOMSlideVODuring this process, the motor speed changes from low to high.K1catchCOMandIN3The motor is controlled to stop urgently.SQ1andSQ2Set limits for forward and reverse rotation respectively.



picture4.9Connection method of dual potentiometer position independent control

By configuring the different types and polarities of digital signals (see6.3.5Section System Parameter Configuration Register0x0081and0x0085） , we can operate the potentiometer, logic level and switch quantity differently Method to achieve motor position adjustment, signal latching and emergency stop, the control logic is shown in the table4.9shown.

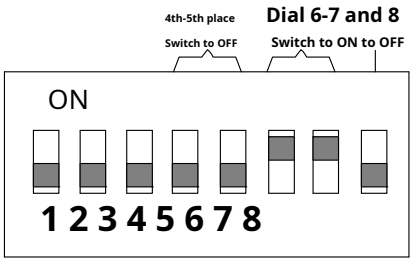
surface4.9Control logic for independent position control of dual potentiometers

Digital signal type	Digital signal polarity	Functions implemented	How to operate	Wiring scheme
Switching quantity	Low level/closed (default)	Adjust position	PotentiometerVR1adjust	
		Adjust speed	PotentiometerVR2adjust	

		Emergency Stop	K1closure	
	High level/disconnect	Adjust position	PotentiometerVR1adjust	
		Adjust speed	PotentiometerVR2adjust	
		Emergency Stop	K1disconnect	

The configuration method of the dip switch for independent control of the dual potentiometer position is shown in the figure4.10The DIP switch1-3 Configure the motor rated current (see table for how to configure the motor rated current2.2);4-5bit configuration signal source (see Table 1 for how to configure the signal source)2.3）, we configure the signal source as a potentiometer, that is4-5Dial toOFF;6-7Bit configuration working mode (how to configure the working mode see table2.4), we configure the working mode as position control, that is, 6-7Dial toON;8 We configure the control mode as digital/analog signal control mode.8Dial toOFF.

The DIP switch is turned to the upper position.ON, below isOFF. From left to right are1-8Bit.



picture4.10DIP switch configuration for independent control of dual potentiometer positions

In the dual potentiometer independent position control mode, the reference configuration of the relevant registers is shown in the table4.10shown.

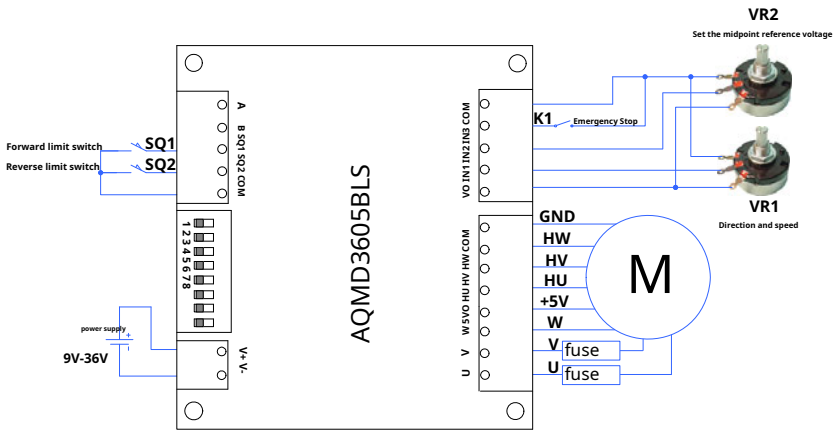
surface4.10Configuration of related registers of dual potentiometer independent position control mode

Register Address	Register function	value	describe
0x0080	Limit trigger polarity	0,1,2,3,4	0: Low level trigger (default) 1: High level trigger 2: Falling edge trigger 3: Rising edge trigger 4: Disable limit function
0x0081	Digital signal polarity	0,1	0: Low level trigger (default) 1: High level trigger
0x0082	Potentiometer Usage	1	Dual potentiometer independent
0x0085	Logic level type	0,1,2,3	0: Switch value (default) 1:0/3.3V 2:0/5V 3:0/12Vor0/24V
0x0086	Potentiometer minimum value	0	The minimum output voltage value of the potentiometer is0(default)
0x0087	Potentiometer maximum value	0x0CDF	The maximum output voltage of the potentiometer is3295mV(default)
0x008a	Logic level threshold	0x07D0	The switching logic level voltage threshold can be configured as 2000mV(default), Other logic levels are configured separately
0x00a0	Position reset mode	0,1,2,3,4	0: Do not reset 1:SQ2Reset (default) 2:SQ1Reset

			3:SQ2Reset and fine tune 4:SQ1Reset and fine tune
0x00a2-0x00a3	Total travel		The total itinerary can be obtained through itinerary learning
0x00a7	The signal to be ignored Quantification	1	neglect0.1%The following potentiometer output voltage fluctuations (default recognize) Used for filtering to eliminate motor jitter caused by interference signals
0x00a9	Current during reset	0~700	When non-zero, multiply by0.01is the maximum load current during reset, in units ofA; When it is zero, use the system parameter configuration Large load current; used to configure the torque during reset. When resetting using the motor stall detection method, here The current configuration is just enough to smoothly drag the load. The stall stop time is configured to non-zero.
0x008e	Stall stop time	0~255	Multiply the value by0.1is the stall stop time, in units of s; For motor stall detection (without limit switch When resetting the detection stroke, the stall stop time should be configured If it is non-zero, it is recommended to configure0.1~1s, in order to block the detection Test.

4.1.6Dual potentiometer coordinated speed regulation

This usage uses one potentiometer to set the midpoint reference voltage, another potentiometer to control the motor speed and direction, and the switch quantity to control the motor emergency stop. The connection method of dual potentiometer coordinated speed regulation is shown in the figure4.11PotentiometerVR2Two fixed terminationsVOandCOM, dynamic terminationIN2, used to set the midpoint reference voltage; potentiometerVR1Two fixed terminationsVOandCOM, Dynamic TerminationIN1, used to control the motor speed and direction, input signal interface IN1,IN2,VOandCOMThe voltages of the ports are recorded asV_{VR1}.V_{VR2},VandV_{COM}.whenV_{VR1}> V_{VR2}The motor rotates forward whenV_{VR1}Depend onV_{VR2} Gradually increase toV During this process, the motor speed will be0Gradually increase to full forward speed; whenV_{VR1}< V_{VR2}When the motor reverses,V_{VR1}Depend onV_{VR2}Gradually decrease toV_{COM}During this process, the motor speed will be0Gradually increase to full reverse speed; whenV_{VR1} = V_{VR2}The motor brakes. SwitchK1catchCOMandIN3The motor is controlled to stop urgently.SQ1andSQ2Set limits for forward and reverse rotation respectively.



picture4.11Connection method of dual potentiometer coordinated speed regulation

By configuring the different types and polarities of digital signals (see6.3.5Section system

Parameter configuration register0x0081and0x0085）, we can use different operations of potentiometers, switch quantities and logic levels to

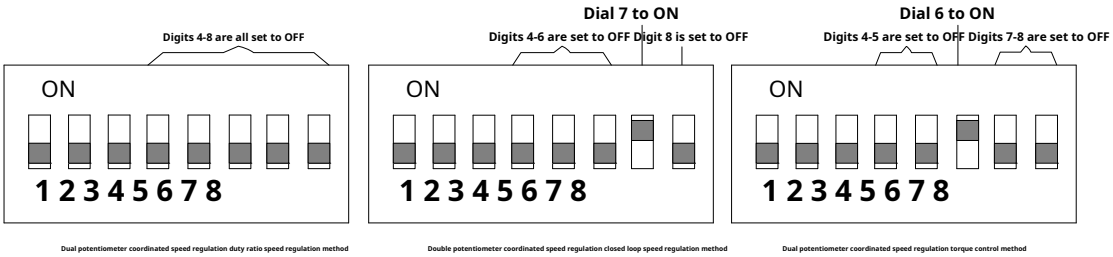
The operation method realizes the start and stop and forward and reverse control of the motor. The control logic is shown in the table4.11shown.

surface4.11Dual potentiometer coordinated speed control logic

Digital signal type	Digital signal polarity	Functions implemented	How to operate	Wiring scheme
Switching quantity	Low level/closed (default)	Speed Control	Speed by potentiometerVR1Output VoltageVVR1With potentiometerVR2 Output voltageVVR2The difference is Determined, that is, by abs(VVR1-VVR2)Decide	
		Forward	VVR1>VVR2,K1disconnect	
		Reversal	VVR1< VVR2,K1disconnect	
		stop	K1closure	
	High level/disconnect	Speed Control	Speed by potentiometerVR1Output VoltageVVR1With potentiometerVR2 Output voltageVVR2The difference is Determined, that is, by abs(VVR1-VVR2)Decide	
		Forward	VVR1>VVR2,K1closure	
		Reversal	VVR1< VVR2,K1closure	
		stop	K1disconnect	

In the dual potentiometer coordinated speed control mode, the driver supports three speed control modes: duty cycle speed control, closed loop speed control and torque control. The configuration method of the DIP switch for each speed control mode is shown in the figure4.12As shown, the dip switch1-3Configure the motor rated current (see table for how to configure the motor rated current2.2); No.4-5bit configuration signal source (see Table 1 for how to configure the signal source)2.3), We configure the signal source as a potentiometer, that is4-5Dial toOFF;6-7Bit configuration working mode (how to configure the working mode see table2.4) ,8We configure the control mode as digital/analog signal control mode. 8 Dial toOFF.

The DIP switch is turned to the upper position.ON, below isOFF. From left to right are1-8Bit.



picture4.12DIP switch configuration for dual potentiometer coordinated speed regulation

In the dual potentiometer coordinated speed control mode, the reference configuration of the relevant registers is shown in the table4.12shown.

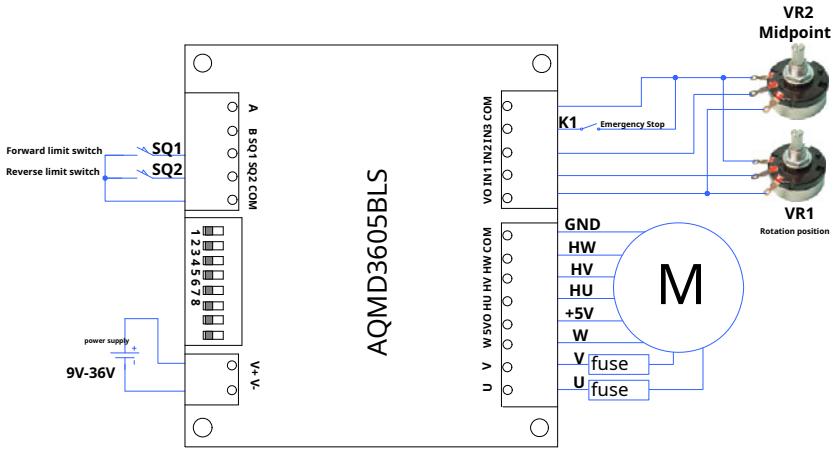
surface4.12Configuration of related registers of dual potentiometer coordinated speed regulation mode

Register Address	Register function	value	describe
0x0080	Limit trigger polarity	0,1,2,3,4	0: Low level trigger (default) 1: High level trigger 2: Falling edge trigger

			3: Rising edge trigger 4: Disable limit function
0x0081	Digital signal polarity	0,1,	0: Low level trigger (default) 1: High level trigger
0x0082	Potentiometer Usage	2	Dual potentiometer synergy
0x0085	Logic level type	0,1,2,3	0: Switch value (default) 1:0/3.3V 2:0/5V 3:0/12Vor0/24V
0x0086	Potentiometer minimum value	0	The minimum output voltage value of the potentiometer is0(default)
0x0087	Potentiometer maximum value	0x0CDF	The maximum output voltage of the potentiometer is3295mV(default)
0x008a	Logic level threshold	0x07D0	The switching logic level voltage threshold can be configured as 2000mV(default), Other logic levels are configured separately
0x008b	Voltage comparison dead zone	0	default value0, the unit ismV; Used to center the potentiometer A dead zone is generated near the point, and the motor remains stopped

4.1.7Dual potentiometer coordinated position control

This usage uses one potentiometer to set the midpoint position, another potentiometer to adjust the rotation position, and the switch quantity to control the motor emergency stop. The connection method of the dual potentiometer position cooperative control is shown in the figure4.13PotentiometerVR2Two fixed terminations VOandCOM, dynamic terminationIN2, used to set the midpoint position; potentiometerVR1Two fixed terminationsVOandCOM, dynamic termination IN1, used to adjust the motor rotation position. Input signal interfaceIN1,IN2,VOandCOMThe voltages of the ports are recorded asV_{VR1}, V_{VR2},VandV_{COM}.whenV_{VR1}Depend onV_{VR2}Gradually increase toVDuring the process, the motor rotates from the midpoint to the maximum stroke position (the total stroke can be0x00a2and0x00a3Registers to configure, see6.3.6Section reciprocating position control parameter register); whenV_{VR1}Depend onV_{VR2}Gradually decrease toV_{COM}During the process, the motor rotation position changes from the midpoint position to the starting point of the stroke; whenV_{VR1}= V_{VR2}When the switchK1catchCOMandIN3The motor is controlled to stop urgently.SQ1andSQ2Set limits for forward and reverse rotation respectively.



picture4.13Connection method of dual potentiometer position cooperative control

By configuring the different types and polarities of digital signals (see6.3.5Section System Parameter Configuration Register0x0081and0x0085） , we can operate the potentiometer, logic level and switch quantity differently

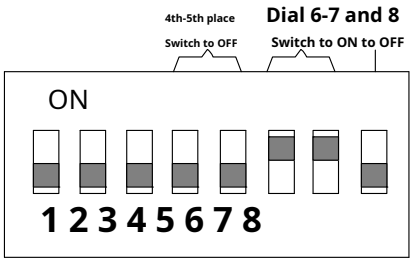
Method to achieve motor position adjustment, signal latching and emergency stop, the control logic is shown in the table4.13shown.

surface4.13Control logic of dual potentiometer position cooperative control

Digital signal type	Digital signal polarity	Functions implemented	How to operate	Wiring scheme
Switching quantity	Low level/closed (default)	Set midpoint	PotentiometerVR2adjust	
		Adjust position	PotentiometerVR1adjust	
		Emergency Stop	K1closure	
	High level/disconnect	Set midpoint	PotentiometerVR2adjust	
		Adjust position	PotentiometerVR1adjust	
		Emergency Stop	K1disconnect	

The configuration method of the dip switch for dual potentiometer position control is shown in the figure4.14As shown, the dip switch1-3Configure the motor rated current (see table for how to configure the motor rated current2.2);4-5bit configuration signal source (see Table 1 for how to configure the signal source) 2.3), we configure the signal source as a potentiometer, that is4-5Dial toOFF;6-7Bit configuration working mode (how to configure the working mode see table2.4）, we configure the working mode as position control, that is,6-7Dial toON;8Bit configuration Control mode, we configure the control mode as digital/analog signal control mode, that is,8Dial toOFF.

The DIP switch is turned to the upper position.ON, below isOFF. From left to right are1-8Bit.



picture4.14DIP switch configuration for dual potentiometer position control

In the dual potentiometer coordinated position control mode, the reference configuration of the relevant registers is shown in the table4.14shown.

surface4.14Configuration of related registers of dual potentiometer coordinated position control mode

Register Address	Register function	value	describe
0x0080	Limit trigger polarity	0,1,2,3,4	0: Low level trigger (default) 1: High level trigger 2: Falling edge trigger 3: Rising edge trigger 4: Disable limit function
0x0081	Digital signal polarity	0,1	0: Low level trigger (default) 1: High level trigger
0x0082	Potentiometer Usage	2	Dual potentiometer synergy
0x0085	Logic level type	0,1,2,3	0: Switch value (default) 1:0/3.3V 2:0/5V 3:0/12Vor0/24V
0x0086	Potentiometer minimum value	0	The minimum output voltage value of the potentiometer is0(default)
0x0087	Potentiometer maximum value	0x0CDF	The maximum output voltage of the potentiometer is3295mV(default)
0x008a	Logic level threshold	0x07D0	The switching logic level voltage threshold can be configured as

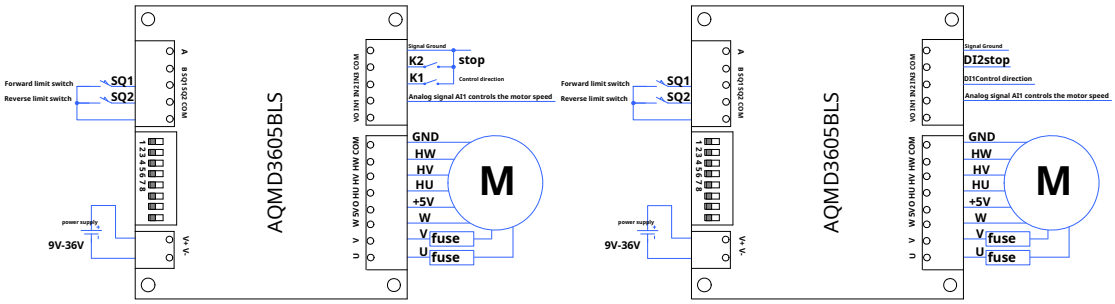
			2000mV(default), Other logic levels are configured separately
0x00a0	Position reset mode	0,1,2,3,4	0: Do not reset 1:SQ2Reset (default) 2:SQ1Reset 3:SQ2Reset and fine tune 4:SQ1Reset and fine tune
0x00a2-0x00a3	Total travel		The total itinerary can be obtained through itinerary learning
0x00a7	The signal to be ignored Quantification	1	neglect0.1%The following potentiometer output voltage fluctuations (default recognize) Used for filtering to eliminate motor jitter caused by interference signals
0x00a9	Current during reset	0~700	When non-zero, multiply by0.01is the maximum load current during reset, in units ofA; When it is zero, use the system parameter configuration Large load current; used to configure the torque during reset. When resetting using the motor stall detection method, here The current configuration is just enough to smoothly drag the load. The stall stop time is configured to non-zero.
0x008b	Voltage comparison dead zone	0	default value0, the unit ismV; Used to center the potentiometer A dead zone is generated near the point, and the motor maintains the midpoint position
0x008e	Stall stop time	0~255	Multiply the value by0.1is the stall stop time, in units of s; For motor stall detection (without limit switch When resetting the detection stroke, the stall stop time should be configured If it is non-zero, it is recommended to configure0.1~1s, in order to block the detection Test.

4.2Connection and configuration of analog signal speed regulation

The usage of analog signals can be configured as single-ended analog signal speed/position control, differential analog signal speed/position control, dual single-ended analog signal independent speed/position control, and dual single-ended analog signal coordinated speed/position control (for how to configure the usage of analog signals, see6.3.5Festival0x0084The wiring and configuration methods of analog signals for various usages are as follows.

4.2.1Single-ended analog signal speed regulation (level trigger)

This usage uses a single-ended analog signal to adjust the motor speed (level trigger), and uses the switch value/logic level to control the motor's rotation direction and start and stop. The connection method of single-ended analog signal speed control is shown in the figure4.15shown.IN1Connect analog signalAI1, used for motor speed control. When using switch quantity to control the motor forward and reverse rotation and start and stop, the switchK1catchIN2 andCOMTime, control the direction of the motor, switchK2catchIN3andCOMWhen the logic level is used to control the motor forward and reverse rotation and start and stop,IN2Connect to logic levelDI1, control the motor direction,IN3Connect to logic levelDI2, control the start and stop of the motor.COMConnect to signal ground,VOIt is a fault output. Limit switchSQ1andSQ2Set limits for forward and reverse rotation respectively.



picture4.15Connection method of single-ended analog signal speed regulation (level trigger) switch quantity (left picture)/logic level (right picture) control

By configuring the different types and polarities of digital signals (see6.3.5Section System Parameter Configuration Register0x0081and0x0085），we can use the different

The operation method can realize the start and stop and forward and reverse control of the motor. The control logic is shown in the table4.15shown.

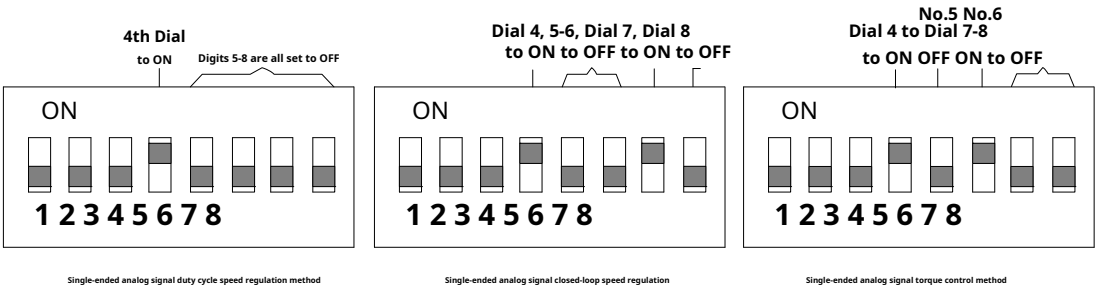
surface4.15Single-ended analog signal speed control (level trigger) control logic

Digital signal type	Digital signal polarity	Functions implemented	How to operate	Wiring scheme
Switching quantity	Low level/closed (default)	Speed Control	analog signalAI1Adjust speed	switch
		Forward	K1disconnect,K2disconnect	
		Reversal	K1closure,K2disconnect	
		stop	K2closure	
	High level/disconnect	Speed Control	analog signalAI1Adjust speed	
		Forward	K1closure,K2closure	
		Reversal	K1disconnect,K2closure	
		stop	K2disconnect	
Logic Level	Low level/closed (default)	Speed Control	analog signalAI1Adjust speed	Level
		Forward	DI1High level,DI2High level	
		Reversal	DI1Low level,DI2High level	
		stop	DI2Low level	
	High level/disconnect	Speed Control	analog signalAI1Adjust speed	
		Forward	DI1Low level,DI2Low level	
		Reversal	DI1High level,DI2Low level	
		stop	DI2High level	

In the single-ended analog signal speed control (level trigger) mode, the driver supports three speed control methods: duty cycle speed control, closed-loop speed control and torque control. The switch configuration method of each speed control method is shown in the figure4.16As shown, the DIP switch1-3 Configure the motor rated current (see table for how to configure the motor rated current2.2);4-5bit configuration signal source (see Table 1 for how to configure the signal source)2.3), we configure the signal source as an analog signal, that is,4Dial toON,5Dial toOFF;4-7 Bit configuration working mode (how to configure the working mode see table2.4）,8We configure the control mode.

Set to digital/analog signal control mode, that is,8Dial toOFF.

The DIP switch is turned to the upper position.ON, below isOFF. From left to right are1-8Bit.



picture4.16 DIP switch configuration for single-ended analog signal speed control (level trigger)

In the single-ended analog signal speed control mode, the reference configuration of the relevant registers is shown in the table4.16shown.

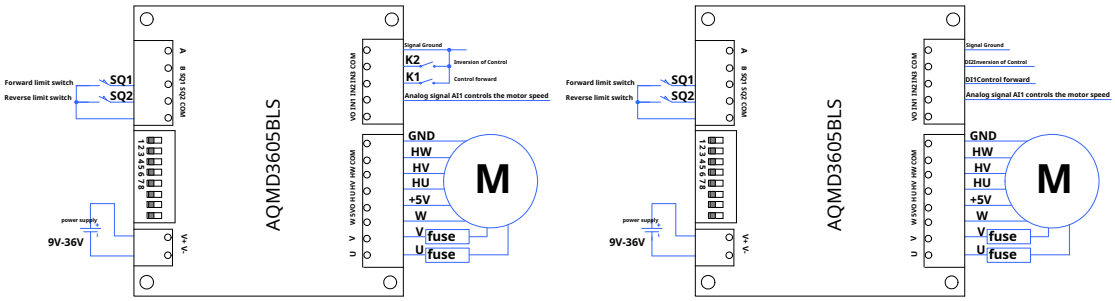
surface4.16Configuration of registers related to single-ended analog signal speed regulation (level trigger) mode

Register Address	Register function	value	describe
0x0080	Limit trigger polarity	0,1,2,3,4	0: Low level trigger (default) 1: High level trigger 2: Falling edge trigger 3: Rising edge trigger 4: Disable limit function
0x0081	Digital signal polarity	0,1	0: Low level trigger (default) 1: High level trigger
0x0084	Analog signal type	0	Single-ended analog signal (default)
0x0085	Logic level type	0,1,2,3	0: Switch value (default) 1:0/3.3V 2:0/5V 3:0/12Vor0/24V
0x0088	Small analog range value	0	The minimum analog range is0(default)
0x0089	Large analog range value	0x2710	The maximum analog range is3300mV(default), or Configure to other values as required
0x008a	Logic level threshold	0x07D0	The switching logic level voltage threshold can be configured as 2000mV(default), Other logic levels are configured separately
0x0096-0x0097	Analog signal conditioning system numberk	1.0f	default value1.0f, used to adjust the analog signal magnification
0x0098	Analog signal conditioning system numberb	0	The unit ismV,default value0; Used to correct analog signals Dead Zone

4.2.2Single-ended analog signal speed regulation (edge triggered)

This usage uses a single-ended analog signal to adjust the motor speed (edge trigger), and uses the switch value/logic level to control the motor's rotation direction and start and stop. The connection method of single-ended analog signal speed control is shown in the figure4.17shown.IN1Connect analog signalAI1, used for motor speed control. When using switch quantity to control the forward and reverse rotation of the motor, the switchK1catchIN2andCOMControl the motor to rotate forward, switchK2 catchIN3andCOMWhen the logic level is used to control the forward and reverse rotation of the motor,IN2Connect to logic level DI1, control the motor to rotate forward,IN3Connect to logic levelDI2, control the motor to reverse.COMConnect to signal ground,VOIt is a fault output.

Position switchSQ1andSQ2Set limits for forward and reverse rotation respectively.



picture4.17Single-ended analog signal speed control switch (edge triggered) (Left)/Logic level (right) control connection

By configuring the different types and polarities of digital signals (see6.3.5Section System Parameter Configuration Register0x0081and0x0085） , we can use the different

The operation method can realize the start and stop and forward and reverse control of the motor. The control logic is shown in the table4.17shown.

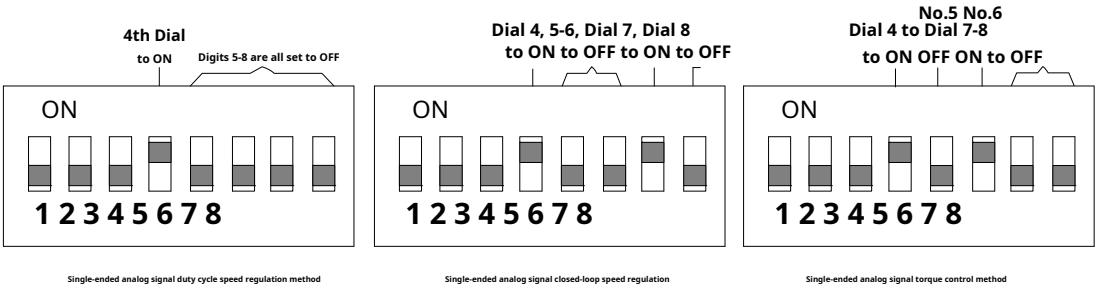
surface4.17Single-ended analog signal speed control (edge-triggered) control logic

Digital signal type	Digital signal polarity	Functions implemented	How to operate	Wiring scheme
Switching quantity	Falling edge/closing moment	Speed Control	analog signalAI1Adjust speed	Self-insurance
		Forward	K1After closing, open.K2Always off open	
		Reversal	K2After closing, open.K1Always off open	
		stop	Limit or speed adjustment0Stop	
	Rising edge/disconnection moment	Speed Control	analog signalAI1Adjust speed	
		Forward	K1After opening, close.K2Always Close combine	
		Reversal	K2After opening, close.K1Always Close combine	
		stop	Limit or speed adjustment0Stop	
Logic Level	Falling edge/closing moment	Speed Control	analog signalAI1Adjust speed	edge
		Forward	DI1From high level to low level,DI2 Always high	
		Reversal	DI2From high level to low level,DI1 Always high	
		stop	Limit or speed adjustment0Stop	
	Rising edge/disconnection moment	Speed Control	analog signalAI1Adjust speed	
		Forward	DI1From low level to high level,DI2 Always low	
		Reversal	DI2From low level to high level,DI1 Always low	
		stop	Limit or speed adjustment0Stop	

In the single-ended analog signal speed control (edge trigger) mode, the driver supports three speed control methods: duty cycle speed control, closed-loop speed control and torque control. The switch configuration method of each speed control method is shown in the figure4.18As shown, the DIP switch1-3Bit configuration

Motor rated current (see table for how to configure the motor rated current2.2);4-5bit configuration signal source (see Table 1 for how to configure the signal source)2.3) , we configure the signal source as an analog signal, that is,4Dial toON,5Dial toOFF;4-7 Bit configuration working mode (how to configure the working mode see table2.4) ,8We configure the control mode. Set to digital/analog signal control mode, that is,8Dial toOFF.

The DIP switch is turned to the upper position.ON, below isOFF. From left to right are1-8Bit.



picture4.18DIP switch configuration for single-ended analog signal speed control (edge triggered)

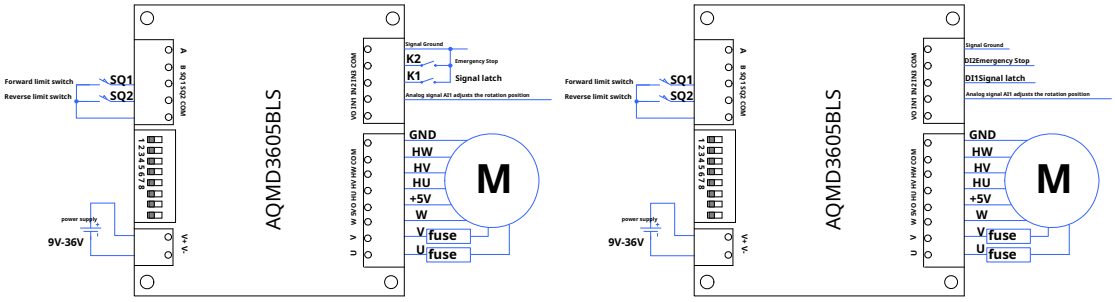
In the single-ended analog signal speed control mode, the reference configuration of the relevant registers is shown in the table4.18shown.

surface4.18Configuration of registers related to single-ended analog signal speed regulation (edge triggering)

Register Address	Register function	value	describe
0x0080	Limit trigger polarity	0,1,2,3,4	0: Low level trigger (default) 1: High level trigger 2: Falling edge trigger 3: Rising edge trigger 4: Disable limit function
0x0081	Digital signal polarity	2,3	2: Falling edge trigger 3: Rising edge trigger
0x0084	Analog signal type	0	Single-ended analog signal (default)
0x0085	Logic level type	0,1,2,3	0: Switch value (default) 1:0/3.3V 2:0/5V 3:0/12Vor0/24V
0x0088	Small analog range value	0	The minimum analog range is0(default)
0x0089	Large analog range value	0x2710	The maximum analog range is3300mV(default), or Configure to other values as required
0x008a	Logic level threshold	0x07D0	The switching logic level voltage threshold can be configured as 2000mV(default), Other logic levels are configured separately
0x0096-0x0097	Analog signal conditioning system numberk	1.0f	default value1.0f, used to adjust the analog signal magnification
0x0098	Analog signal conditioning system numberb	0	The unit ismV,default value0; Used to correct analog signals Dead Zone

4.2.3Single-ended analog signal position control (level triggered)

This usage uses a single-ended analog signal to adjust the motor rotation position (level trigger), and uses logic level/switch quantity to control the position given signal latch and motor emergency stop. The connection method of single-ended analog signal position control is shown in the figure4.19shown.IN1Connect analog signalAI1, used to adjust the motor rotation position. When using switch control, the switchK1catchIN2andCOMFor position signal latch, switchK2catchIN3andCOMWhen using logic level control, IN2 Connect to logic levelDI1, used for position signal latching,IN3Connect to logic levelDI2, control the motor to stop urgently.VOOutput completion signal,COMConnect to signal ground. Limit switchSQ1andSQ2Set limits for forward and reverse rotation respectively.



picture4.19Wiring for single-ended analog signal position (level trigger) switch quantity (left)/logic level (right) control mode

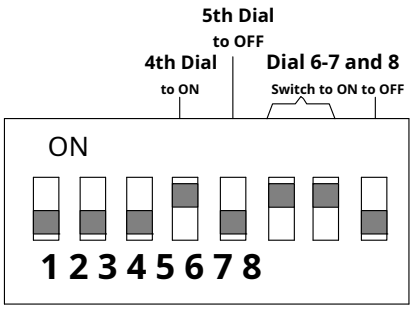
By configuring the different types and polarities of digital signals (see6.3.5Section System Parameter Configuration Register0x0081and0x0085） We can use different analog signals, logic levels and switch quantities to The operation method realizes motor position adjustment, signal latching and emergency stop. The control logic is shown in the table4.19shown.

surface4.19Single-ended analog signal position control (level triggered)

Digital signal type	Digital signal polarity	Functions implemented	How to operate	Wiring scheme
Switching quantity	Low level/closed (default)	Adjust position	analog signalAI1Adjust position	switch
		Signal latch	K1closure,K2disconnect	
		Emergency Stop	K2closure	
	High level/disconnect	Adjust position	analog signalAI1Adjust position	
		Signal latch	K1disconnect,K2closure	
		Emergency Stop	K2disconnect	
Logic Level	Low level/closed (default)	Adjust position	analog signalAI1Adjust position	Level
		Signal latch	DI1Low level,DI2High level	
		Emergency Stop	DI2Low level	
	High level/disconnect	Adjust position	analog signalAI1Adjust position	
		Signal latch	DI1High level,DI2Low level	
		Emergency Stop	DI2High level	

The configuration method of the DIP switch for single-ended analog signal position control (level trigger) is shown in the figure4.20As shown, the DIP switch1-3Configure the motor rated current (see table for how to configure the rated current)2.2） ;4-5bit configuration signal source (how to configure Set the signal source as shown in the table2.3), we configure the signal source as an analog signal, that is,4Dial toON,5Dial to OFF;6-7Bit configuration working mode (how to configure the working mode see table2.4), we configure the working mode as position control, that is,6-7Dial toON;8Dial toOFF, we configure the control mode as digital/analog signal control mode, that is,8 Dial toOFF.

The DIP switch is turned to the upper position.ON, below isOFF. From left to right are1-8Bit.



picture4.20Single-ended analog signal position control (level trigger) DIP switch configuration

In the single-ended analog signal position control (level trigger) mode, the reference configuration of the relevant registers is shown in the table4.20shown.

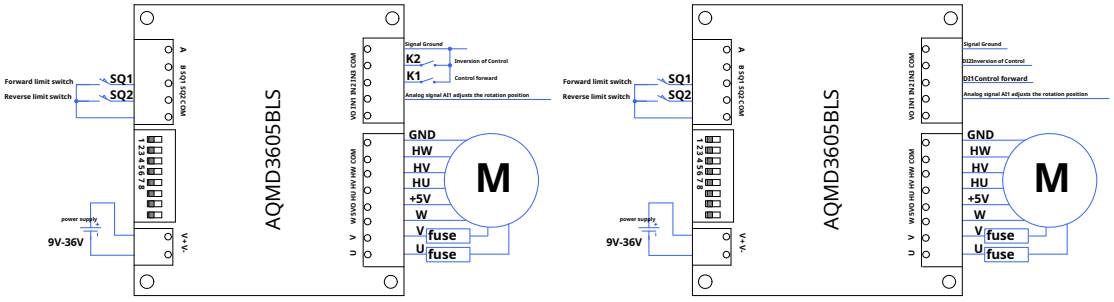
surface4.20Configuration of registers related to single-ended analog signal position control (level trigger) mode

Register Address	Register function	value	describe
0x0080	Limit trigger polarity	0,1,2,3,4	0: Low level trigger (default) 1: High level trigger 2: Falling edge trigger 3: Rising edge trigger 4: Disable limit function
0x0081	Digital signal polarity	0,1	0: Low level trigger (default) 1: High level trigger
0x0084	Analog signal type	0	Single-ended analog signal (default)
0x0085	Logic level type	0,1,2,3	0: Switch value (default) 1:0/3.3V 2:0/5V 3:0/12Vor0/24V
0x0088	Small analog range value	0	The minimum analog range is0(default)
0x0089	Large analog range value	0x2710	The maximum analog range is3300mV(default), or Configure to other values as required
0x008a	Logic level threshold	0x07D0	The switching logic level voltage threshold can be configured as 2000mV(default), Other logic levels are configured separately
0x0096-0x0097	Analog signal conditioning system numberk	1.0f	default value1.0f, used to adjust the analog signal magnification
0x0098	Analog signal conditioning system numberb	0	The unit ismV,default value0; Used to correct analog signals Dead Zone
0x00a0	Position reset mode	0,1,2,3,4	0: Do not reset 1:SQ2Reset (default) 2:SQ1Reset 3:SQ2Reset and fine tune 4:SQ1Reset and fine tune
0x00a2-0x00a3	Total travel		The total itinerary can be obtained through itinerary learning
0x00a7	The signal to be ignored	1	neglect0.1%The following input analog signal voltage fluctuations

	Quantification		(default) Used for filtering to eliminate motor jitter caused by interference signals
0x00a9	Current during reset	0~700	When non-zero, multiply by0.01is the maximum load current during reset, in units ofA; When it is zero, use the system parameter configuration Large load current; used to configure the torque during reset. When resetting using the motor stall detection method, here The current configuration is just enough to smoothly drag the load. The stall stop time is configured to non-zero.
0x008e	Stall stop time	0~255	Multiply the value by0.1is the stall stop time, in units of s; For motor stall detection (without limit switch When resetting the detection stroke, the stall stop time should be configured If it is non-zero, it is recommended to configure0.1~1s, in order to block the detection Test.

4.2.4Single-ended analog signal position control (edge triggered)

This usage uses a single-ended analog signal to adjust the motor speed (edge trigger), and uses the logic level/switch quantity to control the starting point or maximum stroke position of the motor movement. The connection method of single-ended analog signal position control is shown in the figure4.21shown.IN1Connect analog signal AI1, used to adjust the motor speed. When using switch control, the switchK1catchIN2and COMDuring this time, the control motor is turned to the maximum stroke position, and the switchK2catchIN3andCOMWhen using logic level control, IN2Connect to logic levelDI1, control the motor to rotate forward,IN3Connect to logic levelDI2, control the motor to reverse. VOOutput completion signal,COMConnect to signal ground. Limit switchSQ1andSQ2Set limits for forward and reverse rotation respectively.



picture4.21Wiring for single-ended analog signal position (edge triggered) switch quantity (left)/logic level (right) control method

By configuring the different types and polarities of digital signals (see6.3.5Section System Parameter Configuration Register0x0081and0x0085） We can use different analog signals, logic levels and switch quantities to The operation method realizes motor position adjustment, signal latching and emergency stop. The control logic is shown in the table4.21shown.

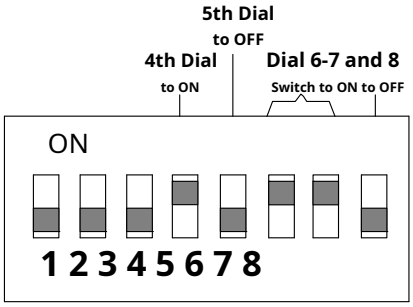
surface4.21Single-ended analog signal position control (edge triggered)

Digital signal type	Digital signal polarity	Functions implemented	How to operate	Wiring scheme
Switching quantity	Falling edge/closing moment	Adjust speed	analog signalAI1Adjust speed	Self-insurance
		Transfer to Daxing Procedure	K1After closing, open.K2Always disconnect	
		Reverse to the start of the stroke point	K2After closing, open.K1Always disconnect	
		stop	Limit or stop when moving to the end point	

	Rising edge/disconnection moment	Adjust speed	analog signalAI1Adjust speed	
		Transfer to Daxing Procedure	K1After opening, close.K2Always closure	
		Reverse to the start of the stroke point	K2After opening, close.K1Always closure	
		stop	Limit or stop when moving to the end point	
Logic Level	Falling edge/closing moment	Adjust speed	analog signalAI1Adjust speed	edge
		Transfer to Daxing Procedure	DI1From high level to low level,DI2 Always high	
		Reverse to the start of the stroke point	DI2From high level to low level,DI1 Always high	
		stop	Limit or stop when moving to the end point	
	Rising edge/disconnection moment	Adjust speed	analog signalAI1Adjust speed	
		Transfer to Daxing Procedure	DI1From low level to high level,DI2 Always low	
		Reverse to the start of the stroke point	DI2From low level to high level,DI1 Always low	
		stop	Limit or stop when moving to the end point	

The configuration method of the DIP switch for single-ended analog signal position control (edge trigger) is shown in the figure4.23As shown, the DIP switch1-3Configure the motor rated current (see table for how to configure the rated current)2.2） ;4-5bit configuration signal source (how to configure Set the signal source as shown in the table2.3), we configure the signal source as an analog signal, that is,4Dial toON,5Dial to OFF;6-7Bit configuration working mode (how to configure the working mode see table2.4), we configure the working mode as position control, that is,6-7Dial toON;8Dial toOFF, we configure the control mode as digital/analog signal control mode, that is,8 Dial toOFF.

The DIP switch is turned to the upper position.ON, below isOFF. From left to right are1-8Bit.



picture4.22Single-ended analog signal position control (edge triggered) DIP switch configuration

In the single-ended analog signal position control (edge trigger) mode, the reference configuration of the relevant registers is shown in the table4.22shown.

surface4.22Configuration of related registers for single-ended analog signal position control (edge trigger) mode

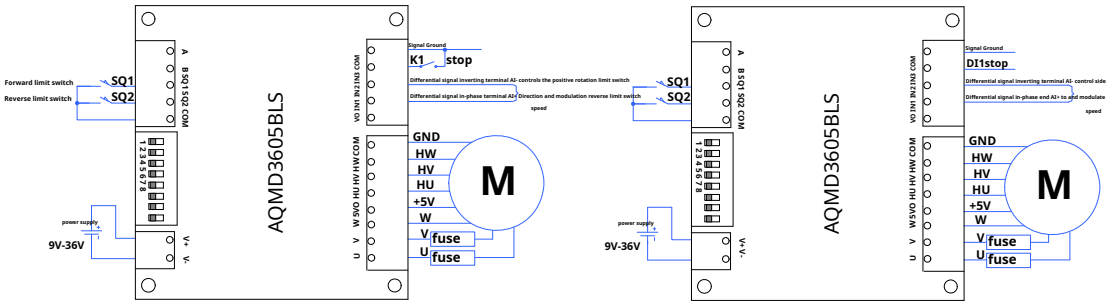
Register Address	Register function	value	describe
0x0080	Limit trigger polarity	0,1,2,3,4	0: Low level trigger (default) 1: High level trigger 2: Falling edge trigger 3: Rising edge trigger 4: Disable limit function

0x0081	Digital signal polarity	2,3	2: Falling edge trigger 3: Rising edge trigger
0x0084	Analog signal type	0	Single-ended analog signal (default)
0x0085	Logic level type	0,1,2,3	0: Switch value (default) 1:0/3.3V 2:0/5V 3:0/12Vor0/24V
0x0088	Small analog range value	0	The minimum analog range is0(default)
0x0089	Large analog range value	0x2710	The maximum value of the analog range is3300mV(default), It can also be configured to other values according to requirements
0x008a	Logic level threshold	0x07D0	The switching logic level voltage threshold can be configured as 2000mV(default), Other logic levels are configured separately
0x0096-0x0097	Analog signal conditioning system numberk	1.0f	default value1.0f, used to adjust the analog signal magnification
0x0098	Analog signal conditioning system numberb	0	The unit ismV,default value0; Used to correct analog signals Dead Zone
0x00a0	Position reset mode	1,2,3,4	1:SQ2Reset (default) 2:SQ1Reset 3:SQ2Reset and fine tune 4:SQ1Reset and fine tune
0x00a2-0x00a3	Total travel		The total itinerary can be obtained through itinerary learning
0x00a7	The signal to be ignored Quantification	1	neglect0.1%The following input analog signal voltage fluctuations (default) Used for filtering to eliminate motor jitter caused by interference signals
0x00a9	Current during reset	0~700	When non-zero, multiply by0.01is the maximum load current during reset, in units ofA; When it is zero, use the system parameter configuration Large load current; used to configure the torque during reset. When resetting using the motor stall detection method, here The current configuration is just enough to smoothly drag the load. The stall stop time is configured to non-zero.
0x008e	Stall stop time	0~255	Multiply the value by0.1is the stall stop time, in units of s; For motor stall detection (without limit switch When resetting the detection stroke, the stall stop time should be configured If it is non-zero, it is recommended to configure0.1~1s, in order to block the detection Test.

4.2.5Differential analog signal speed control

This usage uses differential signals to control the motor speed and direction, and uses switches or logic levels to control the motor to stop. The connection method of differential analog signal speed control is shown in the figure4.23As shown. Among them,IN1Connect to the common-phase terminal of differential analog signalAI+,IN2Connect to the inverting terminal of the differential analog signalAI-, the differential analog signal voltage is recorded asV_{DM}The motor rotation direction is determined byV_{DM}The positive or negative value ofV_{DM}

> 0The motor rotates forward whenV_{DM}< 0When the motor reverses,V_{DM}= 0The motor brakes when the motor speed is proportional to the absolute value of the differential signal voltage; whenV_{DM}When the analog signal is greater than or equal to the maximum value of the set range, the motor rotates at full speed;V_{DM}When the analog signal is less than or equal to the minimum value of the set range, the motor stops.0x0086and 0x0087Configure the analog range (see6.3.5When using logic level to control the motor to stop,IN3Connect to logic level DI1; When using switch quantity to control the motor to stop,IN3andCOMIndirect switchK1; COMConnect to signal ground,VOIt is a fault output. Limit switchSQ1andSQ2Set limits for forward and reverse rotation respectively.



picture4.23Wiring diagram of differential analog signal speed control with switch quantity (left)/logic level (right) control mode

By configuring the different types and polarities of digital signals (see6.3.5Section System Parameter Configuration Register0x0081and0x0085）, we can use the different

The operation method can realize the start and stop and forward and reverse control of the motor. The control logic is shown in the table4.23shown.

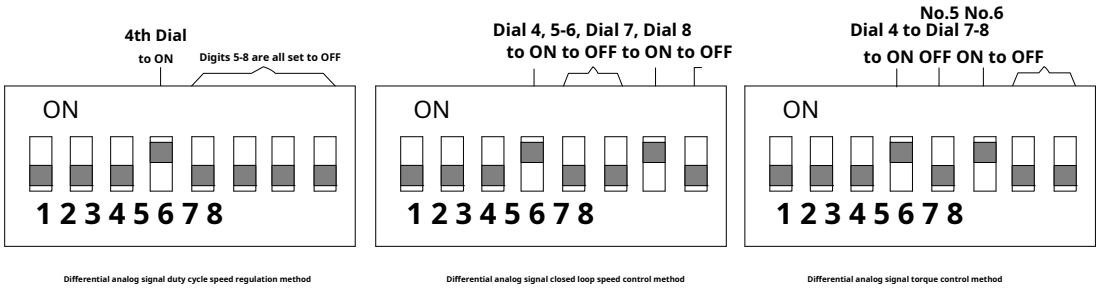
surface4.23Differential analog signal speed control logic

Digital signal type	Digital signal polarity	Functions implemented	How to operate	Wiring scheme
Switching quantity	Low level/closed (default)	Speed Control	The voltage of the analog signal is differentially V_{DM}Amplitude adjustment	difference
		Forward	V_{DM}>0,K1disconnect	
		Reversal	V_{DM}<0,K1disconnect	
		stop	K1closure	
	High level/disconnect	Speed Control	The voltage of the analog signal is differentially V_{DM}Amplitude adjustment	
		Forward	V_{DM}>0,K1closure	
		Reversal	V_{DM}<0,K1closure	
		stop	K1disconnect	
Logic Level	Low level/closed (default)	Speed Control	The voltage of the analog signal is differentially V_{DM}Amplitude adjustment	difference
		Forward	V_{DM}>0,DI1High level	
		Reversal	V_{DM}<0,DI1High level	
		stop	DI1Low level	
	High level/disconnect	Speed Control	The voltage of the analog signal is differentially V_{DM}Amplitude adjustment	
		Forward	V_{DM}>0,DI1Low level	
		Reversal	V_{DM}<0,DI1Low level	
		stop	DI1High level	

Under the differential analog signal speed control mode, the driver supports three speed control modes: duty cycle speed control, closed loop speed control and torque control. The DIP switch configuration method is shown in the figure.4.24The DIP switch1-3Configure the motor rated current (how to configure

The rated current of the motor is shown in the table2.2);4-5bit configuration signal source (see table for how to configure the signal source)2.3), we configure the signal source as an analog signal, that is,4Dial toON,5Dial toOFF;6-7Bit configuration working mode (how to configure the working mode see table2.4） ,8bit configuration control mode, we configure the control mode as digital/analog signal No. control mode, that is,8Dial toOFF.

The DIP switch is turned to the upper position.ON, below isOFF. From left to right are1-8Bit.



picture4.24DIP switch configuration for differential analog signal speed control

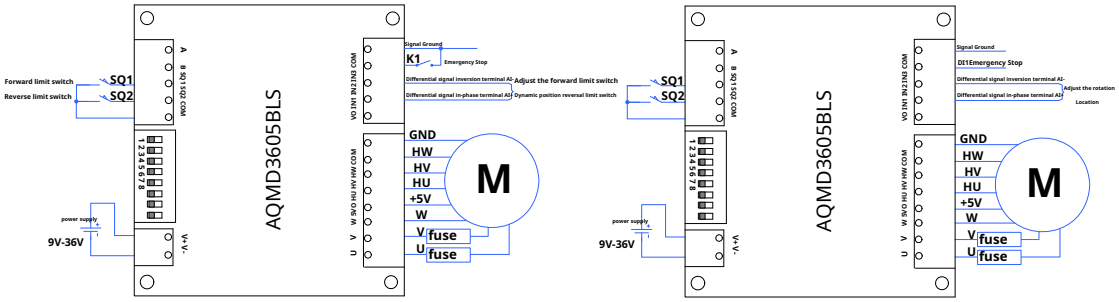
In the differential analog signal speed control mode, the reference configuration of the relevant registers is shown in the table4.24shown.

surface4.24Configuration of registers related to differential analog signal speed regulation

Register Address	Register function	value	describe
0x0080	Limit trigger polarity	0,1,2,3,4	0: Low level trigger (default) 1: High level trigger 2: Falling edge trigger 3: Rising edge trigger 4: Disable limit function
0x0081	Digital signal polarity	0,1	0: Low level trigger (default) 1: High level trigger
0x0084	Analog signal type	1	Differential analog signal
0x0085	Logic level type	0,1,2,3	0: Switch value (default) 1:0/3.3V 2:0/5V 3:0/12Vor0/24V
0x0088	Small analog range value	0	The minimum analog range is0(default)
0x0089	Large analog range value	0x0CE4	The maximum differential analog range is3300mV, you can also root Configure to other values as required
0x008a	Logic level threshold	0x07D0	The switching logic level voltage threshold can be configured as 2000mV(default), Other logic levels are configured separately
0x008b	Voltage comparison dead zone	0	default value0, the unit ismV; Used to make the differential signal 0A dead zone is generated near the voltage, and the motor remains stopped
0x0096-0x0097	Analog signal conditioning system numberk	1.0f	default value1.0f, used to adjust the analog signal magnification
0x0098	Analog signal conditioning system numberb	0	The unit ismV,default value0; Used to correct analog signals Dead Zone

4.2.6Differential analog signal position control

This usage uses differential analog signals to adjust the motor rotation position and controls the emergency stop through switch quantity/logic level. The connection method of differential analog signal position control is shown in the figure4.25As shown. Among them,IN1Connect to the common-phase terminal of differential analog signalAI+,IN2 Connect to the inverting terminal of the differential analog signalAI-, the voltage of the differential analog signal is recorded asV_{DM} , the rotation position is determined byV_{DM}The value ofV_{DM}When it is equal to the maximum value of the set analog signal range, the motor rotates to the maximum stroke position; whenV_{DM}When it is equal to the minimum value of the set analog signal range, the motor rotates to the starting point of the stroke;V_{DM} equal0When the motor rotates to the midpoint of the stroke, we can configure the range of the analog quantity by operating the register (see how to configure 6.3.5Section System Parameter Configuration Register0x0086and0x0087). When using logic level control for emergency stop,IN3Connect to logic levelDI1; When using switch quantity to control the motor emergency stop, the switchK1catchIN3andCOMbetween.VOOutput completion signal,COMConnect to signal ground. Limit switchSQ1andSQ2Set limits for forward and reverse rotation respectively.



picture4.25Connection method of differential analog signal position control

By configuring the different types and polarities of digital signals (see6.3.5Section System Parameter Configuration Register0x0081and0x0085） We can use different analog signals, logic levels and switch quantities to The operation method realizes motor position adjustment, signal latching and emergency stop. The control logic is shown in the table4.25shown.

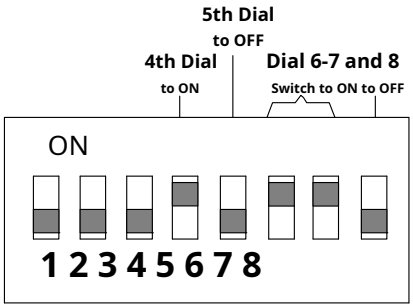
surface4.25Differential analog control signal position control

Digital signal type	Digital signal polarity	Functions implemented	How to operate	Wiring scheme
Switching quantity	Low level/closed (default)	Adjust position	The voltage of the analog signal is differentially V_{DM}Make adjustments	
		Emergency Stop	K1closure	
	High level/disconnect	Adjust position	The voltage of the analog signal is differentially V_{DM}Make adjustments	
		Emergency Stop	K1disconnect	
Logic Level	Low level/closed (default)	Adjust position	The voltage of the analog signal is differentially V_{DM}Make adjustments	
		Emergency Stop	DI1Low level	
	High level/disconnect	Adjust position	The voltage of the analog signal is differentially V_{DM}Make adjustments	
		Emergency Stop	DI1High level	

The configuration method of the DIP switch for differential analog signal position control is shown in the figure4.26As shown, the DIP switch1-3Configure the motor rated current (see table for how to configure the rated current)2.2);4-5bit configuration signal source (see Table 1 for how to configure the signal source) 2.3), we configure the signal source as an analog signal, that is,4Dial toON,5Dial toOFF;6-7Bit configuration working mode (how to configure the working mode see table2.4), we configure the working mode as position control, that is,6-7Dial

arriveON;8We configure the control mode as digital/analog signal control mode.8Dial to OFF.

The DIP switch is turned to the upper position.ON, below isOFF. From left to right are1-8Bit.



picture4.26Differential analog signal position control DIP switch configuration

Reference configuration table of related registers under differential analog signal position control mode4.26shown.

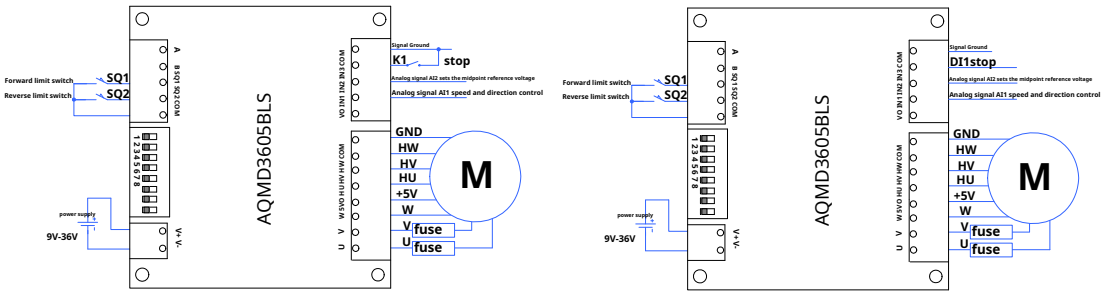
surface4.26Configuration of registers related to differential analog signal position control mode

Register Address	Register function	value	describe
0x0080	Limit trigger polarity	0,1,2,3,4	0: Low level trigger (default) 1: High level trigger 2: Falling edge trigger 3: Rising edge trigger 4: Disable limit function
0x0081	Digital signal polarity	0,1	0: Low level trigger (default) 1: High level trigger
0x0084	Analog signal type	1	Differential analog signal
0x0085	Logic level type	0,1,2,3	0: Switch value (default) 1:0/3.3V 2:0/5V 3:0/12Vor0/24V
0x0088	Small analog range value	0	The minimum analog range is0(default)
0x0089	Large analog range value	0x0CE4	The maximum differential analog range is3300mV, you can also root Configure to other values as required
0x008a	Logic level threshold	0x2710	The switching logic level voltage threshold can be configured as 2000mV(default), Other logic levels are configured separately
0x008b	Voltage comparison dead zone	0	default value0, the unit ismV; Used to make the differential signal 0A dead zone is generated near the voltage, and the motor maintains the midpoint position
0x0096-0x0097	Analog signal conditioning system numberk	1.0f	default value1.0f, used to adjust the analog signal magnification
0x0098	Analog signal conditioning system numberb	0	The unit ismV,default value0; Used to correct analog signals Dead Zone
0x00a0	Position reset mode	1,2,3,4	1:SQ2Reset (default) 2:SQ1Reset

			3:SQ2Reset and fine tune 4:SQ1Reset and fine tune
0x00a2-0x00a3	Total travel		The total itinerary can be obtained through itinerary learning
0x00a7	The signal to be ignored Quantification	1	neglect0.1%The following input analog signal voltage fluctuations (default) Used for filtering to eliminate motor jitter caused by interference signals
0x00a9	Current during reset	0~700	When non-zero, multiply by0.01is the maximum load current during reset, in units ofA; When it is zero, use the system parameter configuration Large load current; used to configure the torque during reset. When resetting using the motor stall detection method, here The current configuration is just enough to smoothly drag the load. The stall stop time is configured to non-zero.
0x008e	Stall stop time	0~255	Multiply the value by0.1is the stall stop time, in units of s; For motor stall detection (without limit switch When resetting the detection stroke, the stall stop time should be configured If it is non-zero, it is recommended to configure0.1~1s, in order to block the detection Test.

4.2.7Dual single-ended analog signal coordinated speed regulation

This usage uses one analog signal to set the midpoint voltage, and the other analog signal to control the motor speed and direction. The connection method of dual single-ended analog signals for coordinated speed regulation is shown in the figure4.27As shown. Among them,IN2 Connect analog signalAI2, used to set as the midpoint reference voltage;IN1Connect analog signalAI1, used to control the motor speed and direction. Analog signalAI1andAI2The voltages are recorded asV_{IN1}andV_{IN2}The maximum and minimum values of the configured analog signal range are recorded asV_{MAX}andV_{MIN}(We can use register0x0086and0x0087Configure the analog range, see6.3.5section System Parameter Configuration Registers).V_{IN1}Depend onV_{IN2}Gradually increase toV_{MAX}During this process, the motor speed will be0Change to positive rotation; when V_{IN1}Depend on V_{IN2}Gradually decrease toV_{MIN}During this process, the motor speed will be0Change to reversal; whenV_{IN1}equalV_{IN2}When the motor is stopped using logic level control,IN3Connect to logic levelDI1; When using switch quantity to control the motor to stop,IN3Connect the switchK1. COMConnect to signal ground,VOIt is a fault output. Limit switchSQ1andSQ2Set limits for forward and reverse rotation respectively.



picture4.27Connection diagram of dual single-ended analog signal coordinated speed regulation switch quantity (left) / logic level (right) control

By configuring the different types and polarities of digital signals (see6.3.5Section System Parameter Configuration Register0x0081and0x0085） We can use the different analog signals, switch quantities and logic levels to

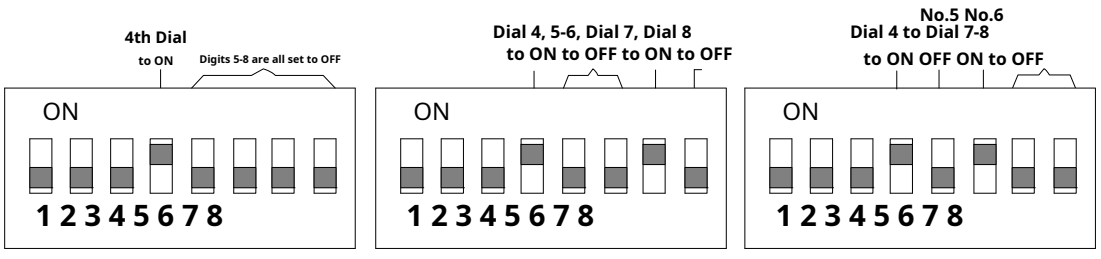
The operation method can realize the start and stop and forward and reverse control of the motor. The control logic is shown in the table4.27shown.

surface4.27Control logic of dual single-ended analog signal coordinated speed regulation

Digital signal type	Digital signal polarity	Functions implemented	How to operate	Wiring scheme
Switching quantity	Low level/closed (default)	Speed Control	Through the single-ended analog signalAI1of VoltageVIN1Make adjustments	
		Forward	VIN1>VIN2	
		Reversal	VIN1<VIN2	
		stop	VIN1=VIN2orK1closure	
	High level/disconnect	Speed Control	Through the single-ended analog signalAI1of VoltageVIN1Make adjustments	
		Forward	VIN1>VIN2	
		Reversal	VIN1<VIN2	
		stop	VIN1=VIN2orK1disconnect	
Logic Level	Low level/closed (default)	Speed Control	Through the single-ended analog signalAI1of VoltageVIN1Make adjustments	
		Forward	VIN1>VIN2	
		Reversal	VIN1<VIN2	
		stop	VIN1=VIN2orDI1Low level	
	High level/disconnect	Speed Control	Through the single-ended analog signalAI1of VoltageVIN1Make adjustments	
		Forward	VIN1>VIN2	
		Reversal	VIN1<VIN2	
		stop	VIN1=VIN2orDI1High level	

In the dual single-ended analog signal coordinated speed control mode, the driver supports three speed control modes: duty cycle speed control, closed-loop speed control and torque control. The configuration method of the DIP switch for each speed control mode is shown in the figure.4.28As shown, the1-3 Configure the motor rated current (see table for how to configure the rated current)2.2);4-5bit configuration signal source (see Table 1 for how to configure the signal source)2.3), we configure the signal source as an analog signal,4Dial toON,5Dial toOFF;6-7Bit configuration working mode (how to configure the working mode see table2.4） ,8Bit configuration control mode, we configure the control mode as digital/analog signal control way, that is,8Dial toOFF.

The DIP switch is turned to the upper position.ON, below isOFF. From left to right are1-8Bit.



Dual single-ended analog signal coordinated speed regulation duty cycle speed regulation method Dual single-ended analog signal coordinated speed regulation closed-loop speed regulation method Dual single-ended analog signal coordinated speed regulation torque control method

picture4.28DIP switch configuration for dual single-ended analog signal coordinated speed regulation

In the dual single-ended analog signal coordinated speed regulation mode, the reference configuration of the relevant registers is shown in the table4.28shown.

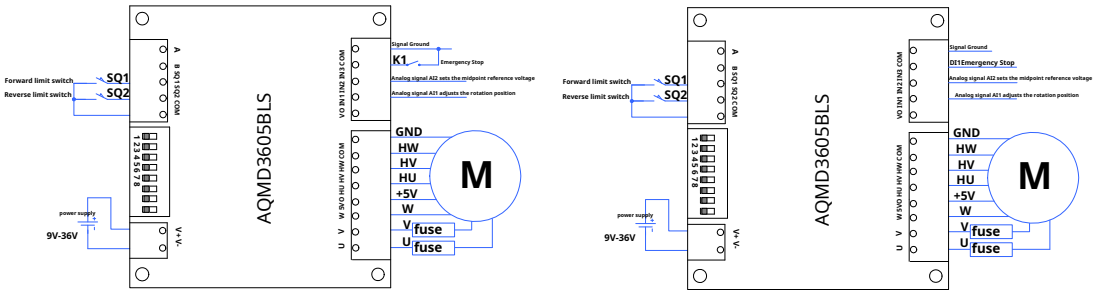
surface4.28Configuration of related registers of dual single-ended analog signal coordinated speed regulation mode

Register Address	Register function	value	describe
0x0080	Limit trigger polarity	0,1,2,3,4	0: Low level trigger (default)

			1: High level trigger 2: Falling edge trigger 3: Rising edge trigger 4: Disable limit function
0x0081	Digital signal polarity	0,1	0: Low level trigger (default) 1: High level trigger
0x0084	Analog signal type	3	Dual single-ended analog signal coordination
0x0085	Logic level type	0,1,2,3	0: Switch value (default) 1:0/3.3V 2:0/5V 3:0/12Vor0/24V
0x0088	Small analog range value	0	The minimum analog range is0(default)
0x0089	Large analog range value	0x0CDF	The maximum analog range is3300mV(default), or Configure to other values as required
0x008a	Logic level threshold	0x2710	The switching logic level voltage threshold can be configured as 2000mV(default), Other logic levels are configured separately
0x008b	Voltage comparison dead zone	0	default value0, the unit ismV; Used to make the analog signal produce a dead zone near the midpoint voltage, and the motor remains stopped state
0x0096-0x0097	Analog signal conditioning system numberk	1.0f	default value1.0f, used to adjust the analog signal magnification
0x0098	Analog signal conditioning system numberb	0	The unit ismV,default value0; Used to correct analog signals Dead Zone

4.2.8Dual single-ended analog signal coordinated position control

This usage uses one single-ended analog signal to set the midpoint position, and another single-ended analog signal to adjust the motor rotation position. The connection method of dual single-ended analog signals for coordinated position control is shown in the figure4.29As shown. Among them,IN2Connect analog signalAI2, used to set the midpoint position;IN1Connect analog signalAI1, adjust the motor rotation position. Analog signalAI1andAI2We denote the voltagesV_{IN1}andV_{IN2}The maximum and minimum values of the configured analog signal range are recorded asV_{MAX} andV_{MIN}(We can use register0x0086and0x0087Configure the analog range, see6.3.5section System Parameter Configuration Registers).V_{IN1}Depend on V_{MIN}Gradually increase toV_{IN2}During the process, the motor rotation position will change from the starting point of the stroke to the midpoint of the stroke; whenV_{IN1}Depend onV_{IN2}Gradually increase toV_{MAX}During the process, the motor rotation position will change from the mid-stroke position to the maximum stroke position; whenV_{IN1}equalV_{IN2}When the motor is stopped by logic level control, the switchK1catchIN3andCOMWhen using logic level to control the motor emergency stop,IN3Connect to logic levelDI1. COMConnect to signal ground,VOIt is a fault output. Limit switchSQ1andSQ2 Set limits for forward and reverse rotation respectively.



picture4.29Connection method of dual single-ended analog signals for coordinated position control

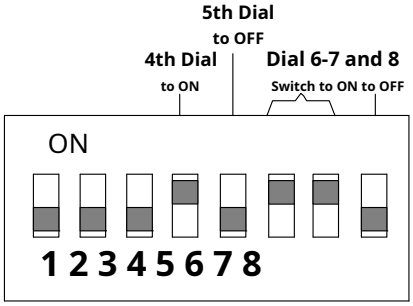
By configuring the different types and polarities of digital signals (see6.3.5Section System Parameter Configuration Register0x0081and0x0085） We can use different analog signals, logic levels and switch quantities to The operation method realizes motor position adjustment, signal latching and emergency stop. The control logic is shown in the table4.29shown.

surface4.29Control logic of dual single-ended analog signals coordinated position control

Digital signal type	Digital signal polarity	Functions implemented	How to operate	Wiring scheme
Switching quantity	Low level/closed (default)	Adjust position	passAI1Adjust the rotation position	
		Set midpoint	passAI2Set midpoint position	
		Emergency Stop	K1closure	
	High level/disconnect	Adjust position	passAI1Adjust the rotation position	
		Set midpoint	passAI2Set midpoint position	
		Emergency Stop	K1disconnect	
Logic Level	Low level/closed (default)	Adjust position	passAI1Adjust the rotation position	
		Set midpoint	passAI2Set midpoint position	
		Emergency Stop	DI1Low level	
	High level/disconnect	Adjust position	passAI1Adjust the rotation position	
		Set midpoint	passAI2Set midpoint position	
		Emergency Stop	DI1High level	

The configuration method of the DIP switch for dual single-ended analog signal coordinated position control is shown in the figure4.30As shown, the DIP switch1-3 Configure the motor rated current (see table for how to configure the rated current)2.2);4-5bit configuration signal source (see Table 1 for how to configure the signal source)2.3) , we configure the signal source as an analog signal,4Dial toON,5Dial toOFF;6-7Bit configuration working mode (how to configure the working mode see table2.4), we configure the working mode as position control, that is,6-7 Dial toON;8We configure the control mode as digital/analog signal control mode. 8Dial to OFF.

The DIP switch is turned to the upper position.ON, below isOFF. From left to right are1-8Bit.



picture4.30DIP switch configuration for dual single-ended analog signals coordinated position control

In the dual single-ended analog signal coordinated position control mode, the reference configuration of the relevant registers is shown in the table4.30shown.

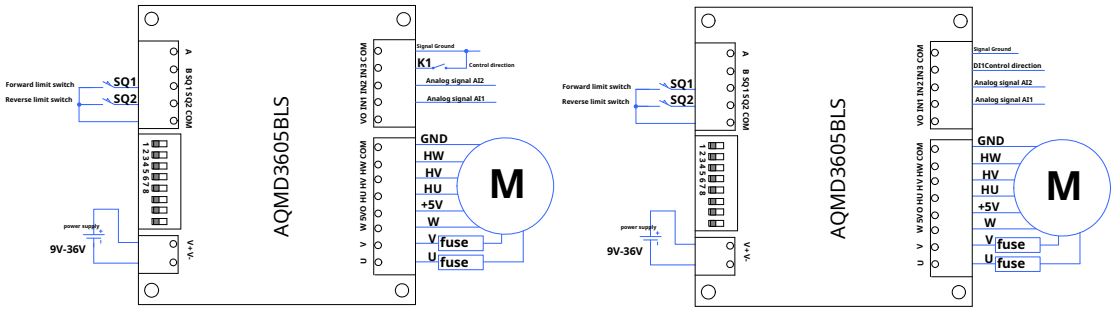
surface4.30Configuration of registers related to dual single-ended analog signal coordinated position control mode

Register Address	Register function	value	describe
0x0080	Limit trigger polarity	0,1,2,3,4	0: Low level trigger (default) 1: High level trigger 2: Falling edge trigger 3: Rising edge trigger 4: Disable limit function
0x0081	Digital signal polarity	0,1	0: Low level trigger (default) 1: High level trigger
0x0084	Analog signal type	3	Dual single-ended analog signal coordination
0x0085	Logic level type	0,1,2,3	0: Switch value (default) 1:0/3.3V 2:0/5V 3:0/12Vor0/24V
0x0088	Small analog range value	0	The minimum analog range is0(default)
0x0089	Large analog range value	0x2710	The maximum analog range is3300mV(default), or Configure to other values as required
0x008a	Logic level threshold	0x07D0	The switching logic level voltage threshold can be configured as 2000mV(default), Other logic levels are configured separately
0x008b	Voltage comparison dead zone	0	default value0, the unit ismV; Used to make the analog signal produce a dead zone near the midpoint voltage, and the motor maintains the midpoint position Place
0x0096-0x0097	Analog signal conditioning system numberk	1.0f	default value1.0f, used to adjust the analog signal magnification
0x0098	Analog signal conditioning system numberb	0	The unit ismV,default value0; Used to correct analog signals Dead Zone
0x00a0	Position reset mode	1,2,3,4	1:SQ2Reset (default) 2:SQ1Reset 3:SQ2Reset and fine tune 4:SQ1Reset and fine tune
0x00a2-0x00a3	Total travel		The total itinerary can be obtained through itinerary learning
0x00a7	The signal to be ignored Quantification	1	neglect0.1%The following input analog signal voltage fluctuations (default) Used for filtering to eliminate motor jitter caused by interference signals
0x00a9	Current during reset	0~700	When non-zero, multiply by0.01is the maximum load current during reset, in units ofA; When it is zero, use the system parameter configuration Large load current; used to configure the torque during reset. When resetting using the motor stall detection method, here The current configuration is just enough to smoothly drag the load.

			The stall stop time is configured to non-zero.
0x008e	Stall stop time	0~255	Multiply the value by0.1is the stall stop time, in units of s; For motor stall detection (without limit switch When resetting the detection stroke, the stall stop time should be configured If it is non-zero, it is recommended to configure0.1~1s, in order to block the detection Test.

4.2.9Dual single-ended analog signal independent speed regulation

This usage uses one single-ended analog signal to adjust the forward speed (torque for torque control mode) and another single-ended analog signal to adjust the reverse speed (speed for torque control mode). The connection method of dual single-ended analog signals for independent speed regulation is shown in the figure.4.31As shown. Among them,IN1Connect analog signalAI1,IN2Connect analog signalAI2, use logic level/switch quantity to control the motor direction. When the working mode is duty cycle speed regulation or closed loop speed regulation, the analog signalAI1Adjust the motor forward speed, analog signalAI2Adjust the motor reverse speed; when the working mode is torque control, the analog signalAI1Adjust motor torque, analog signalAI2Adjust the motor speed. When using switch quantity to control the motor direction, the switchK1catchIN3 andCOMWhen using logic level to control the motor direction,IN3Connect to logic levelDI1.COMConnect to signal ground,VOIt is a fault output. Limit switchSQ1andSQ2Set limits for forward and reverse rotation respectively.



picture4.31Connection method of switch quantity (left picture)/logic level (right picture) of dual single-ended analog signal independent speed regulation

By configuring the different types and polarities of digital signals (see6.3.5Section System Parameter Configuration Register 0x0081and0x0085), we can realize the start and stop and forward and reverse control of the motor through different operation methods of analog signals, switch quantities and logic levels. The control logic is shown in the table4.31shown.

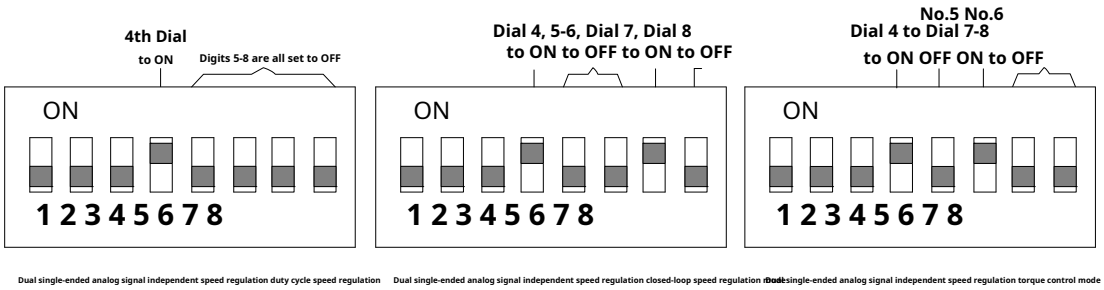
surface4.31Dual single-ended analog signal independent speed control logic

Digital signal type	Digital signal polarity	Functions implemented	How to operate	Wiring scheme
Switching quantity	Low level/closed (default)	Speed Control	Duty cycle speed regulation or closed loop speed regulation In operation mode, analog signalAI1Adjust positive speed Degrees, analog signalAI2Adjustment Reversal speed	
			In torque control working mode, analog signalAI1Adjustment torque, analog signalAI2Adjust speed	
		Forward	K1disconnect	
		Reversal	K1closure	
		stop	Limit or speed adjustment0Stop	

	High level/disconnect	Speed Control	Duty cycle speed regulation or closed loop speed regulation In operation mode, analog signalAI1Adjust positive speed Degrees, analog signalAI2Adjustment Reversal speed	
			In torque control working mode, analog signalAI1Adjustment torque, analog signalAI2Adjust speed	
		Forward	K1closure	
		Reversal	K1disconnect	
			Limit or speed adjustment0Stop	
Logic Level	Low level/closed (default)	Speed Control	Duty cycle speed regulation or closed loop speed regulation In operation mode, analog signalAI1Adjust positive speed Degrees, analog signalAI2Adjustment Reversal speed	
			In torque control working mode, analog signalAI1Adjustment torque, analog signalAI2Adjust speed	
		Forward	DI1High level	
		Reversal	DI1Low level	
		stop	Limit or speed adjustment0Stop	
	High level/disconnect	Speed Control	Duty cycle speed regulation or closed loop speed regulation In operation mode, analog signalAI1Adjust positive speed Degrees, analog signalAI2Adjustment Reversal speed	
			In torque control working mode, analog signalAI1Adjustment torque, analog signalAI2Adjust speed	
		Forward	DI1Low level	
		Reversal	DI1High level	
		stop	Limit or speed adjustment0Stop	

In the dual single-ended analog signal independent speed control mode, the driver supports three speed control modes: duty cycle speed control, closed-loop speed control and torque control. Its DIP switch configuration is shown in the figure4.32As shown, among them,1-3Configure the motor rated current (see table for how to configure the motor rated current2.2);4-5bit configuration signal source (see table for how to configure the signal source)2.3), we configure the signal source as an analog signal, that is,4Dial toON,5Dial toOFF;6-7Bit configuration working mode (how to configure the working mode under analog signal control mode see table2.4);8We configure the control mode as digital/analog signal control mode.8Dial toOFF.

The DIP switch is turned to the upper position.ON, below isOFF. From left to right are1-8Bit.



picture4.32DIP switch configuration for dual single-ended analog signals with independent speed regulation

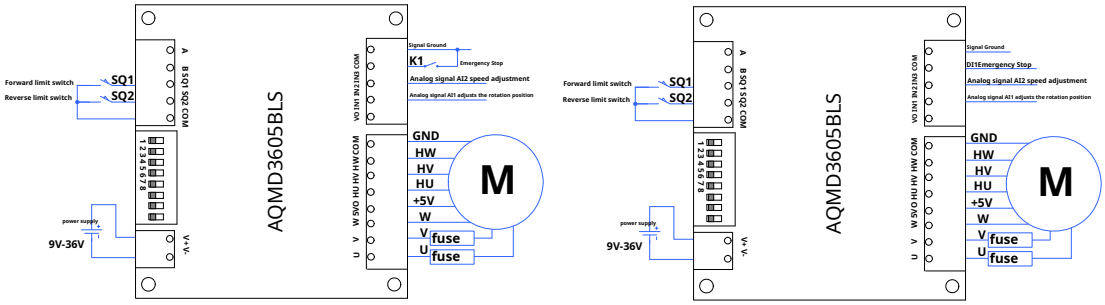
In the dual single-ended analog signal independent speed control mode, the reference configuration of the relevant registers is shown in the table4.32shown.

surface4.32Configuration of related registers of dual single-ended analog signal independent speed regulation mode

Register Address	Register function	value	describe
0x0080	Limit trigger polarity	0,1,2,3,4	0: Low level trigger (default) 1: High level trigger 2: Falling edge trigger 3: Rising edge trigger 4: Disable limit function
0x0081	Digital signal polarity	0,1,	0: Low level trigger (default) 1: High level trigger
0x0084	Analog signal type	2	Dual single-ended analog signals independent
0x0085	Logic level type	0,1,2,3	0: Switch value (default) 1:0/3.3V 2:0/5V 3:0/12Vor0/24V
0x0088	Small analog range value	0	The minimum analog range is0(default)
0x0089	Large analog range value	0x1388	The maximum value of the analog range is configured here as3300mV,also Can be configured to other values as required
0x008a	Logic level threshold	0x07D0	The switching logic level voltage threshold can be configured as 2000mV(default), Other logic levels are configured separately
0x0096-0x0097	Analog signal conditioning system numberk	1.0f	default value1.0f, used to adjust the analog signal magnification
0x0098	Analog signal conditioning system numberb	0	The unit ismV,default value0; Used to correct analog signals Dead Zone

4.2.10Dual single-ended analog signal independent position control

This usage uses one single-ended analog signal to adjust the motor rotation position, and another single-ended analog signal to adjust the motor speed. The connection method of dual single-ended analog signal position control is shown in the figure4.33As shown. Among them,IN1Connect analog signalAI1, used to adjust the rotation position of the motor;IN2Connect analog signalAI2, used to adjust the rotation speed of the motor; when using logic level to control the motor emergency stop,IN3Connect to logic levelDI1; When using switch quantity to control the motor emergency stop, the switchK1catchIN3andCOM between.VO Output completion signal,COMConnect to signal ground. Limit switchSQ1andSQ2Set limits for forward and reverse rotation respectively.



picture4.33Connection method of dual single-ended analog signal independent position control

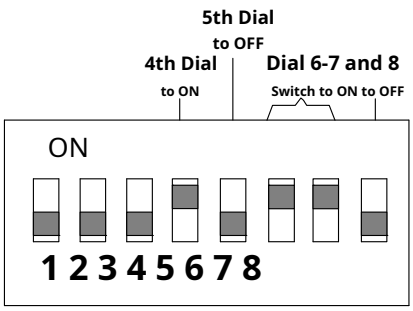
By configuring the different types and polarities of digital signals (see6.3.5Section System Parameter Configuration Register0x0081and0x0085） We can use different analog signals, logic levels and switch quantities to The operation method realizes motor position adjustment, signal latching and emergency stop. The control logic is shown in the table4.33shown.

surface4.33Control logic for independent position control with dual single-ended analog signals

Digital signal type	Digital signal polarity	Functions implemented	How to operate	Wiring scheme
Switching quantity	Low level/closed (default)	Adjust position	analog signalAI1Adjust position	
		Adjust speed	analog signalAI2Adjust speed	
		Emergency Stop	K1closure	
	High level/disconnect	Adjust position	analog signalAI1Adjust position	
		Adjust speed	analog signalAI2Adjust speed	
		Emergency Stop	K1disconnect	
Logic Level	Low level/closed (default)	Adjust position	analog signalAI1Adjust position	
		Adjust speed	analog signalAI2Adjust speed	
		Emergency Stop	DI1Low level	
	High level/disconnect	Adjust position	analog signalAI1Adjust position	
		Adjust speed	analog signalAI2Adjust speed	
		Emergency Stop	DI1High level	

The configuration method of the DIP switch for dual single-ended analog signal position control is shown in the figure4.34As shown, among them,1-3Configure the rated current of the motor (see Table 1 for how to configure the rated current of the motor2.2);4-5bit configuration signal source (see Table 1 for how to configure the signal source)2.3) , we configure the signal source as an analog signal, that is,4Dial toON,5Dial toOFF;6-7 Bit configuration working mode (how to configure the working mode see table2.4), we configure the working mode as position control, that is,6-7 Dial toON;8We configure the control mode as digital/analog signal control mode. 8Dial toOFF.

The DIP switch is turned to the upper position.ON, below isOFF. From left to right are1-8Bit.



picture4.34DIP switch configuration for dual single-ended analog signal position control

In the dual single-ended analog signal independent position control mode, the reference configuration of the relevant registers is shown in the table4.34shown.

surface4.34Configuration of related registers of dual single-ended analog signal independent position control mode

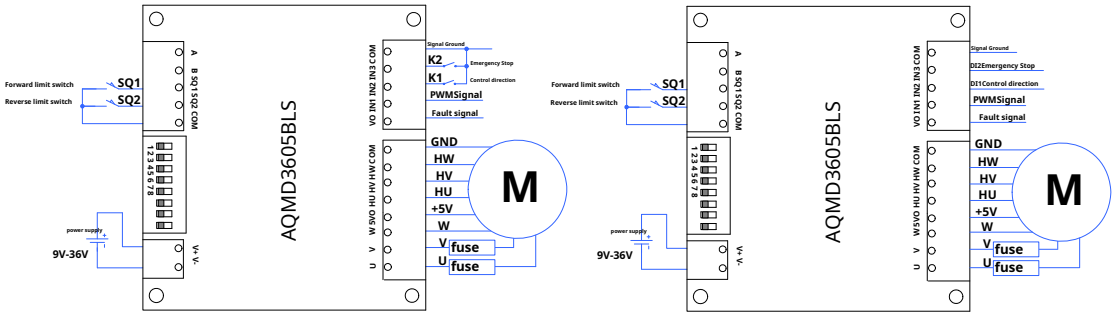
Register Address	Register function	value	describe
0x0080	Limit trigger polarity	0,1,2,3,4	0: Low level trigger (default) 1: High level trigger 2: Falling edge trigger 3: Rising edge trigger 4: Disable limit function
0x0081	Digital signal polarity	0,1	0: Low level trigger (default) 1: High level trigger
0x0084	Analog signal type	2	Dual single-ended analog signals independent
0x0085	Logic level type	0,1,2,3	0: Switch value (default) 1:0/3.3V 2:0/5V 3:0/12Vor0/24V
0x0088	Small analog range value	0	The minimum analog range is0(default)
0x0089	Large analog range value	0x1388	The maximum value of the analog range is configured here as3300mV,also Can be configured to other values as required
0x008a	Logic level threshold	0x07D0	The switching logic level voltage threshold can be configured as 2000mV(default), Other logic levels are configured separately
0x0096-0x0097	Analog signal conditioning system numberk	1.0f	default value1.0f, used to adjust the analog signal magnification
0x0098	Analog signal conditioning system numberb	0	The unit ismV,default value0; Used to correct analog signals Dead Zone
0x00a0	Position reset mode	1,2,3,4	1:SQ2Reset (default) 2:SQ1Reset 3:SQ2Reset and fine tune 4:SQ1Reset and fine tune
0x00a2-0x00a3	Total travel		The total itinerary can be obtained through itinerary learning
0x00a7	The signal to be ignored Quantification	1	neglect0.1%The following input analog signal fluctuations (default) are used for filtering to eliminate interference signals that cause motor jitter
0x00a9	Current during reset	0~700	When non-zero, multiply by0.01is the maximum load current during reset, in units ofA; When it is zero, use the system parameter configuration Large load current; used to configure the torque during reset. When resetting using the motor stall detection method, here The current configuration is just enough to smoothly drag the load. The stall stop time is configured to non-zero.
0x008e	Stall stop time	0~255	Multiply the value by0.1is the stall stop time, in units of s; For motor stall detection (without limit switch

			When resetting the detection stroke, the stall stop time should be configured If it is non-zero, it is recommended to configure0.1~1s, in order to block the detection Test.

4.3 PWM/Connection and configuration of frequency/pulse signal speed regulation

4.3.1 PWMSignal speed regulation (level trigger)

This usage is done through externalPWMThe signal regulates the motor speed, controls the motor direction and emergency stop through switch quantity/logic level.PWMThe connection method of signal speed regulation (level trigger) is shown in the figure4.35As shown. Among them,IN1catchPWMInput signal, used to adjust the motor speed. The motor speed increases with the duty cycle.100% When the switch is used to control the motor direction and emergency stop, the switchK1catchIN2andCOMTo control the direction of motor rotation; switchK2catchIN3andCOMWhen using logic levels to control motor direction and emergency stop, IN2Connect to logic levelDI1, used to control the direction of motor rotation;IN3Connect to logic levelDI2, control the motor to stop urgently.COM Connect to signal ground,VOIt is a fault output. Limit switchSQ1andSQ2Set limits for forward and reverse rotation respectively.



picture4.35 PWMSignal speed regulation (level trigger) switch quantity (left picture)/logic level (right picture) control mode wiring method

By configuring the different types and polarities of digital signals (see6.3.5Section System Parameter Configuration Register 0x0081and0x0085), we canPWMDifferent operation methods of signals, switch quantities and logic levels can realize the start, stop and forward and reverse control of the motor. The control logic is shown in the table4.35shown.

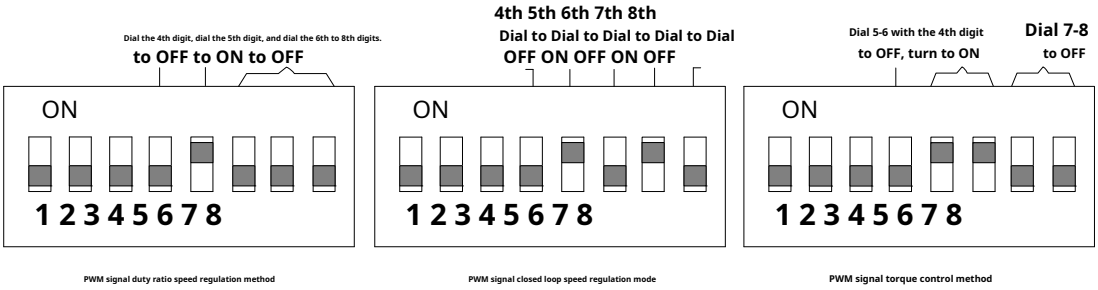
surface4.35 PWMSignal speed regulation (level trigger) control logic

Digital signal type	Digital signal polarity	Functions implemented	How to operate	Wiring scheme
Switching quantity	Low level/closed (default)	Speed Control	PWMSignal speed regulation	
		Forward	K1disconnect,K2disconnect	
		Reversal	K1closure,K2disconnect	
		Emergency Stop	K2closure	
	High level/disconnect	Speed Control	PWMSignal speed regulation	
		Forward	K1closure,K2closure	
		Reversal	K1disconnect,K2closure	
		Emergency Stop	K2disconnect	
Logic Level	Low level/closed (default)	Speed Control	PWMSignal speed regulation	
		Forward	DI1High level,DI2High level	
		Reversal	DI1Low level,DI2High level	
		Emergency Stop	DI2Low level	

	High level/disconnect	Speed Control	PWMSignal speed regulation	
		Forward	DI1Low level,DI2Low level	
		Reversal	DI1High level,DI2Low level	
		Emergency Stop	DI2High level	

PWMIn speed control mode, the driver supports three speed control modes: duty cycle speed control, closed loop speed control and torque control. The configuration method of the DIP switch for each speed control mode is shown in the figure.4.36As shown, the1-3Configure the motor rated current (see table for how to configure the motor rated current2.2) ;4-5bit configuration signal source (see Table 1 for how to configure the signal source)2.3), we will signal source Configured asPWMSignal, that is,4Dial toOFF,5Dial toON;6-7Bit configuration working mode (how to configure the working mode see table2.4);8We configure the control mode as digital/analog signal control mode.8Dial toOFF.

The DIP switch is turned to the upper position.ON, below isOFF. From left to right are1-8Bit.



picture4.36 PWMSignal speed regulation (level trigger) DIP switch configuration

PWMIn the signal speed regulation (level trigger) mode, the reference configuration of the relevant registers is shown in the table4.36shown.

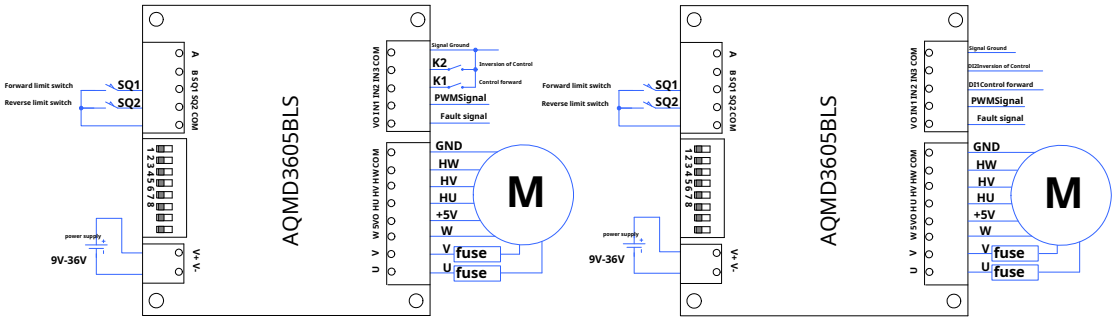
surface4.36 PWMConfiguration of related registers of signal speed regulation (level trigger) mode

Register Address	Register function	value	describe
0x0080	Limit trigger polarity	0,1,2,3,4	0: Low level trigger (default) 1: High level trigger 2: Falling edge trigger 3: Rising edge trigger 4: Disable limit function
0x0081	Digital signal polarity	0,1	0: Low level trigger (default) 1: High level trigger
0x0083	Pulse signal type	0	PWM(default)
0x0085	Logic level type	0,1,2,3	0: Switch value (default) 1:0/3.3V 2:0/5V 3:0/12Vor0/24V
0x008a	Logic level threshold	0x07D0	The switching logic level voltage threshold can be configured as 2000mV(default), Other logic levels are configured separately

4.3.2 PWMSignal speed regulation (edge triggering)

This usage is done through externalPWMSignal speed regulation, controlling forward and reverse rotation respectively through two switch quantity/logic level edge triggering methods.PWMThe connection method of signal speed regulation (edge trigger) is shown in the figure4.37As shown. Among them,IN1catchPWMSignal for tuning

The motor speed increases with the duty cycle.100%When the switch quantity is used to control the forward and reverse rotation, the switchK1catchIN2andCOMBetween, control the motor forward; switchK2catchIN3andCOM When using logic level to control forward and reverse rotation,IN2Connect to logic levelDI1, control the motor to rotate forward; IN3Connect to logic levelDI2, control the motor to reverse.COMConnect to signal ground,VOIt is a fault output. Limit switchSQ1andSQ2 Set limits for forward and reverse rotation respectively.



picture4.37 PWMSignal speed regulation (edge trigger) switch quantity (left picture) / logic level (right picture) control mode wiring method

By configuring the different types and polarities of digital signals (see6.3.5Section System Parameter Configuration Register 0x0081and0x0085), we canPWMDifferent operation methods of signals, switch quantities and logic levels can realize the start, stop and forward and reverse control of the motor. The control logic is shown in the table4.37shown.

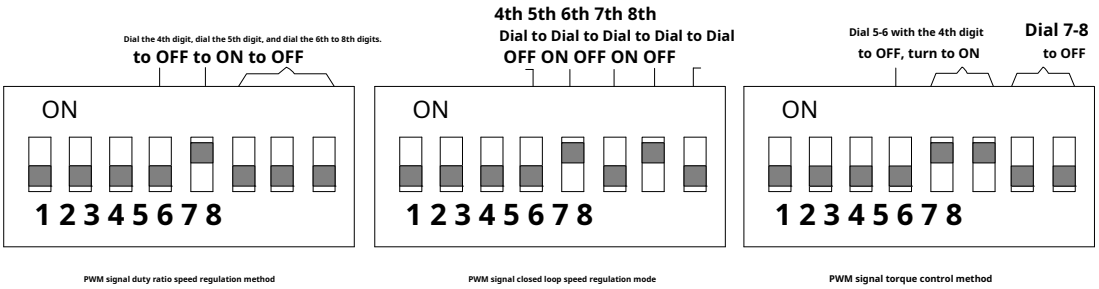
surface4.37 PWMSignal speed regulation (edge triggering) control logic

Digital signal type	Digital signal polarity	Functions implemented	How to operate	Wiring scheme
Switching quantity	Falling edge/closing moment	Speed Control	PWMSignal speed regulation	
		Forward	K1After closing, open.K2Always off open	
		Reversal	K2After closing, open.K1Always off open	
		stop	Limit or speed adjustment0Stop	
	Rising edge/disconnection moment	Speed Control	PWMSignal speed regulation	
		Forward	K1After opening, close.K2Always Close combine	
		Reversal	K2After opening, close.K1Always Close combine	
		stop	Limit or speed adjustment0Stop	
Logic Level	Falling edge/closing moment	Speed Control	PWMSignal speed regulation	
		Forward	DI1From high level to low level,DI2 Always high	
		Reversal	DI2From high level to low level,DI1 Always high	
		stop	Limit or speed adjustment0Stop	
	Rising edge/disconnection moment	Speed Control	PWMSignal speed regulation	
		Forward	DI1From low level to high level,DI2 Always low	
		Reversal	DI2From low level to high level,DI1	

			Always low	
		stop	Limit or speed adjustment0Stop	

PWMIn the speed regulation (edge trigger) mode, the driver supports three speed regulation modes: duty cycle speed regulation, closed loop speed regulation and torque control. The configuration method of the DIP switch of each speed regulation mode is shown in the figure.4.38As shown, the1-3Configure the motor rated current (see table for how to configure the motor rated current2.2);4-5bit configuration signal source (see Table 1 for how to configure the signal source)2.3), we configure the signal source asPWMSignal, that is,4Dial toOFF,5Dial toON;6-7Bit configuration working mode (how to configure the working mode see table2.4);8We configure the control mode as digital/analog signal control mode.8Dial toOFF.

The DIP switch is turned to the upper position.ON, below isOFF. From left to right are1-8Bit.



picture4.38 PWMSignal speed regulation (edge trigger) DIP switch configuration

PWMIn the signal speed regulation (edge trigger) mode, the reference configuration of the relevant registers is shown in the table4.38shown.

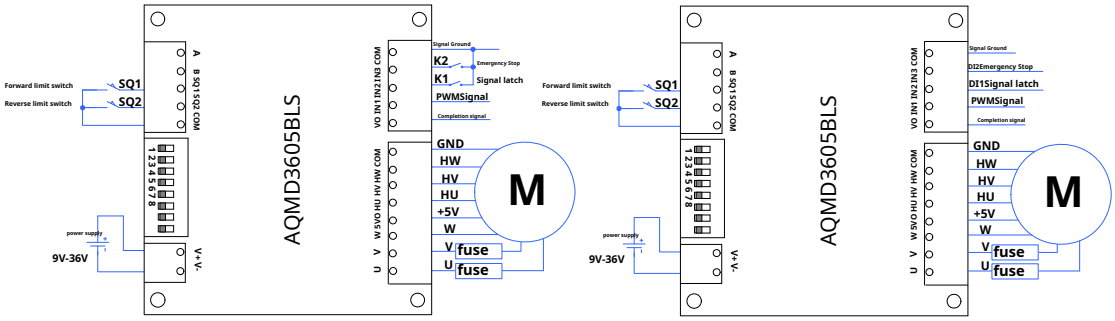
surface4.38 PWMConfiguration of related registers of signal speed regulation (edge triggering) mode

Register Address	Register function	value	describe
0x0080	Limit trigger polarity	0,1,2,3,4	0: Low level trigger (default) 1: High level trigger 2: Falling edge trigger 3: Rising edge trigger 4: Disable limit function
0x0081	Digital signal polarity	2,3	2: Falling edge trigger 3: Rising edge trigger
0x0083	Pulse signal type	0	PWM(default)
0x0085	Logic level type	0,1,2,3	0: Switch value (default) 1:0/3.3V 2:0/5V 3:0/12Vor0/24V
0x008a	Logic level threshold	0x07D0	The switching logic level voltage threshold can be configured as 2000mV(default), Other logic levels are configured separately

4.3.3 PWMSignal position control

This usage is done through externalPWMThe signal adjusts the rotation position of the motor through the switch quantity/logic level inputPWMThe signal is latched and the motor is stopped urgently.PWMThe connection method of signal position control is shown in the figure4.39As shown. Among them,IN1 catch PWMSignal, used to adjust the motor rotation position.PWMSignal from0Gradually increase to100%During the process, the motor rotation position will change from the starting point to When using the switch control signal latch and motor emergency stop, the switch

K1catchIN2andCOMRoom, used forPWMInput signal latch; switchK2catchIN3andCOMWhen using logic level control signal latch and motor emergency stop,IN2Connect to logic levelDI1, used for inputPWM Signal latching;IN3Connect to logic levelDI2, control the motor to stop urgently.COMConnect to signal ground.VOOutput completion signal, used to feed back the position adjustment completion signal to the controller. Limit switchSQ1andSQ2Set limits for forward and reverse rotation respectively.



picture4.39 PWMSignal position control switch quantity (left picture)/logic level (right picture) control mode wiring method

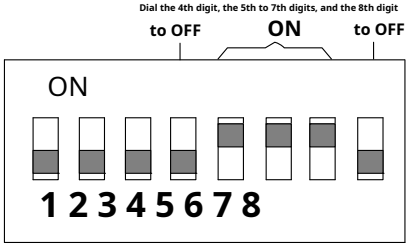
By configuring the different types and polarities of digital signals (see6.3.5Section System Parameter Configuration Register0x0081and0x0085） We can use different pulse signals, switch quantities and logic levels to The operation method realizes motor position adjustment, signal latching and emergency stop. The control logic is shown in the table4.39shown.

surface4.39 PWMControl logic of signal control

Digital signal type	Digital signal polarity	Functions implemented	How to operate	Wiring scheme
Switching quantity	Low level/closed (default)	Adjust position	PWMSignal Conditioning Location	
		Signal latch	K1closure,K2disconnect	
		Emergency Stop	K2closure	
	High level/disconnect	Adjust position	PWMSignal Conditioning Location	
		Signal latch	K1disconnect,K2closure	
		Emergency Stop	K2disconnect	
Logic Level	Low level/closed (default)	Adjust position	PWMSignal Conditioning Location	
		Signal latch	DI1Low level,DI2High level	
		Emergency Stop	DI2Low level	
	High level/disconnect	Adjust position	PWMSignal Conditioning Location	
		Signal latch	DI1High level,DI2Low level	
		Emergency Stop	DI2High level	

PWMThe configuration method of the DIP switch under signal position speed regulation is shown in the figure4.40As shown in the figure.1-3 Configure the motor rated current (see table for how to configure the motor rated current2.2) ;4-5bit configuration signal source (how to configure Set the signal source as shown in the table2.3), we configure the signal source asPWMSignal, that is,4Dial toOFF,5Dial to ON;4-7Bit configuration working mode (how to configure the working mode see table2.4), we configure the working mode as position control, that is,6-7Dial toON;8We configure the control mode as digital/analog signal control mode.8 Dial toOFF.

The DIP switch is turned to the upper position.ON, below isOFF. From left to right are1-8Bit.



picture4.40 PWMDIP switch configuration for signal position control

PWMIn the signal position control mode, the reference configuration of the relevant registers is shown in the table4.40shown.

surface4.40 PWMConfiguration of registers related to signal position control mode

Register Address	Register function	value	describe
0x0080	Limit trigger polarity	0,1,2,3,4	0: Low level trigger (default) 1: High level trigger 2: Falling edge trigger 3: Rising edge trigger 4: Disable limit function
0x0081	Digital signal polarity	0,1	0: Low level trigger (default) 1: High level trigger
0x0083	Pulse signal type	0	PWM(default)
0x0085	Logic level type	0,1,2,3	0: Switch value (default) 1:0/3.3V 2:0/5V 3:0/12Vor0/24V
0x008a	Logic level threshold	0x07D0	The switching logic level voltage threshold can be configured as 2000mV(default), Other logic levels are configured separately
0x00a0	Position reset mode	0,1,2,3,4	0: Do not reset 1:SQ2Reset (default) 2:SQ1Reset 3:SQ2Reset and fine tune 4:SQ1Reset and fine tune
0x00a2-0x00a3	Total travel		The total itinerary can be obtained through itinerary learning
0x00a7	The signal to be ignored Quantification	1	neglect0.1%The following inputPWMSignal duty cycle Fluctuation (default) Used for filtering to eliminate motor jitter caused by interference signals
0x00a9	Current during reset	0~700	When non-zero, multiply by0.01is the maximum load current during reset, in units ofA; When it is zero, use the system parameter configuration Large load current; used to configure the torque during reset. When resetting using the motor stall detection method, here The current configuration is just enough to smoothly drag the load. The stall stop time is configured to non-zero.

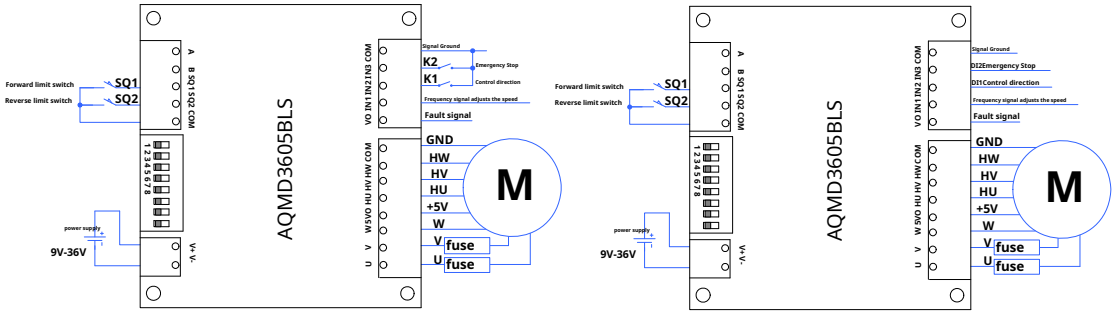
0x008e	Stall stop time	0~255	Multiply the value by0.1is the stall stop time, in units of s; For motor stall detection (without limit switch When resetting the detection stroke, the stall stop time should be configured If it is non-zero, it is recommended to configure0.1~1s, in order to block the detection Test.

4.3.4Frequency signal speed regulation (level trigger)

This usage adjusts the motor speed by inputting the frequency, and controls the start/stop and direction of the motor by switching/logic level. The connection method of frequency signal speed regulation is shown in the figure4.41As shown. Among them,IN1Connect frequency signal to adjust motor speed.

The motor speed increases with the increase of input frequency. We can calculate the motor speed by0x008cand0x008dRegister (see6.3.5 The pulse signal ratio is configured in the section System Parameter Configuration Register to change the proportional coefficient between the motor speed and the input frequency. For the duty cycle speed regulation working mode, the output duty cycle =MIN(Input frequency × pulse signal magnification ×0.1%,100.0%); For torque control mode, stall current =MIN(Input frequency × pulse signal ratio × maximum load current ×0.001, large load current), large load current can be0x006bRegister configuration; for speed closed-loop control mode, motor commutation frequency = MIN(Input frequency × pulse signal ratio, maximum commutation frequency), the maximum commutation frequency can be0x0066Registers to configure.

When using switch quantity to control the start, stop and direction of the motor, the switchK1catchIN2andCOMTo control the direction of motor rotation; switchK2catchIN3andCOMWhen using logic level to control the start, stop and direction of the motor, IN2Connect to logic levelDI1, control the direction of motor rotation;IN3Connect to logic levelDI2, control the motor to stop urgently.COM Connect to signal ground,VOIt is a fault output. Limit switchSQ1andSQ2Set limits for forward and reverse rotation respectively.



picture4.41Frequency signal speed regulation (level trigger) switch quantity (left picture)/logic level (right picture) control mode wiring method

By configuring the different types and polarities of digital signals (see6.3.5Section System Parameter Configuration Register0x0081and0x0085) We can use the different frequency signals, switching quantities and logic levels to The operation method is to realize the start and stop and forward and reverse control of the motor. The control logic is shown in the table4.41shown.

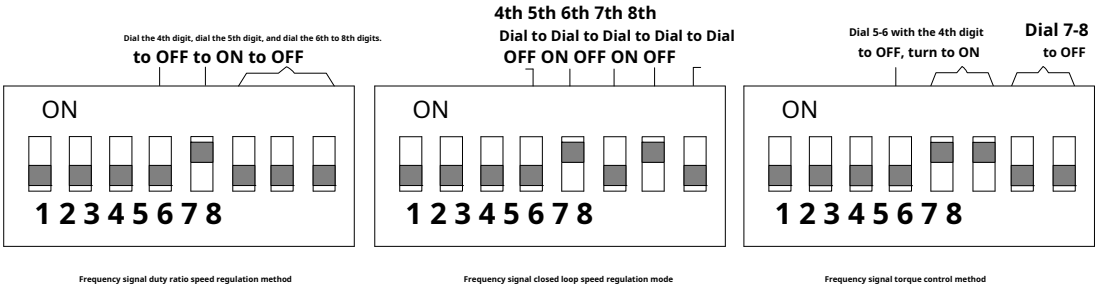
surface4.41Frequency signal speed regulation (level trigger) control logic

Digital signal type	Digital signal polarity	Functions implemented	How to operate	Wiring scheme
Switching quantity	Low level/closed (default)	Speed Control	Frequency signal speed regulation	
		Forward	K1disconnect,K2disconnect	
		Reversal	K1closure,K2disconnect	
		Emergency Stop	K2closure	
	High level/disconnect	Speed Control	Frequency signal speed regulation	
		Forward	K1closure,K2closure	
		Reversal	K1disconnect,K2closure	

		Emergency Stop	K2disconnect	
Logic Level	Low level/closed (default)	Speed Control	Frequency signal speed regulation	
		Forward	DI1High level,DI2High level	
		Reversal	DI1Low level,DI2High level	
		Emergency Stop	DI2Low level	
	High level/disconnect	Speed Control	Frequency signal speed regulation	
		Forward	DI1Low level,DI2Low level	
		Reversal	DI1High level,DI2Low level	
		Emergency Stop	DI2High level	

Under frequency signal speed regulation (level trigger), the driver supports three speed regulation modes: duty cycle speed regulation, closed loop speed regulation and torque control. The configuration of the DIP switches for each speed regulation mode is shown in the figure.4.42As shown, among them,1-3Configure the motor rated current (see table for how to configure the motor rated current2.2);4-5bit configuration signal source (see Table 1 for how to configure the signal source)2.3) ,us Configure the signal source as a frequency signal, that is,4Dial toOFF,5Dial toON;6-7Bit configuration working mode (how to configure the working mode see table2.4);8We configure the control mode as digital/analog signal control mode.8Dial toOFF.

The DIP switch is turned to the upper position.ON, below isOFF. From left to right are1-8Bit.



picture4.42Frequency signal speed regulation (level trigger) DIP switch configuration

In the frequency signal speed regulation (level trigger) mode, the reference configuration of the relevant registers is shown in the table4.42shown.

surface4.42Configuration of registers related to frequency signal speed regulation (level trigger) mode

Register Address	Register function	value	describe
0x0080	Limit trigger polarity	0,1,2,3,4	0: Low level trigger (default) 1: High level trigger 2: Falling edge trigger 3: Rising edge trigger 4: Disable limit function
0x0081	Digital signal polarity	0,1	0: Low level trigger 1: High level trigger
0x0083	Pulse signal type	1	frequency
0x0085	Logic level type	0,1,2,3	0: Switch value (default) 1:0/3.3V 2:0/5V 3:0/12Vor0/24V
0x008a	Logic level threshold	0x07D0	The switching logic level voltage threshold can be configured as 2000mV(default),

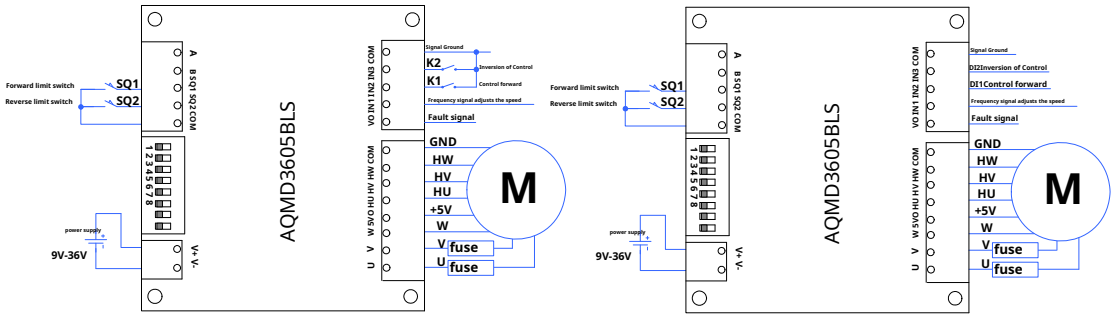
			Other logic levels are configured separately
0x008c-0x008d	Pulse signal magnification	1.0f	default value1.0f; Used to change input frequency and motor speed The ratio coefficient between

4.3.5Frequency signal speed regulation (edge trigger)

This usage adjusts the motor speed by inputting the frequency, and controls the start/stop and direction of the motor by switching/logic level. The connection method of frequency signal speed regulation is shown in the figure4.43As shown. Among them,IN1Connect frequency signal to adjust motor speed.

The motor speed increases with the increase of input frequency. We can calculate the motor speed by0x008cand0x008dRegister (see6.3.5 The pulse signal ratio is configured in the section System Parameter Configuration Register to change the proportional coefficient between the motor speed and the input frequency. For the duty cycle speed regulation working mode, the output duty cycle =MIN(Input frequency × pulse signal magnification ×0.1%,100.0%); For torque control mode, stall current =MIN(Input frequency × pulse signal ratio × maximum load current ×0.001, large load current), large load current can be0x006bRegister configuration; for speed closed-loop control mode, motor commutation frequency = MIN(Input frequency × pulse signal ratio, maximum commutation frequency), the maximum commutation frequency can be0x0066Registers to configure.

When using switch quantity to control the motor direction, the switchK1catchIN2andCOMControl the motor to rotate forward; switchK2 catchIN3andCOMWhen using logic level to control the direction of the motor,IN2Connect to logic levelDI1, control the motor to rotate forward;IN3Connect to logic levelDI2, control the motor to reverse.COMConnect to signal ground,VOIt is a fault output. Limit switch SQ1andSQ2Set limits for forward and reverse rotation respectively.



picture4.43Frequency signal speed regulation (edge trigger) switch quantity (left picture)/logic level (right picture) control mode wiring method

By configuring the different types and polarities of digital signals (see6.3.5Section System Parameter Configuration Register0x0081and0x0085) We can use the different frequency signals, switching quantities and logic levels to The operation method is to realize the start and stop and forward and reverse control of the motor. The control logic is shown in the table4.43shown.

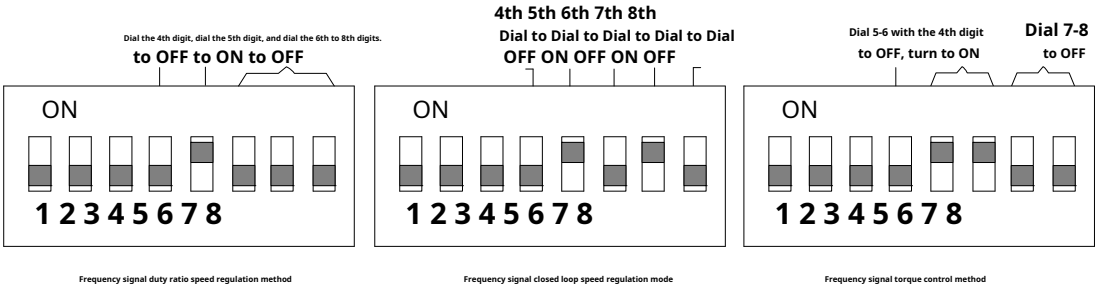
surface4.43Frequency signal speed regulation (edge trigger) control logic

Digital signal type	Digital signal polarity	Functions implemented	How to operate	Wiring scheme
Switching quantity	Falling edge/closing moment	Speed Control	Frequency signal speed regulation	
		Forward	K1After closing, open.K2Always off open	
		Reversal	K2After closing, open.K1Always off open	
		stop	Limit or speed adjustment0Stop	
	Rising edge/disconnection moment	Speed Control	Frequency signal speed regulation	
		Forward	K1After opening, close.K2Always Close	

			combine	
		Reversal	K2After opening, close.K1Always Close combine	
		stop	Limit or speed adjustment0Stop	
Logic Level	Falling edge/closing moment	Speed Control	Frequency signal speed regulation	
		Forward	DI1From high level to low level,DI2 Always high	
		Reversal	DI2From high level to low level,DI1 Always high	
		stop	Limit or speed adjustment0Stop	
	Rising edge/disconnection moment	Speed Control	Frequency signal speed regulation	
		Forward	DI1From low level to high level,DI2 Always low	
		Reversal	DI2From low level to high level,DI1 Always low	
		stop	Limit or speed adjustment0Stop	

Under frequency signal speed regulation (edge trigger), the driver supports three speed regulation modes: duty cycle speed regulation, closed loop speed regulation and torque control. The configuration of the DIP switches for each speed regulation mode is shown in the figure.4.44As shown, among them,1-3Configure the motor rated current (see table for how to configure the motor rated current2.2);4-5bit configuration signal source (see Table 1 for how to configure the signal source)2.3) ,us Configure the signal source as a frequency signal, that is,4Dial toOFF,5Dial toON;6-7Bit configuration working mode (how to configure the working mode see table2.4);8We configure the control mode as digital/analog signal control mode.8Dial toOFF.

The DIP switch is turned to the upper position.ON, below isOFF. From left to right are1-8Bit.



picture4.44Frequency signal speed control (edge trigger) DIP switch configuration

In the frequency signal speed regulation (edge trigger) mode, the reference configuration of the relevant registers is shown in the table4.44shown.

surface4.44Configuration of frequency signal speed regulation (edge trigger) related registers

Register Address	Register function	value	describe
0x0080	Limit trigger polarity	0,1,2,3,4	0: Low level trigger (default) 1: High level trigger 2: Falling edge trigger 3: Rising edge trigger 4: Disable limit function
0x0081	Digital signal polarity	2,3	2: Falling edge trigger 3: Rising edge trigger

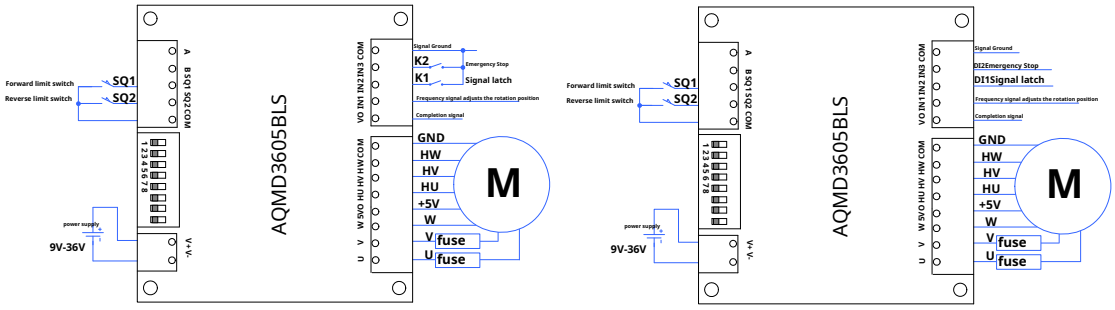
0x0083	Pulse signal type	1	frequency
0x0085	Logic level type	0,1,2,3	0: Switch value (default) 1:0/3.3V 2:0/5V 3:0/12Vor0/24V
0x008a	Logic level threshold	0x07D0	The switching logic level voltage threshold can be configured as 2000mV(default), Other logic levels are configured separately
0x008c-0x008d	Pulse signal magnification	1.0f	default value1.0f; Used to change input frequency and motor speed The ratio coefficient between

4.3.6Frequency signal position control

This usage adjusts the motor rotation position by inputting the frequency, and controls the frequency signal latch and motor emergency stop by switching quantity/ logic level. The connection method of frequency signal position speed regulation is shown in the figure4.45As shown. Among them,IN1Connect frequency signal to adjust the motor rotation position.

The motor rotation position increases with the increase of input frequency, we can use0x008cand0x008dRegister (see 6.3.5The section System Parameter Configuration Register Description) configures the pulse signal magnification to change the proportional coefficient between the motor rotation position and the input frequency. The motor rotation position =MIN(Input frequency × pulse signal ratio × total stroke ×0.001, total stroke), the total stroke can be obtained by0x00a2and0x00a3Register configuration or obtained through trip learning (see3.1.6section).

When using switch control signal latch and motor emergency stop, the switchK1catchIN2andCOMTime, used for input frequency signal latch; switchK2catchIN3andCOMIndirectly, control the motor emergency stop; when using logic level control signal latch and motor emergency stop,IN2Connect to logic levelDI1, used for signal latching,IN3Connect to logic levelDI2, control the motor to stop urgently.COMConnect to signal ground.VOOutput completion signal, used to feedback the position adjustment completion status to the controller. Limit switchSQ1andSQ2Set limits for forward and reverse rotation respectively.



picture4.45Switch quantity (left)/logic level (right) control connection of frequency signal position control

By configuring the different types and polarities of digital signals (see6.3.5Section System Parameter Configuration Register0x0081and0x0085) We can use the different frequency signals, switching quantities and logic levels to The operation method can realize the start and stop and forward and reverse control of the motor. The control logic is shown in the table4.45shown.

surface4.45Control logic of frequency signal position control

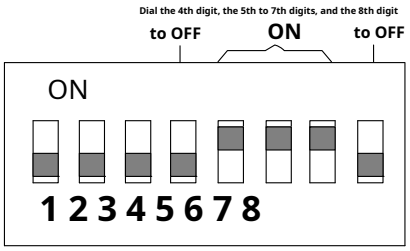
Digital signal type	Digital signal polarity	Functions implemented	How to operate	Wiring scheme
Switching quantity	Low level/closed (default)	Adjust position	Frequency signal adjustment position	
		Signal latch	K1closure,K2disconnect	
		Emergency Stop	K2closure	

	High level/disconnect	Adjust position	Frequency signal adjustment position	
		Signal latch	K1disconnect,K2closure	
		Emergency Stop	K2disconnect	
Logic Level	Low level/closed (default)	Adjust position	Frequency signal adjustment position	
		Signal latch	DI1Low level,DI2High level	
		Emergency Stop	DI2Low level	
	High level/disconnect	Adjust position	Frequency signal adjustment position	
		Signal latch	DI1High level,DI2Low level	
		Emergency Stop	DI2High level	

Under frequency signal position speed regulation, the DIP switch configuration method is as shown in the figure4.46As shown, among them,1-3Configure the motor rated current (see table for how to configure the motor rated current2.2);4-5bit configuration signal source (see Table 1 for how to configure the signal source)

2.3), we configure the signal source as a frequency signal, that is,4Dial toOFF,5Dial toON;6-7Bit configuration working mode (how to configure the working mode see table2.4), we configure the working mode as position control, that is,6-7Dial toON;8We configure the control mode as digital/analog signal control mode.8Dial toOFF .

The DIP switch is turned to the upper position.ON, below isOFF. From left to right are1-8Bit.



picture4.46Frequency signal position control dip switch configuration

In the frequency signal position control mode, the reference configuration of the relevant registers is shown in the table4.46shown.

surface4.46Configuration of frequency signal position control related registers

Register Address	Register function	value	describe
0x0080	Limit trigger polarity	0,1,2,3,4	0: Low level trigger (default) 1: High level trigger 2: Falling edge trigger 3: Rising edge trigger 4: Disable limit function
0x0081	Digital signal polarity	0,1	0: Low level trigger (default) 1: High level trigger
0x0083	Pulse signal type	1	frequency
0x0085	Logic level type	0,1,2,3	0: Switch value (default) 1:0/3.3V 2:0/5V 3:0/12Vor0/24V
0x008a	Logic level threshold	0x07D0	The switching logic level voltage threshold can be configured as 2000mV(default), Other logic levels are configured separately

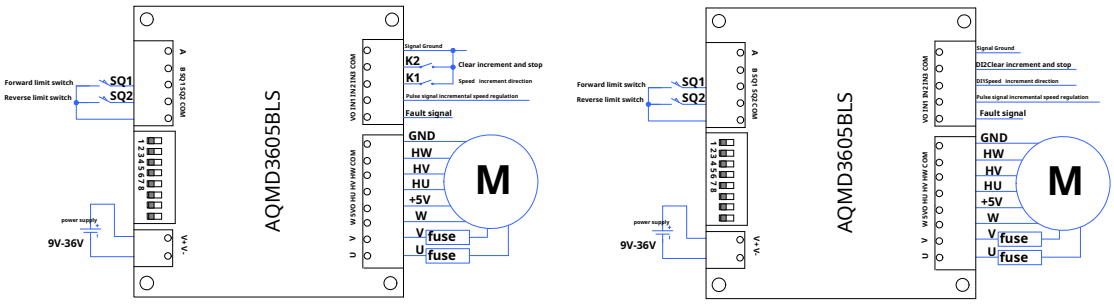
0x008c-0x008d	Pulse signal magnification	1.0f	default value1.0f; Used to change the input frequency and motor rotation Scaling factor between positions
0x00a0	Position reset mode	1,2,3,4	1:SQ2Reset (default) 2:SQ1Reset 3:SQ2Reset and fine tune 4:SQ1Reset and fine tune
0x00a2-0x00a3	Total travel		The total itinerary can be obtained through itinerary learning
0x00a7	The signal to be ignored Quantification	1	neglect0.1%The following input frequency fluctuations (default) Used for filtering to eliminate motor jitter caused by interference signals
0x00a9	Current during reset	0~700	When non-zero, multiply by0.01is the maximum load current during reset, in units ofA; When it is zero, use the system parameter configuration Large load current; used to configure the torque during reset. When resetting using the motor stall detection method, here The current configuration is just enough to smoothly drag the load. The stall stop time is configured to non-zero.
0x008e	Stall stop time	0~255	Multiply the value by0.1is the stall stop time, in units of s; For motor stall detection (without limit switch When resetting the detection stroke, the stall stop time should be configured If it is non-zero, it is recommended to configure0.1~1s, in order to block the detection Test.

4.3.7Pulse signal speed regulation (level trigger)

This usage uses pulse counting to increase the motor speed, and controls the speed increment direction and motor stop through logic level/switch quantity. The connection method of pulse signal speed control is shown in the figure4.47As shown. Among them,IN1Receive pulse signal and adjust the motor speed in increments.

We can0x008cand0x008dRegister (see6.3.5The pulse signal magnification is configured to change the increment coefficient. For each pulse generated by the input signal, for duty cycle speed regulation, the output duty cycle changes by the pulse signal magnification ×1%; For torque control, the output current change is pulse signal ratio × maximum load current ×1%, large load current can be0x006bRegister configuration; For speed closed-loop control, the motor commutation frequency change is the pulse signal multiplier × maximum commutation frequency ×1%, the maximum commutation frequency can be achieved by0x0066The increment direction indicates whether the output is increasing or decreasing.

When using logic levels to control speed increment direction and motor stop,IN2Connect to logic levelDI1, used to control the direction of speed increment;IN3 Connect to logic levelDI2, used to clear the speed increment accumulated value and brake the motor at the same time; when the switch quantity is used to control the speed increment direction and the motor stop, the switchK1catchIN2andCOMTime, used to control the speed increment direction; switchK2catchIN3andCOMIt is used to clear the speed increment accumulated value and brake the motor at the same time.COMConnect to signal ground. VOOutput fault signal. Limit switch SQ1andSQ2Set limits for forward and reverse rotation respectively.



picture4.47Connection diagram of pulse signal speed regulation (level trigger) switch quantity (left)/logic level (right) control

By configuring the different types and polarities of digital signals (see6.3.5Section System Parameter Configuration Register0x0081and0x0085) We can analyze the differences between pulse signals, switch quantities and logic levels.

The operation method can realize the start and stop and forward and reverse control of the motor. The control logic is shown in the table4.50shown.

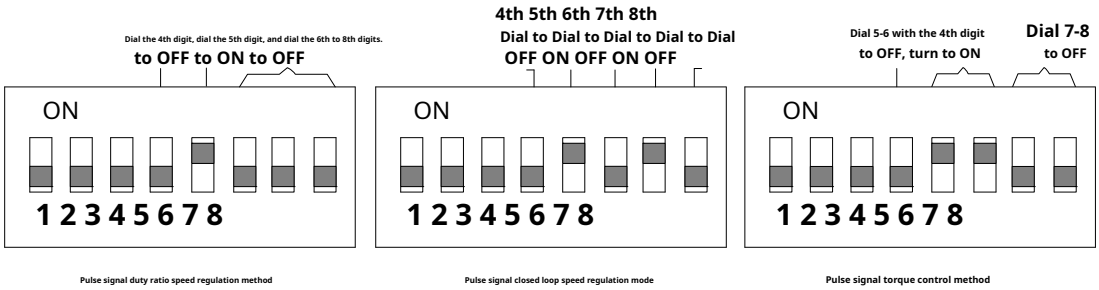
surface4.47Pulse signal speed regulation (level trigger) control logic

Digital signal type	Digital signal polarity	Functions implemented	How to operate	Wiring scheme
Switching quantity	Low level/closed (default)	Speed Control	Pulse signal speed regulation	
		Forward	K1disconnect,K2disconnect	
		Reversal	K1closure,K2disconnect	
		stop	K2closure	
	High level/disconnect	Speed Control	Pulse signal speed regulation	
		Forward	K1closure,K2closure	
		Reversal	K1disconnect,K2closure	
		stop	K2disconnect	
Logic Level	Low level/closed (default)	Speed Control	Pulse signal speed regulation	
		Forward	DI1High level,DI2High level	
		Reversal	DI1Low level,DI2High level	
		stop	DI2Low level	
	High level/disconnect	Speed Control	Pulse signal speed regulation	
		Forward	DI1Low level,DI2Low level	
		Reversal	DI1High level,DI2Low level	
		stop	DI2High level	

Under pulse signal speed regulation (level trigger), the driver supports three modes: duty cycle speed regulation, closed loop speed regulation and torque control. The configuration method of the DIP switch is shown in the figure.4.48As shown, among them,1-3Configure the motor rated current (see table for how to configure the motor rated current2.2);4-5bit configuration signal source (see Table 1 for how to configure the signal source)2.3), we configure the signal source as a pulse signal, that is,4Dial toOFF,5Dial toON;6-7Bit configuration working mode (how to configure the working mode see table2.4)

;8We configure the control mode as digital/analog signal control mode. 8 Dial toOFF.

The DIP switch is turned to the upper position.ON, below isOFF. From left to right are1-8Bit.



picture4.48 Pulse signal speed regulation (level trigger) DIP switch setting

In the pulse signal speed regulation (level trigger) mode, the reference configuration of the relevant registers is shown in the table4.48shown.

surface4.48Configuration of related registers for pulse signal speed regulation (level trigger) mode

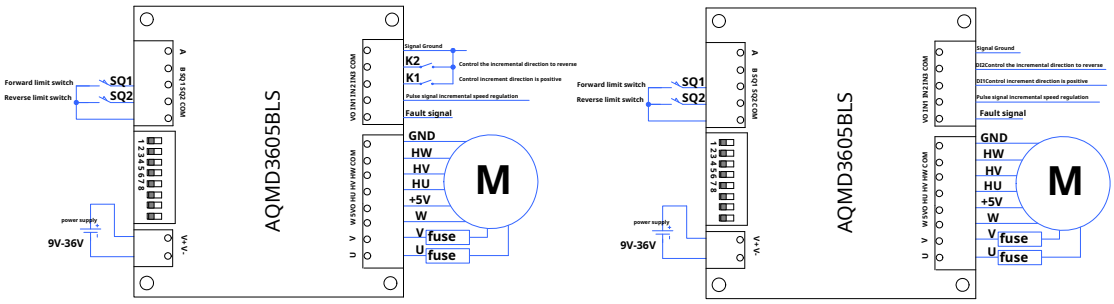
Register Address	Register function	value	describe
0x0080	Limit trigger polarity	0,1,2,3,4	0: Low level trigger (default) 1: High level trigger 2: Falling edge trigger 3: Rising edge trigger 4: Disable limit function
0x0081	Digital signal polarity	0,1	0: Low level trigger 1: High level trigger
0x0083	Pulse signal type	2	pulse
0x0085	Logic level type	0,1,2,3	0: Switch value (default) 1:0/3.3V 2:0/5V 3:0/12Vor0/24V
0x008a	Logic level threshold	0x07D0	The switching logic level voltage threshold can be configured as 2000mV(default), Other logic levels are configured separately

4.3.8Pulse signal speed regulation (edge trigger)

This method uses pulse counting to increase the motor speed and controls the speed increment direction through logic level/switch quantity. The connection method of pulse signal speed control is shown in the figure4.49As shown. Among them,IN1Receive pulse signal and adjust the motor speed in increments.

We can0x008cand0x008dRegister (see6.3.5The pulse signal magnification is configured to change the increment coefficient. For each pulse generated by the input signal, for duty cycle speed regulation, the output duty cycle changes by the pulse signal magnification ×1%; For torque control, the output current change is pulse signal ratio × maximum load current ×1%, large load current can be0x006bRegister configuration; For speed closed-loop control, the motor commutation frequency change is the pulse signal multiplier × maximum commutation frequency ×1%, the maximum commutation frequency can be achieved by0x0066The increment direction indicates whether the output is increasing or decreasing.

When using logic levels to control the speed increment direction,IN2Connect to logic levelDI1, used to control the speed increment direction to be positive; IN3Connect to logic levelDI2, used to control the speed increment direction to the reverse direction; when the switch quantity is used to control the speed increment direction, the switchK1catchIN2andCOMThe switch is used to control the speed increment direction to be positive;K2catchIN3andCOMIt is used to control the speed increment direction to be reverse.COMConnect to signal ground.VOOutput fault signal. Limit switchSQ1andSQ2 Set limits for forward and reverse rotation respectively.



picture4.49Connection diagram of pulse signal speed regulation (edge trigger) switch quantity (left)/logic level (right) control

By configuring the different types and polarities of digital signals (see6.3.5Section System Parameter Configuration Register0x0081and0x0085) We can analyze the differences between pulse signals, switch quantities and logic levels.

The operation method can realize the start and stop and forward and reverse control of the motor. The control logic is shown in the table4.49shown.

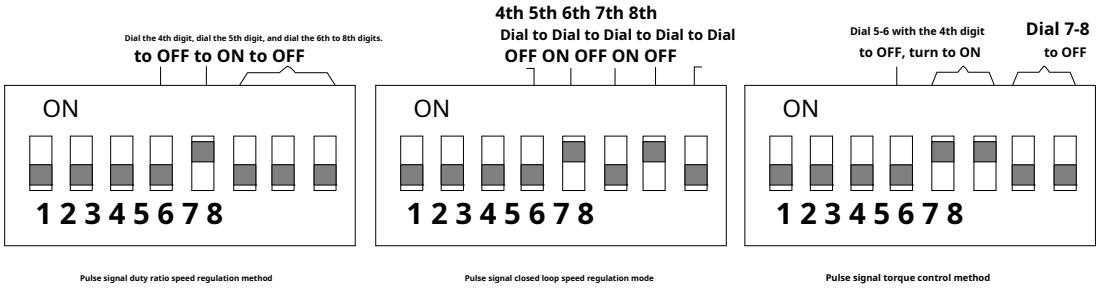
surface4.49Control logic of pulse signal speed regulation (edge triggering)

Digital signal type	Digital signal polarity	Functions implemented	How to operate	Wiring scheme
Switching quantity	Falling edge/closing moment	Speed Control	Pulse signal speed regulation	
		Forward	K1After closing, open.K2Always off open	
		Reversal	K2After closing, open.K1Always off open	
		stop	Limit or speed adjustment0Stop	
	Rising edge/disconnection moment	Speed Control	Pulse signal	
		Forward	K1After opening, close.K2Always Close combine	
		Reversal	K2After opening, close.K1Always Close combine	
		stop	Limit or speed adjustment0Stop	
Logic Level	Falling edge/closing moment	Speed Control	Pulse signal speed regulation	
		Forward	DI1From high level to low level,DI2 Always high	
		Reversal	DI2From high level to low level,DI1 Always high	
		stop	Limit or speed adjustment0Stop	
	Rising edge/disconnection moment	Speed Control	Pulse signal speed regulation	
		Forward	DI1From low level to high level,DI2 Always low	
		Reversal	DI2From low level to high level,DI1 Always low	
		stop	Limit or speed adjustment0Stop	

Under pulse signal speed regulation (edge trigger), the driver supports three modes: duty cycle speed regulation, closed loop speed regulation and torque control. The DIP switch configuration method is shown in the figure.4.51As shown, among them,1-3Configure the motor rated current (see table for how to configure the motor rated current2.2);4-5bit configuration signal source (see Table 1 for how to configure the signal source)2.3), we configure the signal source as

Pulse signal, i.e.4Dial toOFF,5Dial toON;6-7Bit configuration working mode (how to configure the working mode see table2.4) ;8We configure the control mode as digital/analog signal control mode. 8 Dial toOFF.

The DIP switch is turned to the upper position.ON, below isOFF. From left to right are1-8Bit.



picture4.50 Pulse signal speed regulation (edge trigger) DIP switch setting

In the pulse signal speed regulation (edge trigger) mode, the reference configuration of the relevant registers is shown in the table4.50shown.

surface4.50Configuration of related registers for pulse signal speed regulation (edge triggering) mode

Register Address	Register function	value	describe
0x0080	Limit trigger polarity	0,1,2,3,4	0: Low level trigger (default) 1: High level trigger 2: Falling edge trigger 3: Rising edge trigger 4: Disable limit function
0x0081	Digital signal polarity	2,3	2: Falling edge trigger 3: Rising edge trigger
0x0083	Pulse signal type	2	pulse
0x0085	Logic level type	0,1,2,3	0: Switch value (default) 1:0/3.3V 2:0/5V 3:0/12Vor0/24V
0x008a	Logic level threshold	0x07D0	The switching logic level voltage threshold can be configured as 2000mV(default), Other logic levels are configured separately

4.3.9Pulse signal position control

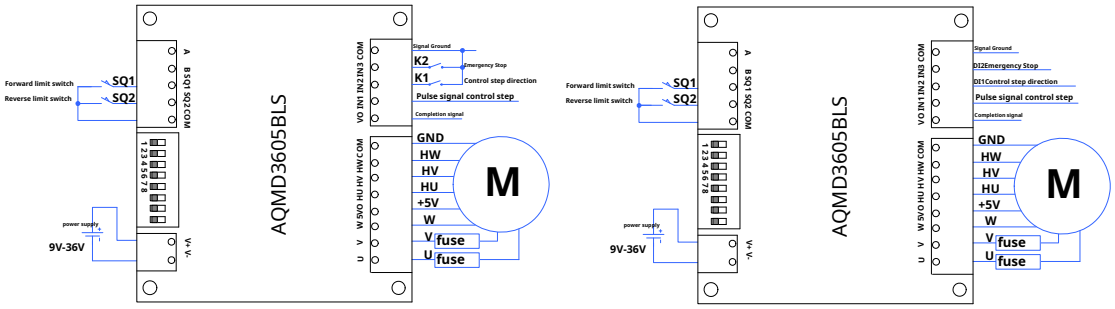
This usage uses pulse signals to step the motor, and controls the step direction and emergency stop through switches/logic levels.4.51As shown.IN1Receive pulse signal to control the motor step by step.

Each time the input signal generates a pulse, the number of commutations (i.e., the step amount) of the motor rotation can be calculated by0x008cand 0x008dRegister (see6.3.5The pulse signal magnification is changed by configuring the pulse signal magnification in the section "Description of the System Parameter Configuration Register". Each step is equal to the pulse signal magnification. The step direction is whether to increase or decrease based on the previous step accumulation value. When the motor is progressively controlled, there is no need to wait for the motor to complete the previously given step amount. Multiple pulses can be given to give the step accumulation value continuously. It is also possible to give multiple reverse step signals continuously while the motor is rotating, so that the direction of the step accumulation value is opposite to the current rotation direction of the motor. Then the driver will automatically perform acceleration and deceleration control to change the rotation direction of the motor.

After the motor is stopped by the emergency stop signal, the accumulated step value will not be cleared and will not change to the motor stop.

After the emergency stop signal is removed, if the motor rotation position is not the position corresponding to the accumulated step value, the motor will continue to rotate. If the motor is required to rotate in the reverse direction after the emergency stop signal is removed, sufficient reverse step amount signals should be given before the emergency stop signal is removed.

When using logic levels to control stepper direction and emergency stop,IN2Connect to logic levelDI1, used to control the stepping direction; IN3Connect to logic levelDI2, used for emergency braking of the motor. When using switch quantity to control stepping direction and emergency stop, the switchK1catchIN2andCOMTime, used to control the stepping direction; switchK2catchIN3andCOMIt is used for emergency braking of the motor.COMConnect to signal ground,VOOutput completion signal. Limit switchSQ1andSQ2Set limits for forward and reverse rotation respectively.



picture4.51Connection method of pulse signal position control

By configuring the different types and polarities of digital signals (see6.3.5Section System Parameter Configuration Register0x0081and0x0085) We can analyze the differences between pulse signals, switch quantities and logic levels.

The operation method can realize the start and stop and forward and reverse control of the motor. The control logic is shown in the table4.51shown.

surface4.51Control logic of pulse signal position control

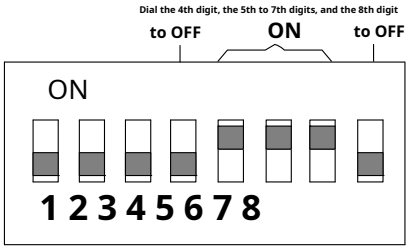
Digital signal type	Digital signal polarity	Functions implemented	How to operate	Wiring scheme
Switching quantity	Low level/closed (default)	Stepper control	Pulse signal	Stepping
		Step amount positive	K1disconnect,K2disconnect	
		Step amount reverse	K1closure,K2disconnect	
		Emergency Stop	K2closure	
	High level/disconnect	Stepper control	Pulse signal	
		Step amount positive	K1closure,K2closure	
		Step amount reverse	K1disconnect,K2closure	
		Emergency Stop	K2disconnect	
Logic Level	Low level/closed (default)	Stepper control	Pulse signal	Stepping
		Step amount positive	DI1High level,DI2High level	
		Step amount reverse	DI1Low level,DI2High level	
		Emergency Stop	DI2Low level	
	High level/disconnect	Stepper control	Pulse signal	
		Step amount positive	DI1Low level,DI2Low level	
		Step amount reverse	DI1High level,DI2Low level	
		Emergency Stop	DI2High level	

The configuration method of the DIP switch for pulse signal position control is shown in the figure4.52As shown, among them,1-3Configure the rated current of the motor (see Table 1 for how to configure the rated current of the motor2.2);4-5bit configuration signal source (see Table 1 for how to configure the signal source)

2.3), we configure the signal source as a pulse signal, that is,4Dial toOFF,5Dial toON;6-7Bit configuration working mode (how to configure the working mode see table2.4), we configure the working mode as position control, that is,6-7Dial

arriveON;8Dial toOFF.

The DIP switch is turned to the upper position.ON, below isOFF. From left to right are1-8Bit.



picture4.52Pulse signal position control DIP switch configuration

In pulse signal position control mode, the reference configuration of related registers is shown in Table4.52shown.

surface4.52Configuration of registers related to pulse signal position control mode

Register Address	Register function	value	describe
0x0080	Limit trigger polarity	0,1,2,3,4	0: Low level trigger (default) 1: High level trigger 2: Falling edge trigger 3: Rising edge trigger 4: Disable limit function
0x0081	Digital signal polarity	0,1	0: Low level trigger (default) 1: High level trigger
0x0083	Pulse signal type	2	pulse
0x0085	Logic level type	0,1,2,3	0: Switch value (default) 1:0/3.3V 2:0/5V 3:0/12Vor0/24V
0x008a	Logic level threshold	0x07D0	The switching logic level voltage threshold can be configured as 2000mV(default), Other logic levels are configured separately
0x008c-0x008d	Pulse signal magnification	1.0f	default value1.0f; Used to configure the step size per pulse
0x00a0	Position reset mode	0	No reset; usually no reset is required for step control, but Configure the reset mode according to the situation

4.4Preset speed control connection and configuration

When the motor speed does not need to be adjusted and the motor start/stop and forward/reverse rotation are controlled by switches or logic levels, we can use the preset speed mode.6.3.7Section)0x00B2and0x00B3Configure the forward and reverse speeds separately, by0x00B0Register configuration speed control mode (configurable as duty cycle speed control, torque control, speed closed-loop control, position closed-loop control), through0x00B1Configure the operation mode, whether a single button (or a single control signal) controls forward and reverse rotation or two buttons (or two control signals) control forward and reverse rotation respectively.

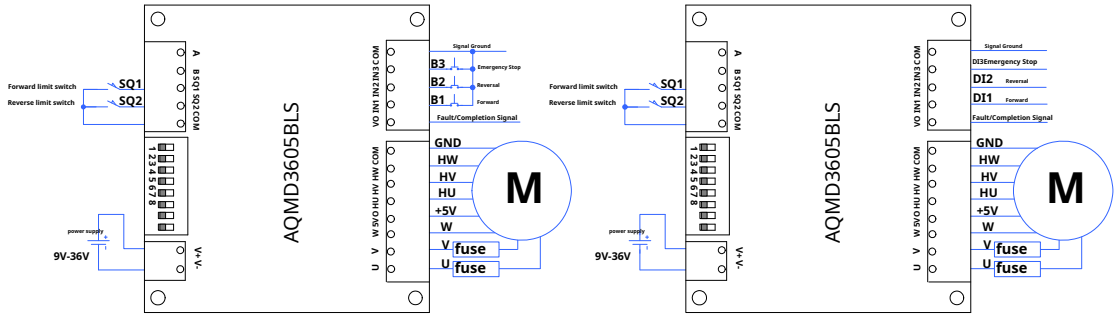
4.4.1Preset speed two-button control

This usage controls forward, reverse and stop respectively by presetting the forward and reverse speeds through three-way switch quantity/logic level signals. The connection method of the preset speed double-key control is shown in the figure4.53shown.

When using the switch quantity to control forward, reverse and stop, press the buttonB1catchIN1andCOMTime, used to control forward rotation; button B2catchIN2andCOMTime, used to control the reversal; buttonB3catchIN3andCOMWhen the digital signal polarity is low level trigger (can be0x0081Register configuration polarity),B1When pressed, the motor rotates forward.B2When pressed, the motor reverses.B1andB2When both are lifted, the motor stops. PressB3The motor stops urgently. When the digital signal polarity is falling edge trigger, pressB1Then the motor will rotate forward, pressB2Then flip up the motor and reverse it.B3The motor stops urgently.

When using logic level to control forward, reverse and stop,IN1Connect to logic levelDI1, used to control forward rotation;IN2Connect to logic levelDI2, used for inversion of control;IN3Connect to logic levelDI3, used for emergency stop.

COMWhen the speed control mode is duty cycle speed control, torque control or speed closed loop control,VOOutput fault signal; when the speed control mode is position control,VOOutput completion signal. Limit switchSQ1andSQ2Set limits for forward and reverse rotation respectively.



picture4.53Connection method of preset speed double key control

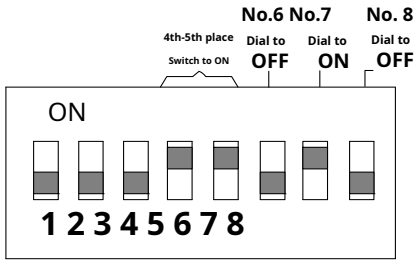
By configuring the different types and polarities of digital signals (see6.3.5Section System Parameter Configuration Register0x0081and0x0085） We can use different operation methods for switch quantity and logic level To realize the start and stop and forward and reverse control of the motor, the control logic is shown in the table4.53shown.

surface4.53Control logic for two-button control of preset speeds

Digital signal type	Digital signal polarity	Functions implemented	How to operate	Wiring scheme
Switching quantity	Low level/closed (default)	Speed Control	Preset speed	
		Forward	B1closure,B2,B3All disconnected	
		Reversal	B2closure,B1,B3All disconnected	
		Normal stop	B1,B2,B3All disconnected	
		Emergency Stop	B3closure	
	High level/disconnect	Speed Control	Preset speed	
		Forward	B1disconnect,B2,B3All closed	
		Reversal	B2disconnect,B1,B3All closed	
		Normal stop	B1,B2,B3All closed	
		Emergency Stop	B3disconnect	
	Falling edge/closing moment	Speed Control	Preset speed	
		Forward	B1After closing, open.B2,B3beginning Final disconnection	

		Reversal	B2After closing, open.B1,B3beginning Final disconnection	
		Emergency Stop	B3closure	
	Rising edge/disconnection moment	Speed Control	Preset speed	
		Forward	B1After opening, close.B2,B3beginning Final closure	
		Reversal	B2After opening, close.B1,B3beginning Final closure	
		Emergency Stop	B3disconnect	
Logic Level	Low level/closed (default)	Speed Control	Preset speed	
		Forward	DI1Low level,DI2,DI3High Voltage flat	
		Reversal	DI2Low level,DI1,DI3High Voltage flat	
		Normal stop	DI1,DI2,DI3High level	
		Emergency Stop	DI3Low level	
	High level/disconnect	Speed Control	Preset speed	
		Forward	DI1High level,DI2,DI3Low battery flat	
		Reversal	DI2High level,DI1,DI3Low battery flat	
		Normal stop	DI1,DI2,DI3Low level	
		Emergency Stop	DI3High level	
	Falling edge/closing moment	Speed Control	Preset speed	
		Forward	DI1From high level to low level, DI2,DI3Always high	
		Reversal	DI2From high level to low level, DI1,DI3Always high	
		Emergency Stop	DI3Low level	
	Rising edge/disconnection moment	Speed Control	Preset speed	
		Forward	DI1From low level to high level, DI2,DI3Always low	
		Reversal	DI2From low level to high level, DI1,DI3Always low	
		Emergency Stop	DI3High level	

When using the preset speed double-key control, the DIP switch configuration method is shown in the figure4.54As shown, among them,1-3Configure the motor rated current (see table for how to configure the motor rated current2.2);4-5bit configuration signal source (see Table 1 for how to configure the signal source)2.3), we configure the signal source as a built-in program, that is,4Dial toON,5Dial toON;6-7Bit configuration working mode (how to configure the working mode see table2.4), we configure the working mode to preset speed control, that is, 6Dial toOFF,No.7Dial toON;8We configure the control mode as digital/analog signal control mode.8Dial toOFF.



picture4.54DIP switch configuration for preset speed dual key control

In the preset speed double-key control mode, the reference configuration of the relevant registers is shown in the table4.54shown.

surface4.54Configuration of registers related to preset speed double-key control mode

Register Address	Register function	value	describe
0x0080	Limit trigger polarity	0,1,2,3,4	0: Low level trigger (default) 1: High level trigger 2: Falling edge trigger 3: Rising edge trigger 4: Disable limit function
0x0081	Digital signal polarity	0,1,2,3	0: Low level trigger 1: High level trigger 2: Falling edge trigger 3: Rising edge trigger
0x0085	Logic level type	0,1,2,3	0: Switch value (default) 1:0/3.3V 2:0/5V 3:0/12Vor0/24V
0x008a	Logic level threshold	0x07D0	The switching logic level voltage threshold can be configured as 2000mV(default), Other logic levels are configured separately
0x00b0	Working Mode	0,1,2,3	0: Duty cycle 1: Torque 2: Speed closed loop 3: Position closed loop
0x00b1	Control method	0	Dual contact/logic level control
0x00b2	Forward speed		Preset forward speed; Duty cycle mode:0~1000 Torque mode:0~700 Speed/position closed loop:0~65535
0x00b3	Reverse speed		Preset reverse speed; Duty cycle mode:0~1000 Torque mode:0~700 Speed/position closed loop:0~65535

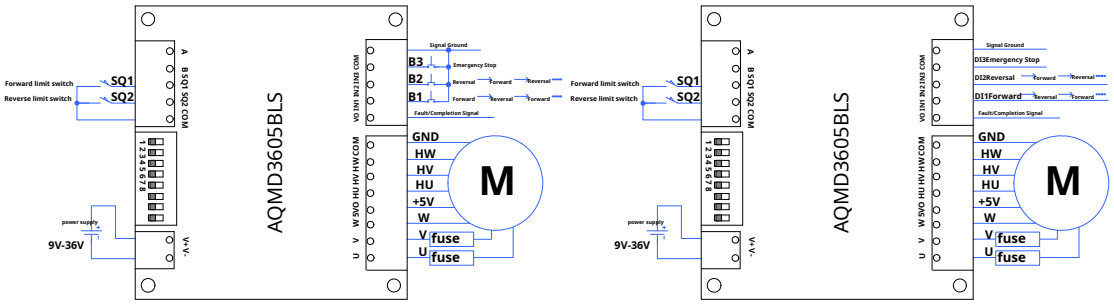
4.4.2Preset speed single button control

This usage uses a single switch quantity/logic level signal to realize the forward, reverse and stop control of the motor. The connection method of the preset speed single key control is shown in the figure4.55shown.

When using the switch quantity to control forward, reverse and stop, press the buttonB1catchIN1andCOMTime, used to control forward/stop/reverse switching; buttonB2catchIN2andCOMTime, used to control reverse/stop/forward switching; buttonB3catchIN3and COMWhen the digital signal polarity is low level trigger (can be0x0081Register configuration polarity),B1The motor rotates forward when pressed, and stops when released.B1When you press it again, the motor will reverse, and when you push it up again, the motor will stop, and the cycle will repeat.B2The motor reverses when pressed, and stops when released.B2When the button is pressed again, the motor rotates forward, and when it is released again, the motor stops, and the cycle repeats.B3When the digital signal polarity is falling edge trigger, pressB1Then pop up the motor to rotate forward, and press it againB1Then pop up the motor to stop, and press it againB1Then pop up the motor to reverse, and press it againB1Then the motor pops up and stops, repeating the cycle; pressB2Then pop up the motor to reverse, and press it again B2Then pop up the motor to stop, and press it againB2Then pop up the motor to rotate forward, and press it againB2Then the motor pops up and stops, repeating the cycle; pressB3The motor stops urgently.

When using logic level to control forward, reverse and stop,IN1Connect to logic levelDI1, used to control forward/stop/reverse; IN2 Connect to logic levelDI2, used to control reverse/stop/forward;IN3Connect to logic levelDI3, used for emergency stop.

COMWhen the speed control mode is duty cycle speed control, torque control or speed closed loop control,VOOutput fault signal; when the speed control mode is position control,VOOutput completion signal.



picture4.55Connection method of preset speed single key control

By configuring the different types and polarities of digital signals (see6.3.5Section System Parameter Configuration Register0x0081and0x0085） We can use different operation methods for switch quantity and logic level To realize the start and stop and forward and reverse control of the motor, the control logic is shown in the table4.55shown.

surface4.55Control logic for single-button control of preset speeds

Digital signal type	Digital signal polarity	Functions implemented		How to operate	Connection party case
Switching quantity	Low level/closed (default)	Speed Control		Preset speed	Jog
		state Switch	Forward → Stop → Reverse → Stop Stop → Forward...	B1After closing, it rotates forward, and after opening, it rotates forward. Stop, close again and reverse, then Disconnect and stop, and repeat this cycle; B2,B3All disconnected	
			Reverse → Stop → Forward → Stop Stop → Reverse...	B2Reverse after closing, and reverse after opening Stop, close again and rotate forward, then Disconnect and stop, and repeat this cycle; B1,B3All disconnected	

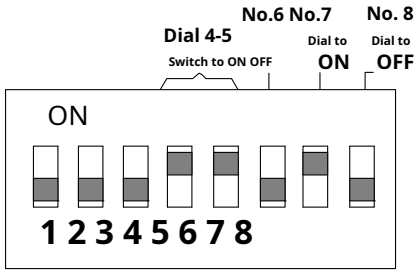
		Emergency Stop		B3closure	
	High level/disconnect	Speed Control		Preset speed	
		state Switch	Forward → Stop → Reverse → Stop Stop → Forward...	B1After disconnection, it rotates forward, and after closing, it rotates Stop, then disconnect the reverse, then close The combination stops, and the cycle repeats. B2,B3All closed	
			Reverse → Stop → Forward → Stop Stop → Reverse...	B2Reverse after opening, and reverse after closing Stop, then disconnect forward, then close The combination stops, and the cycle repeats. B1,B3All closed	
		Emergency Stop		B3closure	
	Falling edge/closing moment	Speed Control		Preset speed	Self-insurance
		state Switch	Forward → Stop → Reverse → Stop Stop → Forward...	B1After closing, disconnect to keep forward rotation. B1After closing, disconnect and keep stopping end,B1After closing, disconnect the Keep reversing and repeat this cycle; B2,B3Always disconnected	
			Reverse → Stop → Forward → Stop Stop → Reverse...	B2After closing, opening keeps reversing. B2After closing, disconnect and keep stopping end,B2After closing, disconnect the Keep rotating in the forward direction and repeat this cycle; B1,B3Always disconnected	
		Emergency Stop		B3closure	
	Rising edge/disconnection moment	Speed Control		Preset speed	
		state Switch	Forward → Stop → Reverse → Stop Stop → Forward...	B1After disconnection, closing keeps forward rotation. B1After opening again, close and keep stop,B1Then open and close Keep reversing and repeating this cycle; B2,B3Always disconnected	
			Reverse → Stop → Forward → Stop Stop → Reverse...	B2After opening, closing keeps reversing. B2After disconnecting, close and keep stopping end,B2After disconnecting, close the Keep rotating in the forward direction and repeat this cycle; B1,B3Always disconnected	
		Emergency Stop		B3closure	
Logic Level	Low level/closed (default)	Speed Control		Preset speed	Level
		state Switch	Forward → Stop → Reverse → Stop Stop → Forward...	DI1Low level forward, high level Stop at a low level, and then reverse at a low level. Then high level stops, and the cycle continues ring;DI2,DI3High level	
			Reverse → Stop	DI2Invert when low level, invert when high level	

→ Forward → Stop at level, then forward at low level.

			Stop → Reverse...	Then high level stops, and the cycle continues ring;DI1,DI3High level	
		Emergency Stop		DI3Low level	
	High level/disconnect	Speed Control		Pulse signal speed regulation	
		state Switch	Forward → Stop → Reverse → Stop Stop → Forward...	DI1When the level is high, it rotates forward, and when the level is low, it rotates forward. Stop at a flat level, and then reverse at a high level. Then the low level stops, and the cycle continues. ring;DI2,DI3Low level	
			Reverse → Stop → Forward → Stop Stop → Reverse...	DI2Invert when high level, invert when low level Stop at level, then rotate forward at high level. Then the low level stops, and the cycle continues. ring;DI1,DI3Low level	
		Emergency Stop		DI3High level	
	Falling edge/closing moment	Speed Control		Preset speed	edge
		state Switch	Forward → Stop → Reverse → Stop Stop → Forward...	DI1From high level to low level change,DI1From high level to Low level stops,DI1Again by High level turns to low level and reverses. This cycle;DI2,DI3Always High level	
			Reverse → Stop → Forward → Stop Stop → Reverse...	DI2From high level to low level change,DI2From high level to Low level stops,DI2Again by High level turns to low level, and the This cycle;DI1,DI3Always High level	
		Emergency Stop		DI3Low level	
	Rising edge/disconnection moment	Speed Control		Preset speed	
		state Switch	Forward → Stop → Reverse → Stop Stop → Forward...	DI1From low level to high level change,DI1Change from low level to High level stops,DI1Again by The low level turns into high level inversion. This cycle;DI2,DI3Always Low level	
			Reverse → Stop → Forward → Stop Stop → Reverse...	DI2From low level to high level change,DI2Change from low level to High level stops,DI2Again by The low level turns to high level and the This cycle;DI2,DI3Always Low level	
		Emergency Stop		DI3High level	

When using the preset speed single-button control, the DIP switch configuration method is shown in the figure4.56As shown, among them,1-3Configure the motor rated current (see table for how to configure the motor rated current2.2);4-5bit configuration signal source (how to configure the signal source

See table2.3), we configure the signal source as a built-in program, that is,4Dial toON,5Dial toON;6-7Bit configuration working mode (how to configure the working mode see table2.4), we configure the working mode to preset speed control, that is, 6Dial toOFF,No.7Dial toON;8We configure the control mode as digital/ analog signal control mode.8Dial toOFF.



picture4.56DIP switch configuration for preset speed single-touch control

Under the preset speed single-key control mode, the reference configuration of the relevant registers is shown in the table4.56shown.

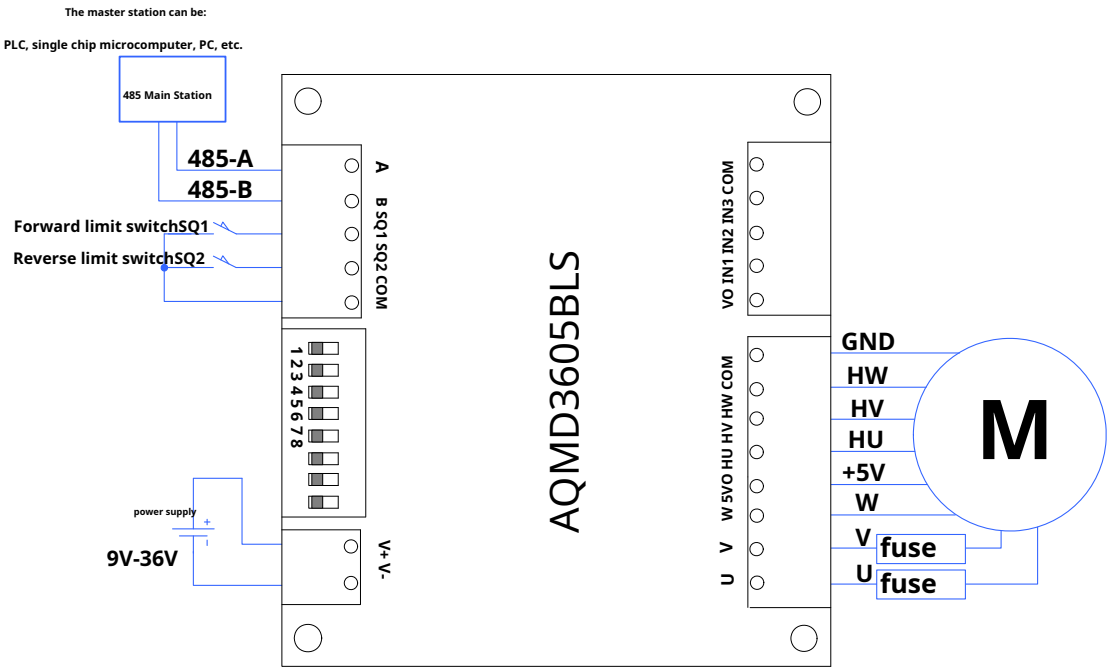
surface4.56Configuration of registers related to preset speed single-key control mode

Register Address	Register function	value	describe
0x0080	Limit trigger polarity	0,1,2,3,4	0: Low level trigger (default) 1: High level trigger 2: Falling edge trigger 3: Rising edge trigger 4: Disable limit function
0x0081	Digital signal polarity	0,1,2,3	0: Low level trigger 1: High level trigger 2: Falling edge trigger 3: Rising edge trigger
0x0085	Logic level type	0,1,2,3	0: Switch value (default) 1:0/3.3V 2:0/5V 3:0/12Vor0/24V
0x008a	Logic level threshold	0x07D0	The switching logic level voltage threshold can be configured as 2000mV(default), Other logic levels are configured separately
0x00b0	Working Mode	0,1,2,3	0: Duty cycle 1: Torque 2: Speed closed loop 3: Position closed loop
0x00b1	Control method	1	Single contact/logic level control
0x00b2	Forward speed	0~65535	Preset forward speed
0x00b3	Reverse speed	0~65535	Preset reverse speed

4.5 485Communication connection and configuration

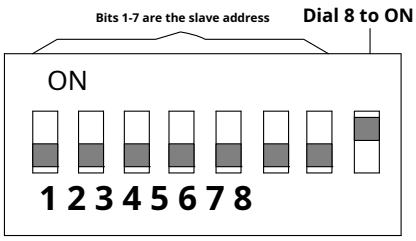
4.5.1 485Communication control

This usage is through485Communication realizes the control operation of the motor.485The connection method of communication control is shown in the figure4.57 shown.485 Master station (the master station can bePLC, MCU orPCMachine, etc.485The two signal lines followAA,BBThe way and drive 485The interface is connected.485The master station passesModbus-RTUThe communication protocol operates the driver's related registers to perform speed regulation, direction control, position control and other operations on the motor.485Under communication control mode, the driver supports duty cycle speed regulation, speed closed-loop control and position closed-loop control.



picture4.57 485Communication control connection

useRS485When communicating with the driver, the communication parameters and device address should be consistent with the driver. Communication parameters include baud rate, parity check mode and stop bit. The default communication parameters of the driver are baud rate 9600bps, even parity,1The baud rate of the drive can be set by0x0090and0x0091Register configuration, the driver supports baud rate range of 1200 ~115200bps; Check mode and stop bit pass0x0092Register configuration, the driver supports even parity +1 Stop bit, odd parity +1Stop bit and no parity +2Stop bit. For details on the communication parameter registers, see6.3.5Section System Parameter Configuration Registers.ModbusThe slave device address is determined by the DIP switch1~7Bit configuration, slave address decoding table see table2.6;8Bit is the control mode bit, use 485Communication control time8The position should be dialed toON; The configuration of the DIP switch is shown in the figure4.58shown.



picture4.58 485Communication mode DIP switch configuration

Before using the motor, you should first configure the rated current and operating current of the motor.0x006aand0x006b Register (see6.3.4The rated current and maximum load current of the motor are configured in the following sections. The configured motor rated current should be consistent with or slightly higher than the actual rated current of the motor. The maximum load current can be used to configure the motor's maximum load/locking torque. If there is no requirement, it is usually configured the same as the rated current. The braking current is configured consistent with the motor's rated current. The motor rated current can be obtained from the motor's nameplate or data sheet. If the motor rated current cannot be determined, it can be estimated by dividing the motor rated power by the rated voltage and then by the motor efficiency.12VMotor, efficiency is desirable50%,for24VAnd above voltage motor, efficiency is desirable70%For the first use of a motor, or when the wiring sequence of the motor phase line or the H signal line is changed, the motor should be trained first. For details on how to train the motor, see3.1.2Section.

Duty cycle speed control modePWMThe rise and fall buffer time and the acceleration and deceleration in the speed closed loop and position closed loop mode can be0x0050~0x0053Register (see6.3.3The default duty cycle speed control mode at power on isPWMThe rise and fall buffer time and the acceleration and deceleration in the speed closed loop and position closed loop mode, as well as the large acceleration and deceleration and large commutation frequency are0x0060~0x0067Register (see6.3.4 Motor Control Parameters Configuration Register Description)

By writing0x0042The register sets the output duty cycle for duty cycle speed regulation; by writing0x0043The register sets the commutation frequency (corresponding to the speed) of the motor for closed-loop speed regulation;0x0044Set the commutation frequency (corresponding to the speed) of position control.0x0045The register sets the position control mode to be absolute or relative.0x0046and0x0047Two registers are written with four-byte integer target position values to perform position closed-loop control;0x0040The register performs the braking operation on the motor. The three speed control modes of duty cycle speed control, closed loop speed control and position control can be switched directly, and the output register corresponding to each speed control mode (such as0x0042,0x0043,0x0047Registers, etc.) to switch to the corresponding speed control mode. For the position control speed control mode, you can only operate0x0046and0x0047Register or in0x0046Register single write0 After operation0x0047Registers for position control.0x0040~0x0047For a detailed description of the registers, see6.3.3Section.

The closed-loop speed control algorithm can be0x0070The register configuration is speed closed-loop control or time-position closed-loop control. The former has the characteristics of small overshoot and smooth speed regulation at high speed, but the speed regulation may be uneven at low speed; the latter can realize the synchronous control of multiple motor rotation angles by multiple drivers, and the speed regulation is also smooth at low speed, which can meet the requirements of extremely low speed control, but there is a certain overshoot in the speed regulation process.

When the closed-loop speed control algorithm is speed closed-loop control,0x00c0~0x00c5Register configuration of closed loop speed regulationPID Parameters; when the closed-loop speed control algorithm is time-position closed-loop control,0x00c6~0x00cbRegister configuration closed loop speed control motor rotationPIDParameters, through0x00ba~0x00bfRegister configuration closed loop speed control motor self-lockingPIDParameters; When it is position closed loop control, it is also0x00c6~0x00cbRegister configuration position closed loop control motor rotationPIDparameter,0x00ba~0x00bfWhen configuring the motor self-lockingPIDparameter.PIDIf the configuration of each parameter is too large, it may cause serious overshoot of speed or position control or even oscillation.PIDIf the parameters are configured too small, it may lead to slow adjustment and poor follow-up. They should be configured reasonablyPIDParameters to achieve the best adjustment effect.PIDFor details on parameter configuration related registers, see6.3.8introduce.

pass0x0080~0x0099Register (see6.3.5Section Description of System Parameter Configuration Registers) Configurable485In the communication control mode, the limit switch trigger polarity, communication parameters, communication interruption protection time and stall stop time are all controlled.0x0095The register sets the communication interruption protection time. If there is no communication access to the drive within the set time,

The driver will brake, which can solve the problem of mechanical device failure caused by communication line failure during the movement of the mechanical device.

To solve the problem that the device is not controlled by the master station, we can set the real-time status register (see6.3.2Section 1.4.2.0x008eThe register sets the stall stop time. When the motor stalls, the current reaches the configured maximum load current and the motor speed is0When this state lasts for a period of time equal to the configured stall stop time, the drive will brake. The stall stop state can be detected by0x0032Register reading, we can clear the stall stop flag by braking or reversing operation.

pass0x0020~0x0034Register (see6.3.2Section Description of the Real-time Status Register) we can read the output PWMvalue, motor commutation frequency, motor phase current, motor rotation position, motor speed and other motor-related real-time status values and real-time values of each input signal. 0x0020Register ReadPWMOutput value,PWMThe output value reflects the voltage added to the motor phase line by the driver output. The phase voltage is approximately equal to the power supply voltage multiplied by the duty cycle.0x0022The register reads the motor commutation frequency. The motor commutation frequency is the frequency at which the Hall signal output by the Hall sensor changes when the motor rotates. The unit isHzThe motor phase current is the motorU,V,WThe average value of the current in the three-phase line, in units ofA.pass0x0024and0x0025 The motor rotation position read by the register is the number of commutation times (or the number of Hall pulses) when the motor rotates in a certain direction. The estimated completion time of the motor position control can be obtained by0x0026and0x0027Register read, completion status through0x0023Register read. Motor speed is measured by0x0034Register reading, the motor speed is the measured real-time motor speed, the unit isRPMTo make the real-time speed of the motor consistent with the actual speed of the motor, you should first0x0073and0x0074Registers configure the number of motor poles and reduction ratio.

485The main registers related to the communication control method are shown in the table4.57shown.

surface4.57 485Configuration of communication control mode related registers

Register Address	Register function	value	describe
0x0040	Motor brake control	0, 1, 2	0: Normal stop1: Emergency brake2: Free stop
0x0042	Setting the Duty Cycle	- 1000~1000	Multiply the value by0.1%The target duty cycle
0x0043	Set speed closed loop control Target speed	- 32768~32767	Multiply the value by0.1is the target commutation frequency, in units ofHz
0x0044	Set position closed loop control Control walking speed	0~32767	Multiply the value by0.1is the target commutation frequency, in units ofHz
0x0045	Set position closed loop control System Type	0,1	0: absolute position1: Relative position
0x0046-0x0047	Set position closed loop control Target position	- 2147483648~ 2147483647	
0x0050	Temporarily set the duty cycle Speed regulation acceleration buffer between	0~255	Multiply the value by0.1Output ratio is0Increase to 100.0%The time required is inS
0x0051	Temporarily set the duty cycle Speed regulation and deceleration buffer between	0~255	Multiply the value by0.1SOutput ratio is100. 0%reduce Small to0The time required is inS
0x0052	Temporary speed setting Loop control, position closed Ring control acceleration Spend	0~66635	Multiply the value by0.1The speed of increasing the commutation frequency, in units of Hz/s
0x0053	Temporary speed setting Loop control, position closed Loop control deceleration and acceleration	0~66635	Multiply the value by0.1The speed of commutation frequency reduction is expressed in Hz/s

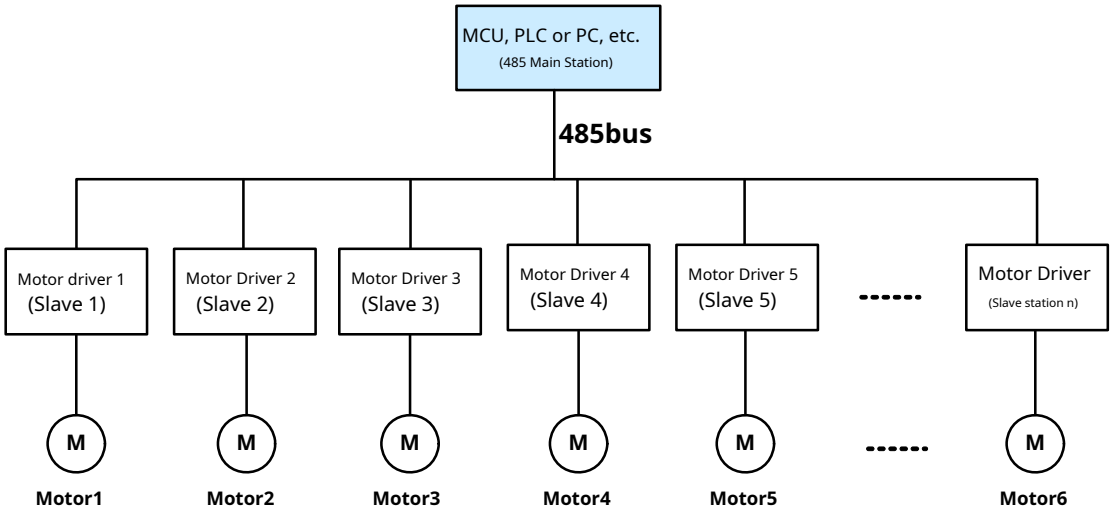
	Spend		
0x006a	Configure motor rated power flow	0~700	Multiply the value by0.01is the current value, in units ofA.
0x006b	Configure motor with large load Carrying current	0~700	Multiply the value by0.01is the current value, in units ofA.
0x006c	Configuration motor size Dynamic current	0~300	Multiply the value by0.01is the current value, in units ofA.
0x0070	Configure speed closed loop control Algorithm	0, 1,2	0: Speed closed loop control 1: Time-position closed loop control 2: Time-position rate control
0x0071	Configuring position closed-loop control Allowable error	0~65535	
0x0072	Configuring position closed-loop control Whether to repair after overshoot just	0, 1	0: No correction 1: Make corrections
0x0073	Configure the number of motor poles	0~65535	Set the number of motor poles. The number of motor poles is usually2of multiple
0x0074	Configure motor reduction ratio	0~65535	
0x0020	PWMOutput value	0~1000	Multiply the value by0.1%Duty cycle
0x0021	Real-time motor phase current	0~700	Multiply the value by0.01is the current value, in units ofA.
0x0022	Real-time motor commutation frequency Rate	- 32768~32767	when0x0035Registers are1When , the value is the commutation frequency; when0x0035 Registers are0When the value is multiplied by0.1 is the commutation frequency; the unit isHz; Commutation frequency divided by electrical The number of poles is multiplied by20is the motor speed, in units RPM.
0x0023	Position control completion status state	0, 1	0: Not completed1:Finish
0x0024-0x0025	Motor real-time position	- 2147483648~ 2147483647	
0x0026-0x0027	Position control estimated residual Remaining time to complete	0~4294967295	The unit isms
0x0032	Motor stall status	0, 1, 2	0: Not blocked 1：Forward rotation stall stop 2: Reverse stall stop
0x0033	Error Status	0, 1, 2, 3, 4,5,6,7,8,9	0: No error 1: Not yet learned 2：Stop 3: Hall Error 4: Unable to reach target speed 5: Coil error (not supported by this model) 6: Overcurrent shutdown 7: Overtemperature shutdown

			8: Overvoltage shutdown 9: Undervoltage shutdown
0x0034	Motor real-time speed	0~65535	when0x0035Registers are1When the value is multiplied by10is the speed; when0x0035Registers are0When , the value is Speed; Unit isRPM. Note: You must first pass0x0073and0x0074The registers are configured with the correct number of motor poles and reduction ratio, and the read Speed is correct.
0x0035	Does the speed need to be multiplied? by10	0, 1	0: The value is the speed; 1: Multiply the value by10is the rotation speed;

For more register descriptions, see6.3Section.

4.5.2 485Multi-site communication control

This usage uses a485Master station (the master station can bePLC, MCU orPCMachine, etc.)485The communication method operates multiple drivers, thereby realizing the separate control of multiple motors. The topology diagram is shown in the figure4.59shown.485For multi-site communication connection method, see5.4Section.



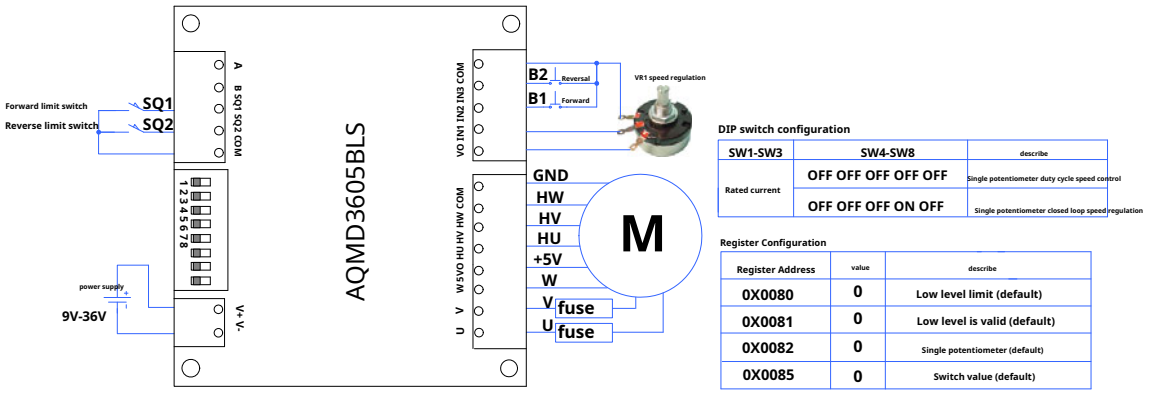
picture4.59 485Multi-site communication control topology diagram

5.Typical comprehensive connection method

5.1Typical connection method of potentiometer speed control

5.1.1Single potentiometer speed control method

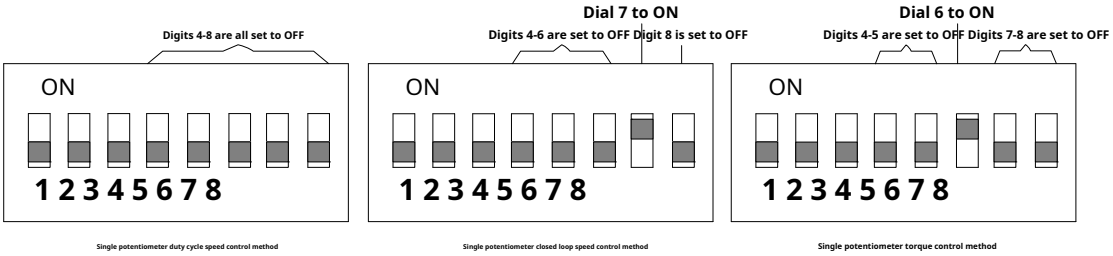
This connection method can use a single potentiometer to adjust the motor speed, control the start and stop and forward and reverse rotation of the motor through the switch, and limit the forward and reverse rotation through the limit switch. The typical connection method of single potentiometer speed control is shown in the figure5.1As shown in the figure, a potentiometer is usedVR1 Adjust the motor speed. PressB1, the motor rotates forward,B1When the forward limit switchSQ1After the limit is triggered, the motor stops.B1Invalid; PressB2, the motor reverses,B2When the limit switch is reversed, the motor stops. SQ2The motor stops when the limit is reached.B2invalid.



picture5.1Wiring diagram of single potentiometer speed control method

In single potentiometer speed control mode, the driver supports three speed control modes: duty cycle speed control, closed loop speed control and torque control. The configuration method of the DIP switch for each speed control mode is shown in the figure.5.2As shown.1-3Configure the motor rated current (see table for how to configure the motor rated current)2.3);4-5bit configuration signal source (see Table 1 for how to configure the signal source)2.4), we configure the signal source as a potentiometer, that is4-5 At the same time, dialOFF;6-7Bit configuration working mode (how to configure the working mode see table 2.5);8We configure the control mode as digital/analog signal control mode.8Dial to OFF.

The DIP switch is turned to the upper position.ON, below isOFF. From left to right are1-8Bit.



picture5.2Single potentiometer duty cycle speed regulation, speed closed loop control and torque control mode DIP switch configuration

In the single potentiometer speed control mode, the reference configuration of the relevant registers is shown in the table5.1shown.

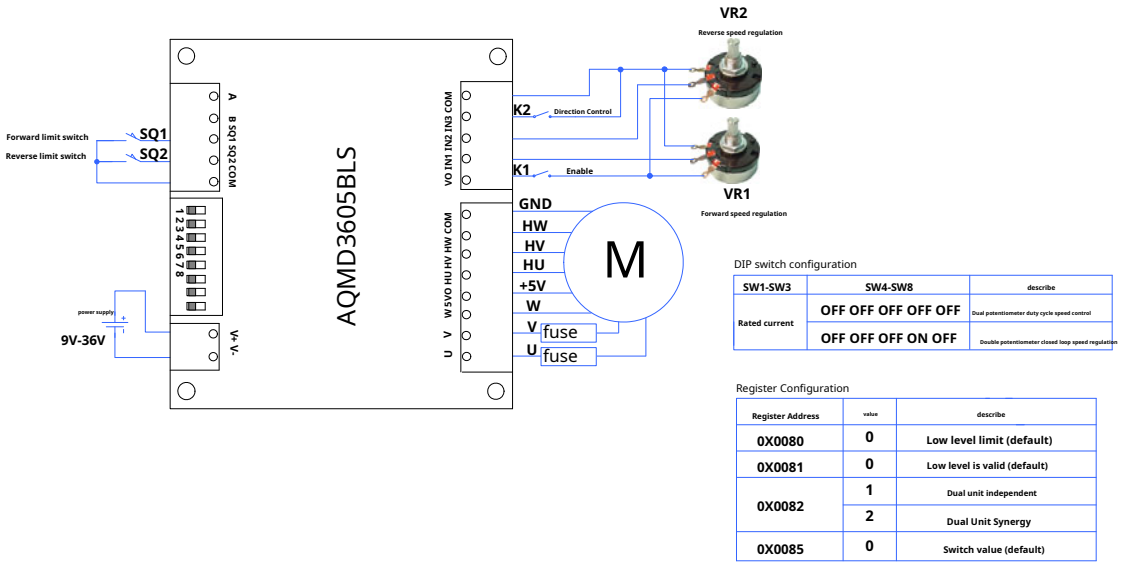
surface5.1Configuration of registers related to single potentiometer speed control mode

Register Address	Register function	value	describe

0x0080	Limit trigger polarity	0,1,2,3,4	0: Low level trigger (default) 1: High level trigger 2: Falling edge trigger 3: Rising edge trigger 4: Disable limit function
0x0081	Digital signal polarity	0,1,2,3	0: Low level trigger (default) 1: High level trigger 2: Falling edge trigger 3: Rising edge trigger
0x0082	Potentiometer Usage	0	Single potentiometer (default)
0x0085	Logic level type	0,1,2,3	0: Switch value (default) 1:0/3.3V 2:0/5V 3:0/12Vor0/24V
0x0086	Potentiometer minimum value	0	The minimum output voltage value of the potentiometer is0(default)
0x0087	Potentiometer maximum value	0x0CDF	The maximum output voltage of the potentiometer is3295mV(default)
0x008a	Logic level threshold	0x07D0	The switching logic level voltage threshold can be configured as 2000mV(default), Other logic levels are configured separately

5.1.2Dual potentiometer speed control method

This connection method uses two potentiometers to adjust the speed and forward and reverse rotation of the motor. The typical comprehensive connection method of the dual potentiometer speed control method is shown in the figure5.3The usage of dual potentiometers includes dual potentiometer independent control and dual potentiometer cooperative control. In the dual potentiometer independent control mode, use the potentiometerVR1andVR2The motor speed is adjusted for forward and reverse rotation respectively by switchingK2Control the motor enable through the switchK1Switch the motor rotation direction through the limit switchSQ1andSQ2Limit the forward and reverse directions respectively. For detailed usage, see4.1.4Section: In the dual potentiometer cooperative control mode, the potentiometerVR2Used to set the midpoint of the reference voltage, potentiometerVR1Control motor speed and direction, limit switchSQ1andSQ2Limit the forward and reverse rotation respectively. For detailed usage, see4.1.6Section.



DIP switch configuration

SW1-SW3	SW4-SW8	describe
Rated current	OFF OFF OFF OFF OFF	Dual potentiometer duty cycle speed control
	OFF OFF OFF ON OFF	Double potentiometer closed loop speed regulation

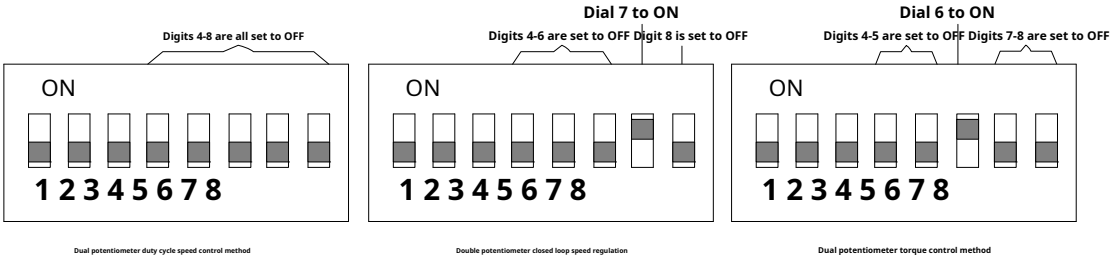
Register Configuration

Register Address	value	describe
0X0080	0	Low level limit (default)
0X0081	0	Low level is valid (default)
0X0082	1	Dual unit independent
	2	Dual Unit Synergy
0X0085	0	Switch value (default)

picture5.3Wiring diagram of dual potentiometer speed control method

In the dual potentiometer speed control mode, the driver supports three speed control modes: duty cycle speed control, closed loop speed control and torque control. The configuration method of the DIP switch for each speed control mode is shown in the figure.5.4As shown in the figure. Among them, the dip switch1-3Configure the motor rated current (see table for how to configure the rated current)2.2);4-5bit configuration signal source (see Table 1 for how to configure the signal source)2.3), we configure the signal source as a potentiometer, that is4-5At the same time, dialOFF;4-7The working mode when the potentiometer is controlled by the bit configuration (see Table 2 for how to configure the working mode when the potentiometer is controlled)2.4);8We configure the control mode as digital/analog signal control mode.8Dial toOFF.

The DIP switch is turned to the upper position.ON, below isOFF. From left to right are1-8Bit.



picture5.4 DIP switch configuration for dual potentiometer speed control

Under dual potentiometer speed regulation, the reference configuration of related registers is shown in the table5.2shown.

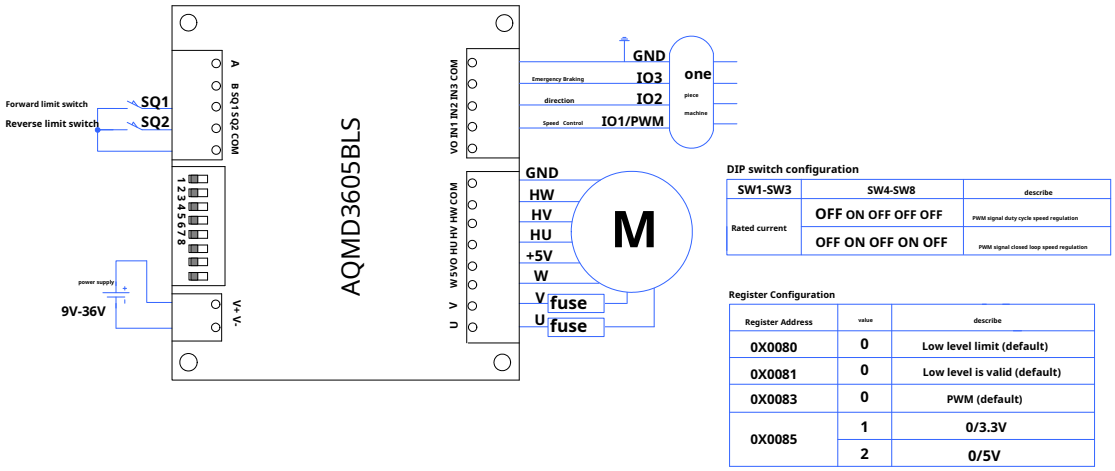
surface5.2Configuration of related registers of dual potentiometer speed control mode

Register Address	Register function	value	describe
0x0080	Limit trigger polarity	0,1,2,3,4	0: Low level trigger (default) 1: High level trigger 2: Falling edge trigger 3: Rising edge trigger 4: Disable limit function
0x0081	Digital signal polarity	0,1,2,3	0: Low level trigger (default) 1: High level trigger 2: Falling edge trigger 3: Rising edge trigger
0x0082	Potentiometer Usage	1,2	1: Dual potentiometers independent 2：Dual potentiometer synergy
0x0085	Logic level type	0,1,2,3	0: Switch value (default) 1:0/3.3V 2:0/5V 3:0/12Vor0/24V
0x0086	Potentiometer minimum value	0	The minimum output voltage value of the potentiometer is0(default)
0x0087	Potentiometer maximum value	0x0CDF	The maximum output voltage of the potentiometer is3295mV(default)
0x008a	Logic level threshold	0x07D0	The switching logic level voltage threshold can be configured as 2000mV(default), Other logic levels are configured separately

5.2Typical connection method of single chip microcomputer control

5.2.1MicrocontrollerPWMSignal speed control method

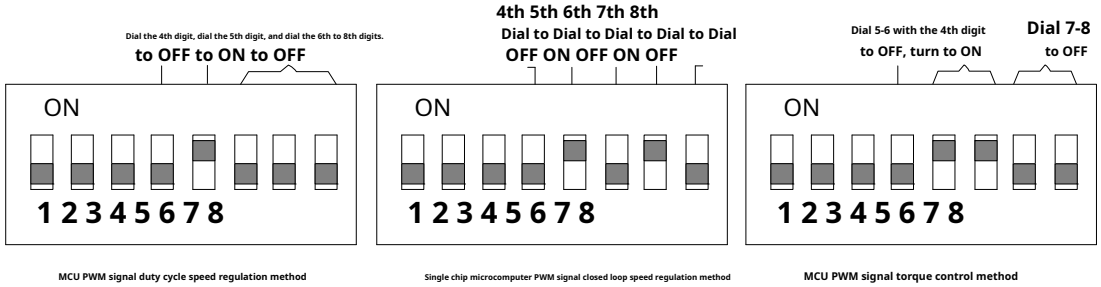
This connection method can realize the output through the microcontrollerPWMThe signal controls the motor speed through the microcontrollerIOThe signal controls the start and stop and the forward and reverse rotation, and the limit switches are used to set the limits for the forward and reverse rotation.PWMThe typical connection method of signal duty cycle/closed loop speed regulation is shown in the figure5.5The driveCOMConnected to the power ground of the microcontroller;IN1Connect to microcontrollerPWM Output, used for speed regulation;IN2andIN3The two differences with the microcontrollerIOThey are connected to control the motor forward and reverse rotation and emergency braking.SQ1andSQ2Set limits for forward and reverse rotation respectively.



picture5.5MicrocontrollerPWMConnection method of signal duty cycle/closed loop speed regulation mode

MicrocontrollerPWMIn the signal duty cycle/closed loop speed control mode, the driver supports duty cycle speed control, torque control and speed closed loop control. The DIP switch configuration method is shown in the figure5.6As shown, among them,1-3 Configure the motor rated current (see table for how to configure the motor rated current2.2);4-5bit configuration signal source (see Table 1 for how to configure the signal source)2.3), we configure the signal source asPWM/Pulse signal, i.e.4Dial toOFF,5Dial toON;6-7Bit configuration working mode (how to configure the working mode see table2.4),8We configure the control mode as digital/analog signal control mode.8Dial toOFF.

The DIP switch is turned to the upper position.ON, below isOFF. From left to right are1-8Bit.



picture5.6MicrocontrollerPWMDIP switch configuration for signal duty cycle speed regulation/closed loop speed regulation/torque control

MicrocontrollerPWMIn the signal speed regulation mode, the reference configuration of the relevant registers is shown in the table5.3shown.

surface5.3MicrocontrollerPWMConfiguration of signal speed control related registers

Register Address	Register function	value	describe

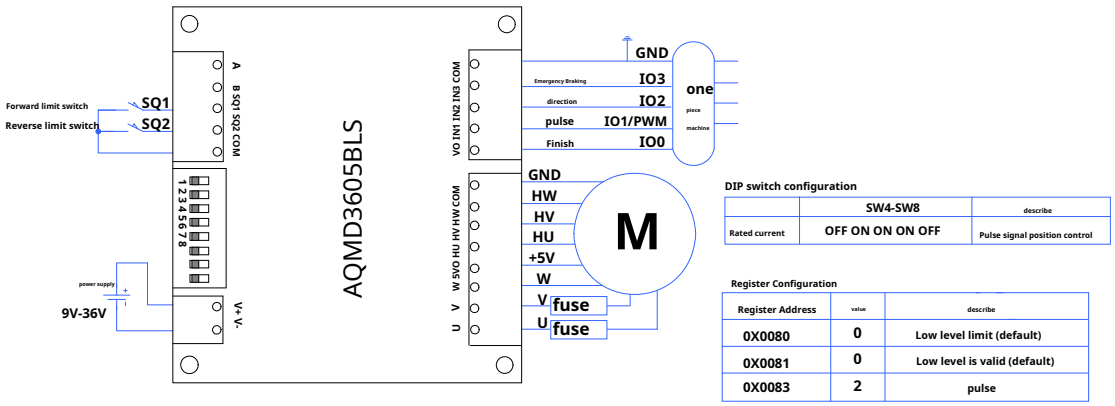
0x0080	Limit trigger polarity	0,1,2,3,4	0: Low level trigger (default) 1: High level trigger 2: Falling edge trigger 3: Rising edge trigger 4: Disable limit function
0x0081	Digital signal polarity	0,1	0: Low level trigger (default) 1: High level trigger
0x0083	Pulse signal type	0	PWM(default)
0x0085	Logic level type	0,1,2	0: Switch value (default, if51The microcontroller should be configured as this) 1:0/3.3V(ARMThe microcontroller is usually3.3V Output) 2:0/5V
0x008a	Logic level threshold	0x07D0	The switching logic level voltage threshold can be configured as 2000mV(default), Other logic levels are configured separately

5.2.2Single chip pulse signal position control

This connection method can be used to control the motor rotation position using pulse signals in the single chip microcomputer. Typical connection diagram of single chip microcomputer pulse signal position control5.7shown.

DriverCOMConnected to the power ground of the microcontroller;IN1Connect to microcontrollerIO1, receiving pulse signals from the microcontroller, used to control the motor stepping;IN2Connect to microcontrollerIO2, used to control the stepping direction;IN3Connect to microcontrollerIO3, used to control emergency stop;VOWith microcontrollerIO0connected to output a completion signal to notify the microcontroller that the position control process has been completed; limit switchSQ1andSQ2Set limits for forward and reverse rotation respectively.

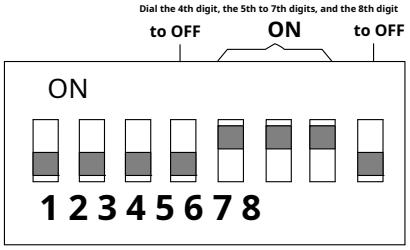
Note:VOThe output is3.3VLogic level, if the microcontroller does not accept3.3VLogic level, need to be converted to5V Logic level.



picture5.7Single chip microcomputer pulse signal position control method

The configuration method of the DIP switch for position control using the microcontroller pulse signal is shown in the figure5.8As shown, among them,1-3 Configure the rated current of the motor (see Table 1 for how to configure the rated current of the motor2.2);4-5 bit configuration signal source (see Table 1 for how to configure the signal source)2.3), we configure the signal source as a pulse signal, that is,4Dial toOFF,5Dial toON;6-7Bit configuration working mode (how to configure the working mode see table2.4), we configure the working mode as position control, that is,6-7Dial toON;8We configure the control mode as digital/analog signal control mode.8Dial toOFF.

The DIP switch is turned to the upper position.ON, below isOFF. From left to right are1-8Bit.



picture5.8MCU pulse signal position control DIP switch configuration

In the single chip pulse signal position control mode, the reference configuration of the relevant registers is shown in the table5.4shown.

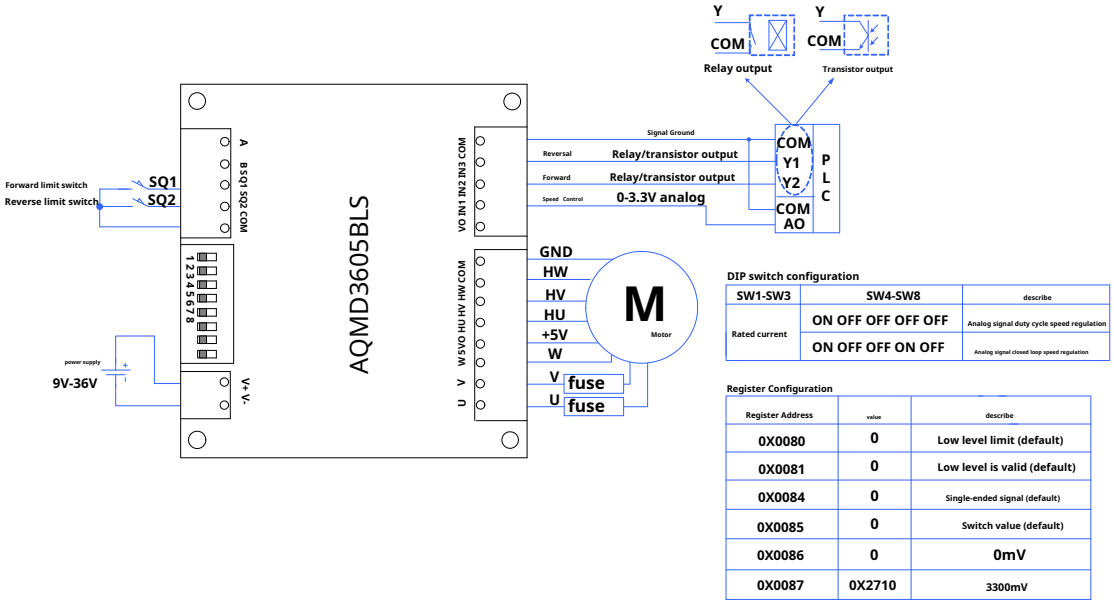
surface5.4Configuration of related registers of single chip microcomputer pulse signal position control mode

Register Address	Register function	value	describe
0x0080	Limit trigger polarity	0,1,2,3,4	0: Low level trigger (default) 1: High level trigger 2: Falling edge trigger 3: Rising edge trigger 4: Disable limit function
0x0081	Digital signal polarity	0,1	0: Low level trigger (default) 1: High level trigger
0x0083	Pulse signal type	2	pulse
0x0085	Logic level type	0,1,2	0: Switch value (default, if51The microcontroller should be configured For this item) 1:0/3.3V(ARMThe microcontroller is usually3.3VOutput) 2:0/5V
0x008a	Logic level threshold	0x07D0	The switching logic level voltage threshold can be configured as 2000mV(default), Other logic levels are configured separately
0x008c-0x008d	Pulse signal magnification	1.0f	default value1.0f; Used to configure the step size per pulse
0x00a0	Position reset mode	0	No reset; usually no reset is required for step control, but Configure the reset mode according to the situation

5.3 PLCTypical connection method of control method

5.3.1 PLCAnalog signal speed control

This connection method can be usedPLCTo adjust the speed and forward and reverse rotation of the motor.PLCThe typical comprehensive connection method of analog signal duty cycle speed regulation is shown in the figure5.9The driveCOMandPLCRelayCOMThe terminal and the analog signal ground are connected;IN1 catchPLCAnalog outputAO, used for speed regulation;IN2,IN3RespectivelyPLCRelay/transistor outputY2andY1, respectively control the motor forward and reverse; through the limit switchSQ1andSQ2Set limits for forward and reverse rotation respectively.



DIP switch configuration

SW1-SW3	SW4-SW8	describe
Rated current	ON OFF OFF OFF OFF	Analog signal duty cycle speed regulation
	ON OFF OFF ON OFF	Analog signal closed loop speed regulation

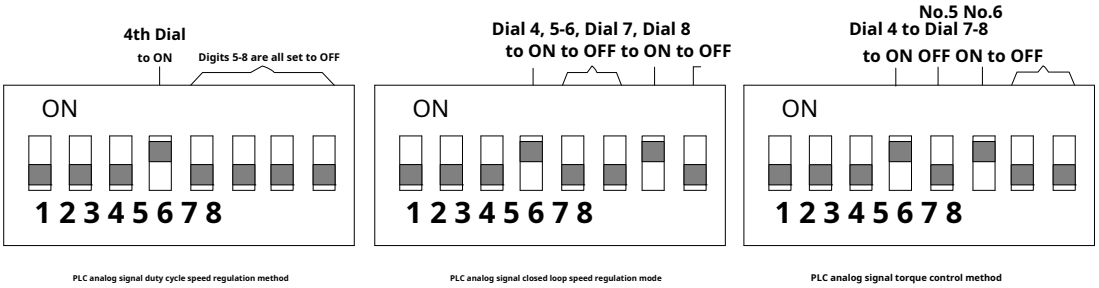
Register Configuration

Register Address	value	describe
0X0080	0	Low level limit (default)
0X0081	0	Low level is valid (default)
0X0084	0	Single-ended signal (default)
0X0085	0	Switch value (default)
0X0086	0	0mV
0X0087	0X2710	3300mV

picture5.9 PLCAnalog signal speed control wiring diagram

PLCThe configuration method of the DIP switch for analog signal duty cycle speed regulation is shown in the figure5.11As shown, the1-3Configure the motor rated current (see table for how to configure the rated current)2.2);4-5bit configuration signal source (see Table 1 for how to configure the signal source) 2.3), we configure the signal source as an analog signal, that is,4Dial toON,5Dial toOFF;4-7Bit configuration working mode (how to configure the working mode see table2.4),8We configure the control mode as digital/ analog signal control mode.8Dial toOFF.

The DIP switch is turned to the upper position.ON, below isOFF. From left to right are1-8Bit.



picture5.10 PLCDIP switch configuration for analog signal speed regulation

PLCIn analog signal speed control mode, the reference configuration of related registers is shown in Table5.5shown.

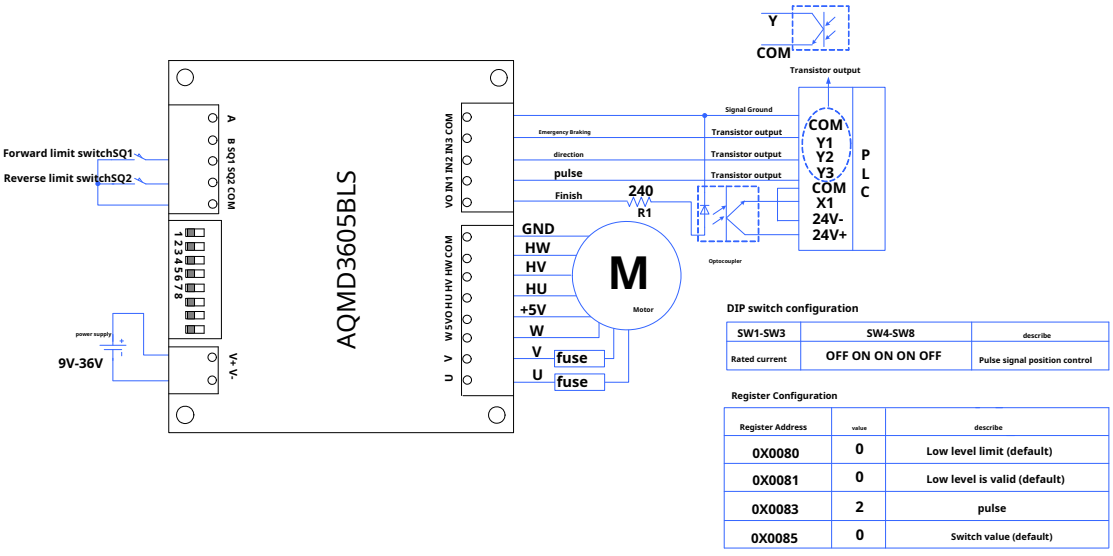
surface5.5 PLCConfiguration of registers related to analog signal speed regulation (level trigger) mode

Register Address	Register function	value	describe
0x0080	Limit trigger polarity	0,1,2,3,4	0: Low level trigger (default) 1: High level trigger 2: Falling edge trigger 3: Rising edge trigger 4: Disable limit function
0x0081	Digital signal polarity	0,1	0: Low level trigger (default) 1: High level trigger
0x0084	Analog signal type	0	Single-ended analog signal (default)

0x0085	Logic level type	0,1,2,3	0: Switch value (default) 1:0/3.3V 2:0/5V 3:0/12Vor0/24V
0x0088	Analog range minimum value	0	The minimum analog range is0(default)
0x0089	Analog range maximum value	0x2710	The maximum analog range is3300mV(default), or Configure to other values as required
0x008a	Logic level threshold	0x07D0	The switching logic level voltage threshold can be configured as 2000mV(default), Other logic levels are configured separately
0x0096-0x0097	Analog signal adjustment factork	1.0f	default value1.0f, used to adjust the analog signal magnification
0x0098	Analog signal adjustment factorb	0	The unit ismV,default value0; Used to correct analog signals Dead Zone

5.3.2 PLCPulse signal position control

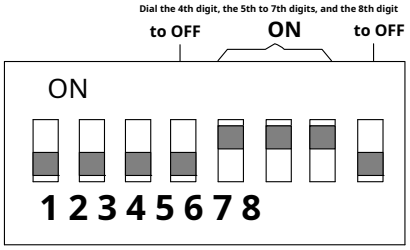
This connection can be realized inPLCThe motor rotation position is controlled by pulse signal.PLCThe typical integrated connection method of pulse signal position control is shown in the figure5.12The driveCOMcatchPLCSignal ground;IN1catchPLCofY3 ,acceptPLCThe pulse signal is used to control the motor stepping;IN2catchPLCofY2, used to control the stepping direction;IN3catchPLCof Y1, used to control the motor emergency stop; the driverVOPort series connection240Ohm resistanceR1,andVOandCOMandPLCof X1and 24V+Connect an optocoupler between them to output a completion signal to notifyPLCPosition control process is complete; limit switch SQ1andSQ2Set limits for forward and reverse rotation respectively.



picture5.11 PLCSchematic diagram of pulse signal position control connection

PLCThe configuration method of the DIP switch for pulse signal position control is shown in the figure5.12As shown, among them,1-3Configure the rated current of the motor (see Table 1 for how to configure the rated current of the motor2.2);4-5bit configuration signal source (see Table 1 for how to configure the signal source)2.3), we configure the signal source as a pulse signal, that is,4Dial toOFF,5Dial toON;6-7Bit configuration working mode (how to configure the working mode see table2.4), we configure the working mode as position control, that is,6-7 Dial toON;8We configure the control mode as digital/analog signal control mode.8Dial to OFF.

The DIP switch is turned to the upper position.ON, below isOFF. From left to right are1-8Bit.



picture5.12 PLCSignal position control dip switch configuration

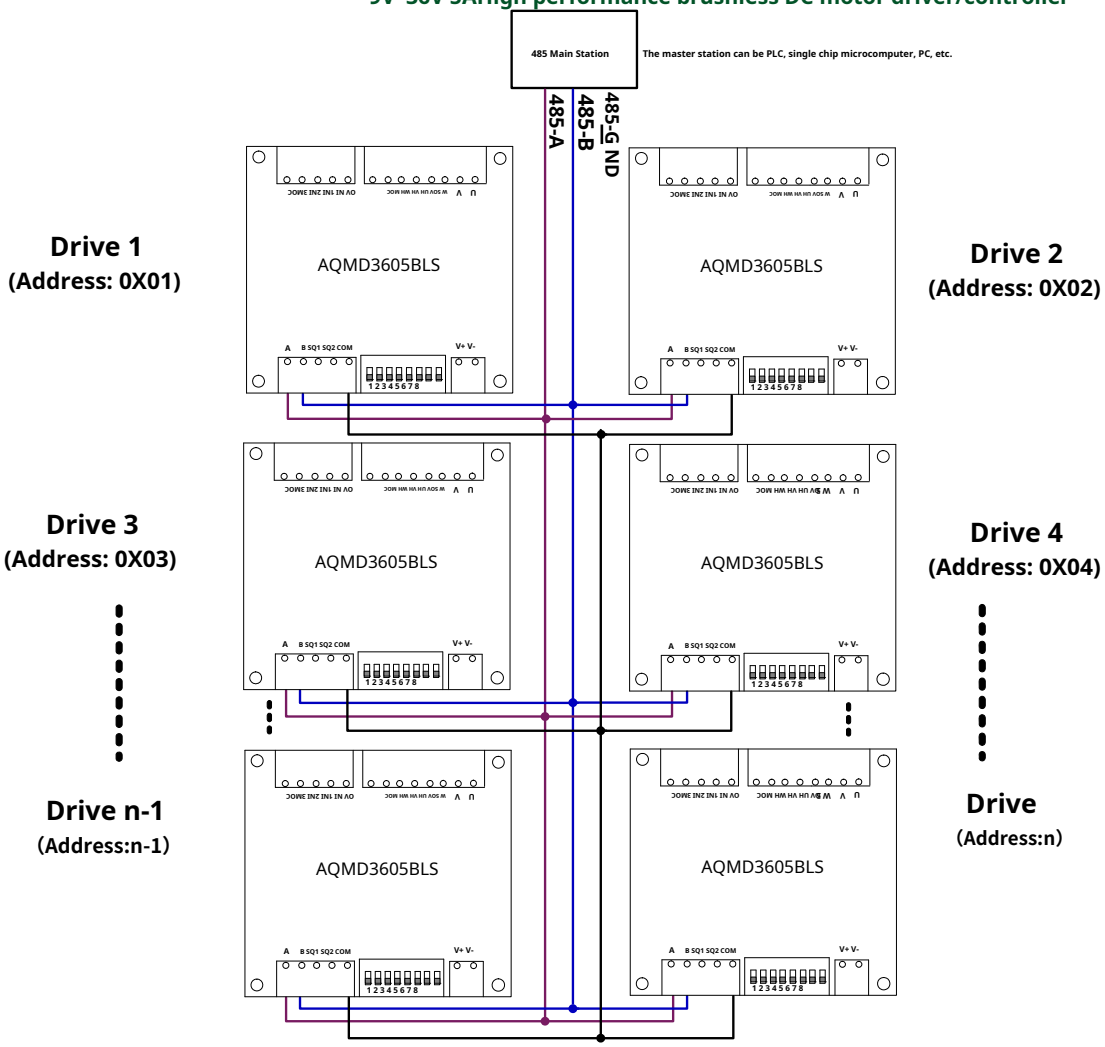
PLCIn pulse signal position control mode, the reference configuration of related registers is shown in Table5.6shown.

surface5.6 PLCConfiguration of registers related to pulse signal position control mode

Register Address	Register function	value	describe
0x0080	Limit trigger polarity	0,1,2,3,4	0: Low level trigger (default) 1: High level trigger 2: Falling edge trigger 3: Rising edge trigger 4: Disable limit function
0x0081	Digital signal polarity	0,1	0: Low level trigger (default) 1: High level trigger
0x0083	Pulse signal type	2	pulse
0x0085	Logic level type	0,1,2,3	0: Switch value (default) 1:0/3.3V 2:0/5V 3:0/12Vor0/24V
0x008a	Logic level threshold	0x07D0	The switching logic level voltage threshold can be configured as 2000mV(default), Other logic levels are configured separately
0x008c-0x008d	Pulse signal magnification	1.0f	default value1.0f; Used to configure the step size per pulse
0x00a0	Position reset mode	0	No reset; usually no reset is required for step control, but Configure the reset mode according to the situation

5.4 485Multi-site communication control

RS485The schematic diagram of multi-site communication is shown in the figure5.13All drives485Signal lineA,BAfter being connected in parallel485Main Station485Signal lineA,BTo make the signal more stable,COMAfter connection, it is connected to the signal ground of the master station. The slave address configured for each driver should be unique and cannot be the same as other drivers. The configuration method of the driver slave address is shown in the table 2.6.485The master station specifies which drive to operate through the address byte in the communication frame. Only the drive with the same address as the address specified in the communication frame will respond to the master station's request (see How to configure the slave station address2.1.5If the communication line is long,485Signal lines are connected in parallel120ΩThe terminal resistance is used to eliminate the interference caused by reflection in the communication line.



picture5.13 RS485Multi-site communication wiring diagram

6.Communication Protocol

This drive usesMODBUS-RTU(National StandardGB/T19582-2008)Communication protocol, supports one master station to control multiple slave stations, can be configured through the DIP switch128slave station address, the master station can be a single-chip microcomputer,PLCorPCFor the configuration of slave station address, see2.1.5Section.

6.1Communication parameters

When using potentiometer/analog signal control mode, the serial port baud rate is fixed at9600bps, the data bits are8bit, even parity, stop bit is1bits; the slave address is fixed to0x01.

When using serial communication control mode, the baud rate defaults to9600bps, the data bits are8bit, even parity, stop bit is1Bit; Baud rate configurable range1200-115200bps, the data bits are fixed to8The check mode can be configured as odd check, even check or no check. When it is odd or even check, the stop bit is1When there is no check, the stop bit is1bit or2The slave address is determined by the dip switch1 – 7Bit setting.

Each character uses11bits (1The start bit,8Data bit,1Check digit plus1stop bit or no parity bit plus1bit or2bit stop bit); when the baud rate is19200bpsWhen the character timeout is1.5Character spacing; 19200bpsWhen the above, the timeout period is0.75ms;When a character timeout occurs, the previously received data will be considered invalid; the frame timeout is 3.5character interval. When a frame timeout occurs, it means that the frame has been sent successfully.

6.2 MODBUS-RTUFrame format

This driver supportsMODBUSof0x03(Read Holding Registers),0x06(Write single register),0x10(Write multiple registers) and0x2B(Read device identification code) function code.

6.2.1 0x03Read Holding Registers

The master sends:

byte	1	2	3	4	5	6	7	8
content	ADR	0x03	Initial deposit High Byte	Initial deposit Low Byte	Number of registers High Byte	Number of registers Low Byte	CRCLow byte	CRChigh byte

No.1byteADR： Slave address code (=001~254)2

byte0x03： Read register value function code3,4

byte: The starting address of the register to be read

No.5,6byte: Number of registers to read

No.7,8byte: From Byte1arrive6ofCRC16Check code

Slave sendback:

byte	1	2	3	4,5	6,7		M-1,M	M+1	M+2
content	ADR	0x03	Total bytes	register data1	register data2	...	register dataM	CRCLow byte	CRChigh byte

No.1byteADR： Slave address code (=001~254)2

byte0x03： Return to read function code3byte:

from4arriveM(include4andM)

No.4arriveMByte: Register data

No.M+1,M+2Bytes: From Bytes1arriveMofCRC16When the slave receives an error, the slave returns:

byte	1	2	3	4	5
content	ADR	0x83	Exception code	CRCLow byte	CRChigh byte

No.1byteADR： Slave address code (=001~254)2byte

0x83： Error reading register value3Byte exception code: see6.2.4Sections

No.4,5Bytes: From Bytes1arrive3ofCRC16Check code

6.2.2 0x06Writing a single register

The master sends:

byte	1	2	3	4	5	6	7	8
content	ADR	0x06	Register High Byte Address	Register Low Byte Address	Data High byte	Data low byte	CRCcode Low Byte	CRCcode High Byte

When the slave receives the data correctly, it sends back:

byte	1	2	3	4	5	6	7	8
content	ADR	0x06	Register High Byte Address	Register Low Byte Address	Data High byte	Data low byte	CRCcode Low Byte	CRCcode High Byte

When a slave receives an error, the slave sends back:

byte	1	2	3	4	5
content	ADR	0x86	Exception code	CRCLow byte	CRChigh byte

No.1byteADR：Slave address code (=001~254)2byte0x86：Error in writing register value Function code3Byte exception code: see6.2.4Sections

No.4,5Bytes: From Bytes1arrive3ofCRC16Check code

6.2.3 0x10Writing multiple register values

The master sends:

byte	1	2	3	4	5	6	7
content	ADR	0x10	Start register High byte address	Start register Low byte address	Number of registers High Byte	Number of registers Low Byte	Data Bytes total

byte	8,9	10,11	N,N+1	N+2	N+3
content	register data1	register data2	register dataM	CRCCode Low byte	CRCCode height byte

When the slave receives the data correctly, it sends back:

byte	1	2	3	4	5	6	7	8

content	ADR	0x10	Register High Byte Address	Register Low Byte Address	Number of registers High Byte	Number of registers Low Byte	CRCcode Low Byte	CRCcode High Byte

When a slave receives an error, the slave sends back:

byte	1	2	3	4	5
content	ADR	0x90	Exception code	CRCLow byte	CRChigh byte

No.1byte ADR: Slave address code (=001~254) Error in

No.2byte 0x90: writing register value

No.3byte Exception code: see6.2.4Sections

No.4,5Bytes: From Bytes1arrive3ofCRC16Check code

6.2.4Error exception code

1. MODBUSException code

surface6.1 MODBUSAbnormal code table

Exception code	meaning
0x01	Illegal function code
0x02	Illegal data address
0x03	Illegal data value
0x04	Slave device failure
0x05	The request has been confirmed, but it will take a long time to process.
0x06	Slave device busy
0x08	Storage parity error
0x0A	Unavailable Gateway
0x0B	The gateway target device failed to respond

2. Extended exception code

surface6.2Extended exception code table

Exception code	meaning
0x40	Prohibited Operations
0x60	The motor phase sequence has not yet been learned
0xff	Undefined Error

6.3Register Definition

6.3.1Device Description Register

Register Address	describe	Value range	Support function code	Remark
0x0000	Equipment identification		0x03	
0x0001	Device version number		0x03	The high byte is the main version number, the low byte is Minor version number.

0x0002 | 0x0009	Device Name		0x03	by'\0'End of string
0x000A	PWMThe inverse of resolution		0x03	
0x000B	PWMfrequency		0x03	The unit isHz
0x000C	Large output current		0x03	Multiply the value by0.01is the current value, single PositionA.
0x000D	Current resolution		0x03	The unit ismA
0x000E	reserve		0x03	
0x000F	reserve		0x03	

6.3.2Real-time status register

Register Address	describe	Value range	Support functions code	Remark
0x0020	real timePWM	0~1000	0x03	Multiply the value by0.1%Duty cycle
0x0021	Real-time current	0~1000	0x03	Multiply the value by0.01is the current value, single PositionA.
0x0022	Real-time commutation frequency (speed)	- 32768~32767	0x03	when0x0035Registers are1When , the value is the commutation frequency; when0x0035 Registers are0When the value is multiplied by0.1 is the commutation frequency; the unit isHz;Change Divide the frequency by the number of motor poles and multiply by20is the motor speed, in units RPM.
0x0023	Position control completion status	0, 1	0x03	0: Not completed1:Finish
0x0024	Motor real-time position high half word	- 2147483647~ 2147483647	0x03	Motor commutation pulse number
0x0025	Motor real-time position low half word			
0x0026	Remaining completion time high half word	0~4294967295	0x03	The unit isms
0x0027	Remaining completion time is half a word lower			
0x0028	IN1Voltage	0~3300	0x03	The unit ismV
0x0029	IN2Voltage	0~3300	0x03	The unit ismV
0x002a	IN3Voltage	0~3300	0x03	The unit ismV
0x002b	Differential Voltage	- 3300~3300	0x03	The unit ismV
0x002c	SQ1Level	0,1	0x03	0：Low level1: High level
0x002d	SQ2Level	0,1	0x03	0：Low level1: High level
0x002e	IN1Input duty cycle	0~1000	0x03	Multiply the value by0.1%Duty cycle
0x002f	IN1Input frequency	0~100000	0x03	The unit isHz
0x0030	IN1Input pulse high half word	0~2147483647	0x03	Number of input pulses
0x0031	IN1Input pulse low half word			
0x0032	Stalled state	0, 1, 2	0x03	0: Not blocked 1：Forward rotation stall stop 2: Reverse stall stop

0x0033	Error Status	0, 1, 2, 3, 4,5,6,7,8,9	0x03	0: No error 1: Not yet learned 2：Stop 3: Hall Error 4: Unable to reach target speed 5: Coil error (not supported by this model) 6: Overcurrent shutdown 7: Overtemperature shutdown 8: Overvoltage shutdown 9: Undervoltage shutdown
0x0034	Motor speed	0~65535	0x03	when0x0035Registers are1When the value is multiplied by10is the speed; when0x0035 Registers are0When Speed; Unit isRPM. Note: You must first pass0x0073and 0x0074Register configuration correct power The number of machine poles and the reduction ratio, the speed read Speed is correct.
0x0035	Does the speed need to be multiplied by10	0, 1	0x03	0: The value is the speed; 1: Multiply the value by10Speed
0x0037	Internal (drive circuit) temperature	- 400~1250	0x03	Multiply the value by0.1℃ is temperature
0x0038	Supply voltage	0~700	0x03	Multiply the value by0.1V is the voltage

6.3.3Speed Control Register

Register Address	describe	Value range	Support function code	Remark
0x0040	stop	0, 1, 2	0x06	0: Normal stop 1: Emergency brake 2: Free stop
0x0041	reserve		No access	
0x0042	Setting the Duty Cycle	- 1000~1000	0x06	Multiply the value by0.1%The target duty cycle
0x0043	Set the speed closed-loop control target Speed (commutation frequency)	- 32768~32767	0x06	Multiply the value by0.1The target switching frequency Rate, in units ofHz
0x0044	Set position closed loop control walking Speed (commutation frequency)	0~32767	0x06	Multiply the value by0.1The target switching frequency Rate, in units ofHz
0x0045	Set the position closed loop control type	0, 1	0x06	0: absolute position1: Relative position
0x0046	Set the position closed-loop control target Position high half word	- 2147483648~ 2147483647	0x06	If it is an absolute position, it can be used at any time Change the target position; if it is a relative position If the position is set, wait for the last position control The next operation can be performed only after completion
0x0047	Set the position closed-loop control target Position lower half word			
0x0048 | 0x004F	reserve		No access	

0x0050	Duty cycle speed regulation acceleration buffer between	0~255	0x03 0x06 0x10	Multiply the value by0.1Output ratio is 0Increase to100.0%The time required is inS
0x0051	Duty ratio speed regulation deceleration buffer between	0~255	0x03 0x06 0x10	Multiply the value by0.1Output ratio is 100. 0%Reduce to0The time required is inS
0x0052	Speed closed loop control, position closed loop Control acceleration	0~66635	0x03 0x06 0x10	Multiply the value by0.1To increase the commutation frequency Speed, inHz/s
0x0053	Speed closed loop control, position closed loop Control deceleration acceleration	0~66635	0x03 0x06 0x10	Multiply the value by0.1To reduce the commutation frequency Speed, inHz/s

6.3.4Motor control parameter configuration register

Register Address	describe	Value range	Support function code	Remark
0x0060	The default duty cycle speed control is increased when powered on. Speed buffer time	0~255	0x03 0x06 0x10	Multiply the value by0.1SOutput ratio is empty Depend on0Increase to100.0%Time required
0x0061	The default duty cycle speed reduction is set when power is turned on. Speed buffer time	0~255	0x03 0x06 0x10	Multiply the value by0.1SOutput ratio is empty Depend on100.0%Reduce to0Time required
0x0062	Speed closed loop control, position closed loop Controlling large acceleration	0~66635	0x03 0x06 0x10	Multiply the value by0.1is the commutation frequency Maximum increase rate, in units ofHz/s
0x0063	Default speed closed loop/bit at power on Closed loop control acceleration	0~66635	0x03 0x06 0x10	Multiply the value by0.1Increase the switching frequency Maximum speed, inHz/s
0x0064	Speed closed loop control, position closed loop Controlling large deceleration acceleration	0~66635	0x03 0x06 0x10	Multiply the value by0.1is the commutation frequency Maximum reduction speed, in units ofHz/s
0x0065	Default speed closed loop/bit at power on Closed loop control deceleration acceleration	0~66635	0x03 0x06 0x10	Multiply the value by0.1The commutation frequency is reduced Small speed, unit isHz/s
0x0066	Speed closed loop control, position closed loop Control maximum speed (commutation frequency)	0~32767	0x03 0x06 0x10	Multiply the value by0.1is the commutation frequency, The unit isHz
0x0067	Speed closed loop control at power on/position Set the closed loop control default speed (change Direction frequency)	0~32767	0x03 0x06 0x10	Multiply the value by0.1is the commutation frequency, The unit isHz
0x0068	reserve	0	0x03 0x06 0x10	
0x0069	Position control algorithm	0, 1, 2	0x03 0x06 0x10	0: Horizontal positioning control 1: Horizontal sliding positioning control 2：Vertical positioning control
0x006a	Motor rated current	0~700	0x03 0x06 0x10	Multiply the value by0.01is the current value, single PositionA.
0x006b	Motor high load current	0~700	0x03 0x06 0x10	Multiply the value by0.01is the current value, single PositionA.
0x006c	Motor large braking current	0~300	0x03 0x06 0x10	Multiply the value by0.01is the current value, single PositionA.
0x006d | 0x006f	Motor phase sequence data6byte	1~6	0x03 0x06 0x10	Only the motor learning status is not learned To perform write operations, otherwise the write operation The operation will be ignored

0x0070	Speed closed loop control algorithm	0, 1,2	0x03 0x06 0x10	0: Speed closed loop control 1: Time-position closed loop control 2: Time-position rate control
0x0071	Position closed loop control allowable error	0~65535	0x03 0x06 0x10	
0x0072	Position closed loop control overshoot correction	0, 1	0x03 0x06 0x10	0: No correction 1: Make corrections
0x0073	Number of motor poles	0~65535	0x03 0x06 0x10	Usually2Multiples of
0x0074	Motor reduction ratio	0~65535	0x03 0x06 0x10	Multiply the value by0.1is the motor reduction ratio
0x0075	Motor learning status	0, 1	0x03 0x06 0x10	0: Not learned1: Learned (Only through motor learning operation Ability to change unlearned status to learned Status, cannot be written directly1)
0x0076	Disable motor phase sequence learning function	0, 1	0x03 0x06 0x10	0: Not disabled1: Disable
0x0078	Normal self-locking current	0~1200	0x03 0x06 0x10	Multiply the value by0.01is the current value, single PositionA (Note: must be less than the rated power of the motor Flow1/2Otherwise, the motor may heat up. Burnt motor)
0x0079	The short-time maximum output current is Multiples of large load current	0, 100~200	0x03 0x06 0x10	0: Disable current doubler Others: Multiply the value by0.01times
0x007a	Allowable current double output time	0~999	0x03 0x06 0x10	0: Disable current doubler Others: Multiply the value by0.1Second

6.3.5System parameter configuration register

Register Address	describe	Value range	Support function code	Remark
0x0080	Limit trigger polarity	0,1,2,3,4	0x03 0x06 0x10	0: Low level trigger 1: High level trigger 2: Falling edge trigger 3: Rising edge trigger 4: Disable limit function
0x0081	Digital signal polarity	0,1,2,3	0x03 0x06 0x10	0: Low level trigger 1: High level trigger 2: Falling edge trigger 3: Rising edge trigger
0x0082	Potentiometer Usage	0,1,2	0x03 0x06 0x10	0: Single Potentiometer 1: Dual potentiometers independent 2: Dual potentiometer synergy
0x0083	Pulse signal type	0,1,2	0x03 0x06 0x10	0:PWM 1:frequency2:pulse

0x0084	Analog signal type	0,1,2,3	0x03 0x06 0x10	0: Single-ended signal 1: Differential signal 2: Dual single-ended signals independent 3：Dual single-ended signal coordination
0x0085	Logic level type	0,1,2,3	0x03 0x06 0x10	0：Switch quantity 1:0/3.3V 2:0/5V 3:0/12Vor0/24V
0x0086	Potentiometer minimum value	0~3300	0x03 0x06 0x10	The unit ismV
0x0087	Potentiometer maximum value	0~3300	0x03 0x06 0x10	The unit ismV
0x0088	Analog range minimum value	0~3300	0x03 0x06 0x10	The unit ismV
0x0089	Analog range maximum value	0~3300	0x03 0x06 0x10	The unit ismV
0x008a	Logic level threshold	0~3300	0x03 0x06 0x10	The unit ismV
0x008b	Potential comparison dead zone	0~3300	0x03 0x06 0x10	The unit ismV
0x008c	Pulse signal multiplication four-byte floating point Type high half word		0x03 0x06 0x10	
0x008d	Pulse signal multiplication four-byte floating point Type lower half word			
0x008e	Stall stop time	0~255	0x03 0x06 0x10	Multiply the value by0.1When the motor is stopped The unit iss
0x0090	Baud rate high half word	9600~ 115200	0x03 0x06 0x10	
0x0091	Baud rate low half word			
0x0092	Verification method	0,1,2	0x03 0x06 0x10	0：No check+2Stop bits 1: Odd parity +1Stop bits 2: Even parity +1Stop bits
0x0093	485Control the default speed control mode	0, 1, 2	0x03 0x06 0x10	0: Duty cycle 1: Speed closed loop control 2: Position closed loop control
0x0094	485Parameter configuration is prohibited during control	0, 1	0x03 0x06 0x10	0: Not prohibited 1:prohibit
0x0095	Communication interruption stop time	0~255	0x03 0x06 0x10	Multiply the value by0.1Stop for communication interruption End time, in units ofs
0x0096	Analog signal adjustment factorkFour characters Floating point high halfword		0x03 0x06 0x10	Cannot be less than0
0x0097	Analog signal adjustment factorkFour characters Floating point low halfword			
0x0098	Analog signal adjustment factorb	0~65535	0x03 0x06 0x10	The unit ismV

0x0099	Disable Alarm	0, 1	0x03 0x06 0x10	0: Do not disable 1: Disable

6.3.6Reciprocating position control parameters

Register Address	describe	Value range	Support function code	Remark
0x00a0	Reset Mode	0,1,2,3,4	0x03 0x06 0x10	0: Do not reset 1:SQ2Reset 2:SQ1Reset 3:SQ2Reset and fine tune 4:SQ1Reset and fine tune
0x00a1	Whether to enable reset fine adjustment	0, 1	0x03 0x06 0x10	0: Disable1: Enable
0x00a2	Total stroke high half word	- 2147483648 ~2147483647	0x03 0x06 0x10	
0x00a3	Total stroke lower half word			
0x00a4	Reset coarse speed	0~65535	0x03 0x06 0x10	Multiply0.1is the commutation frequency
0x00a5	Reset fine speed	0~65535	0x03 0x06 0x10	Multiply0.1is the commutation frequency
0x00a6	Final speed after reaching the endpoint	0~65535	0x03 0x06 0x10	Multiply0.1is the commutation frequency
0x00a7	Amount of signal change to ignore	0~1000	0x03 0x06 0x10	Multiply the value by0.1%To be ignored The ratio of input signal change; To solve potentiometer, analog signal, Duty cycle or frequency signal fluctuation problem
0x00a8	Whether to reset after limit	0, 1	0x03 0x06 0x10	0:no1:yes Used to solve the problem of mechanical wheel slippage Stroke error problem
0x00a9	reserve		0x03 0x06 0x10	
0x00aa	Reset test	0,1,2,3,4	0x03 0x06 0x10	0: Non-reset state 1: Cancel reset 2:SQ1Reset 3:SQ2Reset 4：Measurement stroke

6.3.7Preset Speed Register

Register Address	describe	Value range	Support function code	Remark
0x00b0	Working Mode	0,1,2,3	0x03 0x06 0x10	0: Duty cycle 1: Torque 2: Speed closed loop 3：Position closed loop
0x00b1	Control method	0, 1	0x03 0x06 0x10	0: Double contact/logic level control 0: Single contact/logic level control

0x00b2	Forward speed	Duty cycle mode: 0~1000 Torque mode: 0~700 Speed position closed loop: 0~65536	0x03 0x06 0x10	Multiply the value by0.1%is the duty cycle; Multiply the value by0.01is the torque; Multiply the value by0.1is the commutation frequency;
0x00b3	Reverse speed	Duty cycle mode: 0~1000 Torque mode: 0~700 Speed position closed loop: 0~65536	0x03 0x06 0x10	Multiply the value by0.1%is the duty cycle; Multiply the value by0.01is the torque; Multiply the value by0.1is the commutation frequency;

6.3.8Closed-loop controlPIDParameter configuration register

Register Address	describe	Value range	Support function code	Remark
0x00ba	Position self-lockingPCoefficient four-byte floating point Type high half word	suggestion0.1~100	0x03 0x06 0x10	
0x00bb	Position self-lockingPCoefficient four-byte floating point Type lower half word			
0x00bc	Position self-lockingICoefficient four-byte floating point Type high half word	suggestion0.001~1	0x03 0x06 0x10	
0x00bd	Position self-lockingICoefficient four-byte floating point Type lower half word			
0x00be	Position self-lockingDCoefficient four-byte floating point Type high half word	suggestion0.001~1	0x03 0x06 0x10	
0x00bf	Position self-lockingDCoefficient four-byte floating point Type lower half word			
0x00c0	Speed closed loop controlPCoefficient four bytes Floating point high halfword	suggestion0.001~1	0x03 0x06 0x10	
0x00c1	Speed closed loop controlPCoefficient four bytes Floating point low halfword			
0x00c2	Speed closed loop controlICoefficient four bytes Floating point high halfword	suggestion0.001~1	0x03 0x06 0x10	
0x00c3	Speed closed loop controlICoefficient four bytes Floating point low halfword			
0x00c4	Speed closed loop controlDCoefficient four bytes Floating point high halfword	suggestion0.001~1	0x03 0x06 0x10	
0x00c5	Speed closed loop controlDCoefficient four bytes Floating point low halfword			
0x00c6	Position closed loop controlPCoefficient four bytes Floating point high halfword	suggestion0.1~100	0x03 0x06 0x10	

0x00c7	Position closed loop controlPCoefficient four bytes Floating point low halfword			
0x00c8	Position closed loop controlICoefficient four bytes Floating point high halfword	suggestion0.001~1	0x03 0x06 0x10	
0x00c9	Position closed loop controlICoefficient four bytes Floating point low halfword			
0x00ca	Position closed loop controlDCoefficient four bytes Floating point high halfword	suggestion0.001~1	0x03 0x06 0x10	
0x00cb	Position closed loop controlDCoefficient four bytes Floating point high halfword			

6.3.9Motor Learning Register

Register Address	describe	Value range	Support function code	Remark
0x00e0	reserve	0	0x03	Do not operate this register.
0x00e1	Learning Commands	0,1	0x03 0x06 0x10	0: Not learned 1：Start motor learning/Learning
0x00e2	Learning status	0, 1, 2, 3, 4	0x03	0: Ready 1：Learning 2: Stopping 3：Complete learning 4: Learning failure
0x00e3	Learning progress		0x03	Subprocess number
0x00e4	Number of bytes of learning result data		0x03	
0x00e5 | 0x00ef	Learning outcome data		0x03	

6.3.10Security protection register

Register Address	describe	Value range	Support function code	Remark
0x0100	Overtemperature shutdown trigger temperature	- 40~125	0x03 0x06 0x10	When the temperature reaches this value, the output is turned off.
0x0101	Disable current doubler trigger temperature	- 40~125	0x03 0x06 0x10	When the temperature reaches this value, the current doubler is disabled. out
0x0102	Overvoltage shutdown trigger voltage	80~400	0x03 0x06 0x10	Multiply the value by0.1Vis the voltage; The output will be turned off after the voltage exceeds this value
0x0103	Undervoltage shutdown trigger voltage	80~399	0x03 0x06 0x10	Multiply the value by0.1Vis the voltage; The output will be turned off after the value drops below this value.
0x0104	Overcurrent shutdown trigger current	0~2500	0x03 0x06 0x10	When the current peak reaches this value, the input is turned off. out
0x0105	Hall error shielding time	0~100	0x03 0x06 0x10	unitms; When the Hall error state After reaching this time, the output is turned off

0x0106	Enable automatic adjustment of current loop coefficients	0, 1	0x03 0x06 0x10	0: Disable 1: Enabled; when the starting current rises Reduce when too fastPIDcoefficient
0x0107	reserve		0x03 0x06 0x10	
0x0108	Enable overheat protection when the temperature is below Automatically clear alarm after triggering value	0, 1	0x03 0x06 0x10	0: Disable 1: Enable
0x0109	reserve		0x03 0x06 0x10	
0x010a	Temperature correction factorK(multiple)	9500~10500	0x03 0x06 0x10	Multiply the value by0.0001times
0x010b	Temperature correction factorB(intercept)	- 100~100	0x03 0x06 0x10	Multiply the value by0.1℃
0x010c	Voltage correction factorK(multiple)	9700~10300	0x03 0x06 0x10	Multiply the value by0.0001times
0x010d	Voltage correction factorB(intercept)	- 10~10	0x03 0x06 0x10	Multiply the value by0.1V

6.3.11Configuration parameter storage registers

Register Address	describe	Value range	Support function code	Remark
0x0160	Store motor configuration parameters	1	0x06	
0x0180	Storage system configuration parameters	1	0x06	
0x01a0	Storage of reciprocating control parameters	1	0x06	
0x01b0	Store preset speed parameters	1	0x06	
0x01c0	Storage closed loop speed regulationPIDparameter	1	0x06	
0x01d0	Storage security parameters	1	0x06	
0x01f0	Storage of user process data	1	0x06	

Note: By0x10The parameters configured by the function code can be directly stored in the drive.0x06The parameters configured by the function code need to be stored in the memory through the above registers.

7.Common problems and precautions

7.1Frequently asked questions

1)When the switch (including limit switch) or button wiring is long, the switch or button is not operated, the driver malfunctions, and the operation switch or button does not respond properly.

A: This may be caused by interference on the switch or button signal line. It is recommended to add a few K The pull-up resistor toVO, or use shielded cable.

2) 485The master station cannot communicate with the drive in communication mode.

A: Please check whether the master serial port baud rate, verification mode, and slave address are consistent with the driver configuration. 485Is the communication wiring correct?485The master station and the slave station should be connected according toAA,BBIf the master station is connected in this way, check whether the frame format is correct.PCmachine, you can use it firstModbusThe debugging tool tests whether the communication is normal.

3)The rated current parameter of the driver is configured as the rated current of the motor. The motor cannot carry the load, but the motor can drive the load when it is directly connected to the power supply without passing through the driver.

A: When the motor is overloaded, the driver will output a steady current, and the output current is the configured working current. While limiting the maximum working current of the motor, it also limits the maximum output torque of the motor. If the load is too large, the motor may not be able to carry the load. We can use the DIP switch or485Configure the working current parameter to be slightly larger to increase the maximum output current of the driver. In addition, if the motor current reaches the rated current of the motor but cannot carry the load, it means that the motor power is too small. If the motor can drive the overloaded load by increasing the output current of the driver, the motor will work in an overloaded state for a long time, which may affect the life of the motor. It is recommended to replace it with a motor with a higher power.

4)When the motor is stalled, it keeps vibrating, and it will not stall even if the stall stop function is enabled. A: The rated current parameter can be configured larger; if using485Configuration parameters can also configure the working current to the previous rated current value.

7.2Precautions

1) The driver power supply voltage should be**9～36V**If the voltage is over-voltage, the driver may be burned after power-on.

2) When the driver is connected to a non-isolated user controller (signal line), the power supplies should not be grounded together, otherwise there will be potential safety hazards that may damage the driver or user controller. For principle analysis and solutions, see Section 9.1.

3) Power supply or motor**The interface wiring must not be connected together with the potentiometer, limit or communication interface.** Otherwise, some components of the driver may be burned. Do not connect the power ground or control signal ground to the chassis, otherwise the driver may work unstably. If conditions permit, please connect the chassis to the ground.

4) Driver**Power off**When**Do not directly or indirectly rotate the motor at high speed**, otherwise the electromotive force generated by the motor may burn out the driver.

5) The driver should be connected to the motor first.**Power on after connection is complete**, otherwise the fuse or driver may burn out.

6) Motor interface**No short circuit**, otherwise the fuse or driver may burn out.

7) Pay attention to the drive**don't want**damp,**don't want**Short-circuit the components on the driver board.**don't want**Touch the pins and pads of the components on the board with your hands.

8) If the drive**The fuse burns out during use**, please check the circuit and connect it correctly. After the fuse burns out, do not force the power on and continue to use it; otherwise the driver will be severely burned and cannot be repaired.

9) In Drive**Failure**When necessary, users should contact our company in time and are not allowed to repair or replace accessories without permission.

10) This driver**Can only be used to drive inductive loads**(such as motors), and cannot be used to drive resistive (such as resistors) or capacitive loads (such as capacitors).

11)**Please read the precautions and warranty instructions carefully, which will save you unnecessary trouble.**.

12)**Please read this user manual carefully and use this driver correctly**.

8.Warranty Manual

1)Please operate and use according to the instructions in the user manual.

2)From the date of purchase, if there is any quality problem with the product itself, it will be returned or replaced within three months.1Years free warranty.

3)When requesting warranty service, please be sure to bring your receipt and warranty instructions with you to our company.

4)The replacement of consumables (such as silicone sheets, radiators, etc.) and accessories is not within the warranty scope of this manual.

5)The company does not assume any responsibility for any loss or damage to profits caused by driver failure or deletion or change of programs by users or after-sales maintenance personnel during repair and replacement of accessories (as well as unreasonable claims made by third parties).

6)During the warranty period, the following situations will be repaired for a fee:

a)Failure to produce a receipt with the company's seal;

b)Failure caused by improper carrying, transportation or storage after purchase;

c)Failures caused by improper use;

d)Failure or damage caused by fire, earthquake, flood, lightning, rodent infestation and other disasters or theft;

e)Failures and damages caused by improper repairs.

7)Damage caused by operation contrary to the instructions in the user manual, unauthorized modification,CPUThe company does not provide repair services for failures and damages caused by damage, abnormal voltage.

8)If the user connects the power supply or motor output wiring with the control signal line, causing the driver to malfunction or be damaged, our company will not provide maintenance services.

9)If the user forcibly connects the power supply and continues to use the drive after the fuse burns out, causing the drive to burn out, this situation is not covered by the warranty.

10)The drive module without the housing (bare board) is a special drive promoted at cost price and does not provide warranty service.

11)After the free warranty period expires, the drive with housing can be3After the cost-only warranty period expires, repair costs will be charged according to market prices.

12)This instruction manual is only valid within the territory of the People's Republic of China.

13)This manual does not limit the customer's legal rights.

9.appendix

9.1The harm and solution of driver and user controller sharing the same ground

In the design of industrial control systems, many engineers have encountered situations where the controller power supply and the equipment power supply share the same ground, resulting in unexpected faults. After the fault occurs, it is often difficult to find the exact cause of the fault. We analyze the typical reasons for damage caused by the driver and the user controller sharing the same ground.

The typical reason is that there is no isolation inside the user controller, and the driver or user controller power ground wire is loose; or when the wiring is live, other parts are connected, the positive pole of the power supply is connected, and the negative pole is not connected, etc., which will cause the driver ground wire to be disconnected. For example, when the driver and controller are wired normally, the power current should flow in from the positive pole of the driver power interface, and then flow out from the negative pole of the driver power interface and return to the negative pole of the power supply. When the driver power ground wire is not connected, and the positive pole of the power supply and other signal ports are connected, the power current will flow in from the positive pole of the driver power supply, flow out from the driver signal interface, and then flow in from the user controller signal interface, and finally flow out from the user controller power ground wire, and finally return to the negative pole of the power supply. In this way, the power current flows through the signal interface of the driver and the user controller, which may cause damage to the circuit connected to the signal interface inside the driver or user controller. The following figure takes the loose driver ground wire as an example to illustrate its overvoltage principle.

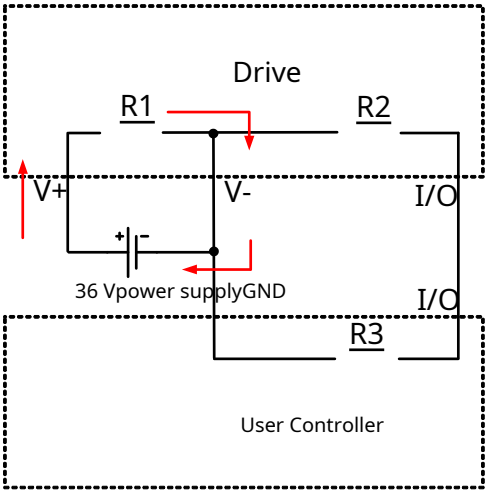


Figure 1: Normal situation

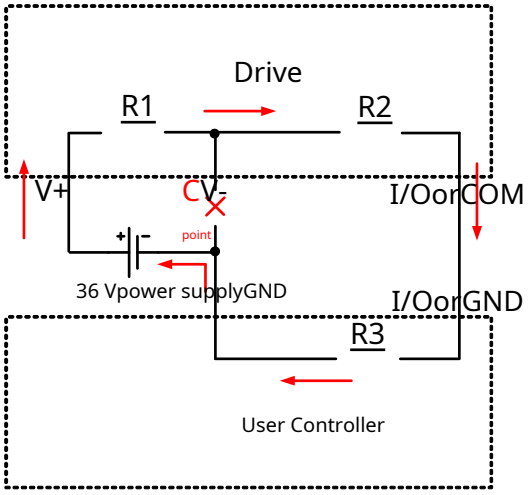


Figure 2: Ground wire is off

The internal circuits between the positive and negative poles of the driver power supply, between the negative pole of the driver power supply and the signal interface, and between the negative pole of the user controller and the signal interface are each equivalent to a resistor.RWhen connected normally, the power current flows from the positive pole of the power supply to the driverV+, through the internal circuit of the driver (equivalent toR1)Then byV-It flows out and back to the negative pole of the power supply, and the current flow direction is shown in Figure 1.

When the negative pole of the driver power supply falls off, as shown in the figureCThe point is disconnected, and the power current flows from the positive pole of the power supply to the driverV+, through the internal circuit of the driver (equivalent toR1andR2)Through the driver's signal interface (IOorCOM)Flow out and then pass through the signal interface of the user controllerIOorGNDThrough the internal circuit of the user controller (equivalent toR3)From the negative pole of the controllerGNDThe current flows out and back to the negative pole of the power supply. At this time, the current flow direction of the power supply is shown in Figure 2. This may cause damage to the circuit connected to the signal interface inside the driver or user controller.

Solution:

1. If the user's controller has built-in power supply isolation or signal isolation, there is no need to consider the common ground problem. Most PLCs have built-in isolation.

Leave.

2. If the signal interface between the user controller and the driver is only connected through 485, a driver with 485 isolation function can be selected without considering the power common ground problem.

3. The driver and the user controller use different power supplies, and please isolate the power supply grounds of the two. 4. If the user controller must use the same power supply as the driver, then an isolated DC-DC can be connected to the power supply to power the user controller, or the signal output from the user controller to the driver can be isolated through an isolation device (such as: relay, optical coupler, magnetic isolation).

5. If the user controller is driven by a 5V power supply and the current of the driver's 5V output meets the use requirements, it can be powered from the driver's 5V output, and the output signal of the user controller can only be connected to the driver from which power is taken, and cannot be connected to other drivers. Of course, the driver's 5V output can also power the optocoupler.

9.2useWindowsBuilt-in calculator for decimal-hexadecimal conversion

1.useWindows XPThe steps for converting decimal to hexadecimal using your own calculator are as follows:

12)Open the system's built-in calculator tool, as shown in the figure9.1shown.

picture9.1 Windows XPBuilt-in calculator

13)Select the "View" - "Scientific" menu item, and the calculator interface will switch to the figure below.9. 9.2shown.

picture9. 9.2The calculator interface after switching to scientific mode

14)Click on the "Decimal" radio button and enter the decimal number to be converted to hexadecimal. We start with -100 For example, first enter100, then press the "+/-" button to enter the negative sign, as shown in the figure9.3 shown.

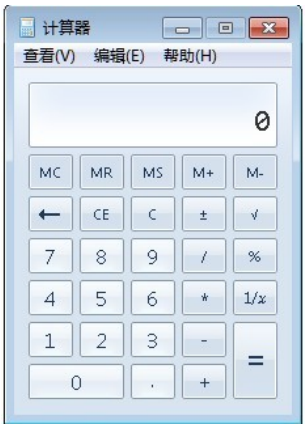
picture9.3In the calculator, enter "-100”

15)Then click the "Hexadecimal" radio button on the left. At this time, the decimal number we entered previously -100is converted to __int64The integers of type are displayed in hexadecimal.longtype,shortType orchar The hexadecimal display of the integer type can be displayed by pressing the "Double Word", "Single Word" and "Byte" radio buttons on the right. The display result is shown in the figure9.4shown.

picture9.4 "-100"Convert toshortType and display in hexadecimal

2.useWindows 7The steps for converting decimal to hexadecimal using your own calculator are as follows:

16)Open the system's built-in calculator tool, as shown in the figure9.5shown.



picture9.5 Windows 7Built-in calculator

17)Select the "View" - "Programmer" menu item, and the calculator interface will switch to the figure below.9.6shown.

picture9.6The calculator interface after switching to scientific mode

18)Click on the "Decimal" radio button and enter the decimal number to be converted to hexadecimal. We start with -100 For example, first enter100, and then press the "±" button to enter the minus sign, as shown in the figure9.7 shown.

picture9.7In the calculator, enter "-100”

19)Then click the "Hexadecimal" radio button on the left. At this time, the decimal number we entered previously -100is converted to __int64The integers of type are displayed in hexadecimal.longtype,shortType orchar The hexadecimal display of the integer type can be displayed by pressing the "Double Word", "Word" and "Byte" radio buttons on the lower left.9.8shown.

picture9.8 "-100"Convert toshortType and display in hexadecimal

9.3 CRC16Calculation

ClanguageCRCGenerate functions like programs9.1All possibleCRCThe values are preloaded into two arrays, which can be simply indexed when calculating the message content. An array contains16BitCRCAll domains256The possible high-order bytes and the other array contain the values of the low-order bytes.CRCThe method provides a new calculation for each new character in the message buffer.CRCA faster way.

Note: This function internally performs a high/lowCRCThe bytes are swapped. This function returns the bytes that have been swapped.CRC That is, the value returned from this functionCRCThe value can be placed directly in the message for sending. The function takes two parameters:

unsigned char *puchMsg;Points to theCRCPointer to the binary data message buffer. unsigned short usDataLen;The number of bytes in the message buffer.

Note: The followingCRC16The generating function program is taken from <MODBUS over Serial Line Specification and Implementation Guide V1.02>.

program9.1 CRC16Generate function program listing

```
/*High ByteCRCvalue*/
static unsigned char auchCRCHi[] = {
    0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41, 0x01, 0xC0, 0x80, 0x41, 0x00, 0xC1, 0x81, 0x40,
    0x01, 0xC0, 0x80, 0x41, 0x00, 0xC1, 0x81, 0x40, 0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41,
    0x01, 0xC0, 0x80, 0x41, 0x00, 0xC1, 0x81, 0x40, 0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41,
    0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41, 0x01, 0xC0, 0x80, 0x41, 0x00, 0xC1, 0x81, 0x40,
    0x01, 0xC0, 0x80, 0x41, 0x00, 0xC1, 0x81, 0x40, 0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41,
    0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41, 0x01, 0xC0, 0x80, 0x41, 0x00, 0xC1, 0x81, 0x40,
    0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41, 0x01, 0xC0, 0x80, 0x41, 0x00, 0xC1, 0x81, 0x40,
    0x01, 0xC0, 0x80, 0x41, 0x00, 0xC1, 0x81, 0x40, 0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41,
    0x01, 0xC0, 0x80, 0x41, 0x00, 0xC1, 0x81, 0x40, 0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41,
    0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41, 0x01, 0xC0, 0x80, 0x41, 0x00, 0xC1, 0x81, 0x40,
    0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41, 0x01, 0xC0, 0x80, 0x41, 0x00, 0xC1, 0x81, 0x40,
    0x01, 0xC0, 0x80, 0x41, 0x00, 0xC1, 0x81, 0x40, 0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41,
    0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41, 0x01, 0xC0, 0x80, 0x41, 0x00, 0xC1, 0x81, 0x40,
    0x01, 0xC0, 0x80, 0x41, 0x00, 0xC1, 0x81, 0x40, 0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41,
    0x01, 0xC0, 0x80, 0x41, 0x00, 0xC1, 0x81, 0x40, 0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41,
    0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41, 0x01, 0xC0, 0x80, 0x41, 0x00, 0xC1, 0x81, 0x40


} ;
/*Low byteCRCvalue*/ static
char auchCRCLo[] = {
    0x00, 0xC0, 0xC1, 0x01, 0xC3, 0x03, 0x02, 0xC2, 0xC6, 0x06, 0x07, 0xC7, 0x05, 0xC5, 0xC4, 0x04,
    0xCC, 0x0C, 0x0D, 0xCD, 0x0F, 0xCF, 0xCE, 0x0E, 0x0A, 0xCA, 0xCB, 0x0B, 0xC9, 0x09, 0x08, 0xC8,
    0xD8, 0x18, 0x19, 0xD9, 0x1B, 0xDB, 0xDA, 0x1A, 0x1E, 0xDE, 0xDF, 0x1F, 0xDD, 0x1D, 0x1C,
    0xDC, 0x14, 0xD4, 0xD5, 0x15, 0xD7, 0x17, 0x16, 0xD6, 0xD2, 0x12, 0x13, 0xD3, 0x11, 0xD1,
    0xD0, 0x10, 0xF0, 0x30, 0x31, 0xF1, 0x33, 0xF3, 0xF2, 0x32, 0x36, 0xF6, 0xF7, 0x37, 0xF5, 0x35,
    0x34, 0xF4, 0x3C, 0xFC, 0xFD, 0x3D, 0xFF, 0x3F, 0x3E, 0xFE, 0xFA, 0x3A,
```

```
        0x3B, 0xFB, 0x39, 0xF9, 0xF8, 0x38, 0x28, 0xE8, 0xE9, 0x29, 0xEB, 0x2B, 0x2A, 0xEA, 0xEE, 0x2E,
        0x2F, 0xEF, 0x2D,   0xED, 0xEC, 0x2 C, 0xE4, 0x24, 0x25, 0xE5, 0x27, 0xE7, 0xE6, 0x26, 0x22, 0xE2,
        0xE3, 0x23, 0xE1, 0x21, 0x20, 0xE0, 0xA0, 0x60, 0x61, 0xA1, 0x63, 0xA3, 0xA2, 0x62, 0x66, 0xA6,
        0xA7, 0x67, 0xA5, 0x65, 0x64, 0xA4, 0x6C, 0xAC, 0xAD, 0x6D, 0xAF, 0x6F, 0x6E, 0xAE, 0xAA, 0
        x6A, 0x6B, 0xAB, 0x69, 0xA9, 0xA8, 0x68, 0x78, 0xB8, 0xB9, 0x79, 0xBB, 0x7B, 0x7A, 0xBA, 0xBE,
        0x7E, 0x7F, 0xBF, 0x7D, 0xBD, 0xBC, 0x7C, 0xB4, 0x74, 0x75, 0xB5, 0x77, 0xB7, 0xB6, 0x76, 0x72,
        0xB2, 0xB3, 0x73, 0xB1, 0x71, 0x70, 0xB0, 0x50, 0x90, 0x9 1, 0x51, 0x93, 0x53, 0x52, 0x92, 0x96,
        0x56, 0x57, 0x97, 0x55, 0x95, 0x94, 0x54, 0x9C, 0x5C, 0x5D, 0x9D, 0x5F, 0x9F, 0x9E, 0x5E, 0x5A,
        0x9A, 0x9B, 0x5B, 0x99, 0x59, 0x58, 0x98, 0x88, 0x48, 0x49, 0x89, 0x4B, 0x8B, 0x8A, 0x4A, 0x4E,
        0x8E, 0x8F, 0x 4F, 0x8D, 0x4D, 0x4C, 0x8C, 0x44, 0x84, 0x85, 0x45, 0x87, 0x47, 0x46, 0x86, 0x82,
        0x42, 0x43, 0x83, 0x41, 0x81, 0x80, 0x40


};
unsigned short CRC16(puchmsg, usDataLen)        /*Functionunsigned shortType returnedCRC */ /*Used for
unsigned char *puchMsg, unsigned short          calculationCRCMessage*/ /*Number of bytes in the
usDataLen {                                     message*/

        unsigned char uchCRCHi = 0xFF;          /* CRCInitialize the high byte of */
        unsigned char uchCRCLo = 0xFF;          /* CRCInitialize the low byte of */
        unsigned uIndex;                        /* CRCLookup table index*/

        while (usDataLen--)                     /*Complete the entire message buffer */
        {
                uIndex = uchCRCLo ^ *puchMsg++; uchCRCLo =  /*CRCLookup to calculateCRC */
                uchCRCHi ^ auchCRCHi[uIndex]; uchCRCHi =
                auchCRCLo[uIndex];
        }
        return (uchCRCHi << 8 | uchCRCLo);
}
```

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