杰美康机电
JUST MOTION CONTROL

iHSV series
Integrated AC servo drive motor

User manual

iHSV42
iHSV57
iHSV60
iHSV80
iHSV86

Preface

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Contents

Chapter 1 Overview

iHSV42/57/60/86-XX integrated AC servo drive motor integrates the AC servo drive into the servo motor, and the two are perfectly integrated. The vector control designed and produced by DSP has the characteristics of low cost, full closed loop, full digital, small heating, small vibration and fast response. Including adjustable three feedback loop control (position loop, speed loop and current loop). With stable performance, it is a motion control product with high cost performance.

Chapter 2 Features

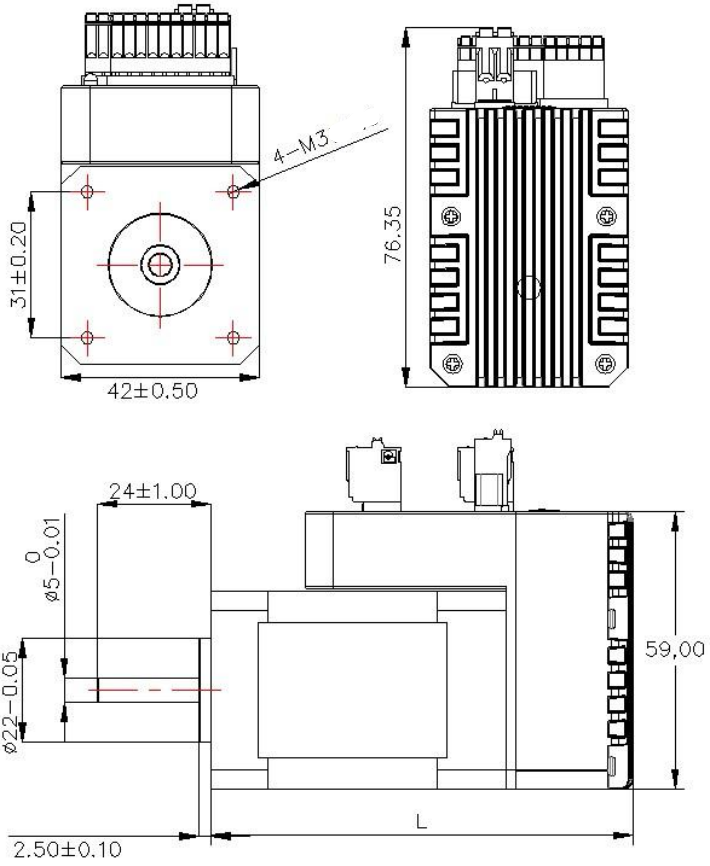
- Multiple pulse input modes
  - Pulse + Direction
- Optocoupler isolation servo reset input interface ERC
- Bandwidth of current loop: 2KHz (typical value)
- Speed loop bandwidth: 500Hz (typical value)
- Position ring bandwidth: 200Hz (typical value)
- Motor quadrature encoder input interface: Differential input (26LS32)
- RS232 interface can be used to connect with PC to modify parameters
- The user can select the subdivision through an external dial switch or customize the subdivision through the software
- Over current, overload, under voltage, over speed and out of tolerance protection
- The green light indicates operation, and the red light indicates protection or offline

Chapter 3 Technical indicators

Base		42 Base		57 Base			60 base		86 base	
Power		52W	78W	100W	140W	180W	200W	400W	440W	660W
Rated speed (rpm)		4000	4000	3000	3000	3000	3000	3000	3000	3000
Maximum rotational speed (rpm)		5200	5200	4200	4200	4200	4000	4000	4000	4000
Rated torque		0.13	0.19	0.32	0.45	0.6	0.64	1.27	1.4	2.1
Input voltage (VDC)		24		36				48		72
Maximum pulse frequency		200K								
Default communication rate		57600 (additional conversion interface required)								
Protection		Overload, overcurrent, excessive position deviation								
Environment	Occasion	Avoid dust, oil mist and corrosive gases as much as possible								
	Operating temperature	0～+70℃								
	Storage temperature	-20℃～+80℃								

Humidity	40～90%RH
Cooling method	Natural cooling or forced air cooling

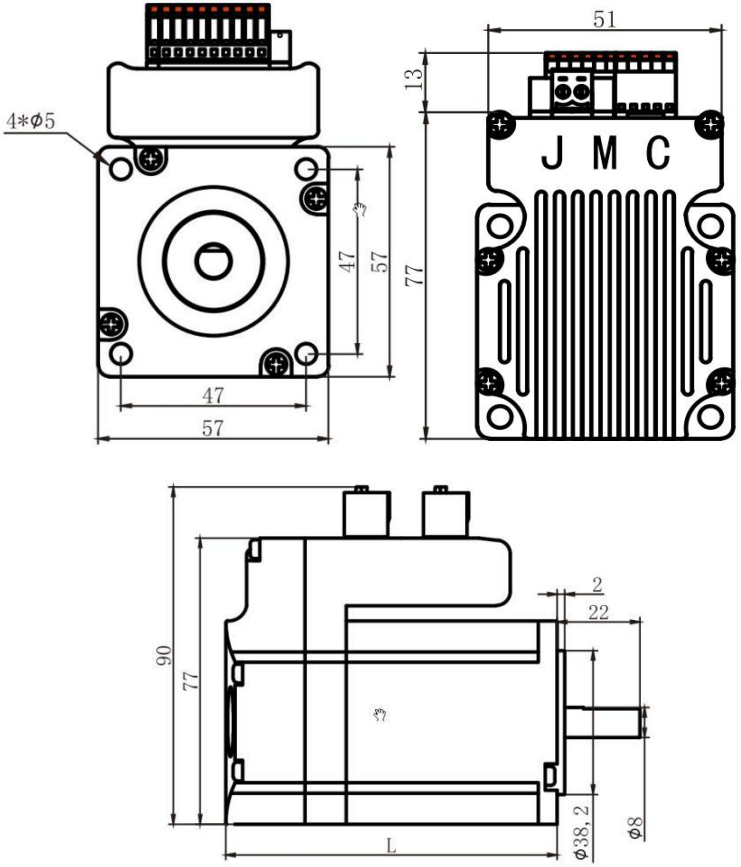
Chapter 4 Installation size (unit: mm)



IHSV42-XX installation size

Type	Length L (mm)	Shaft length (mm)

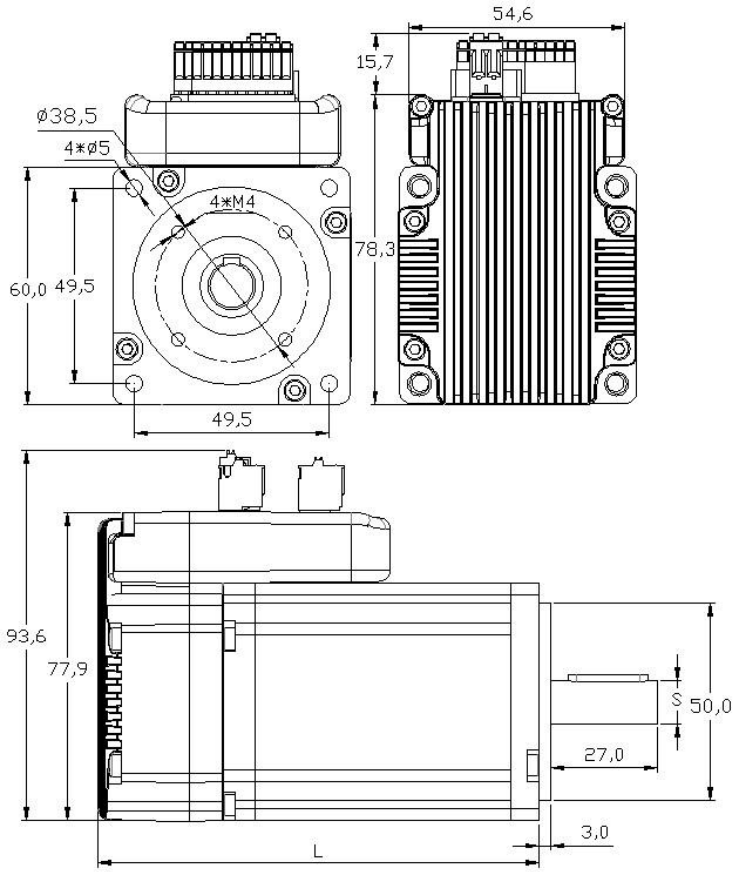
iHSV42-40-05-24-XXX	84	24
iHSV42-40-07-24-XXX	110	



iHSV57-XX Installation dimensions

Type	Length L(mm)	Axial length (mm)
iHSV57-30-10-36-01-T-33-XXX	110	33
iHSV57-30-14-36-01-T-33-XXX	130	

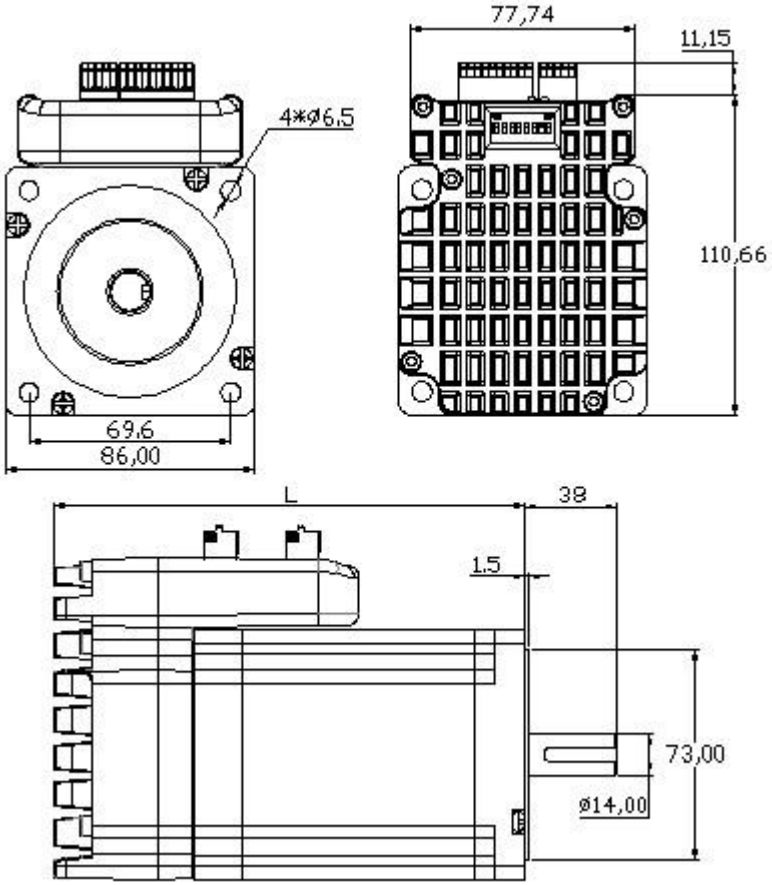
iHSV57-30-18-36-01-T-33-XXX	150	



iHSV60-XX installation size

Type	Length L (mm)	Shaft diameter S(mm)	Axis length (mm)
iHSV60-30-20-36-XXX	112	11	30
iHSV60-30-20-36-03-XXX	112	14	

iHSV60-30-40-48-XXX	142	14	

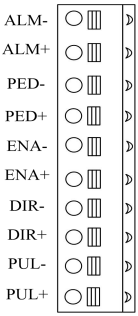


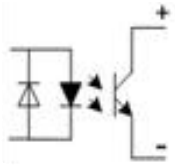
iHSV86-XX installation dimensions

Type	Length L (mm)	Shaft length (mm)
iHSV86-30-44-48-XXX	162	38
iHSV86-30-66-72-XXX	189	

Chapter 5 Port Description

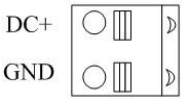
5.1 Signal port description



Symbols	Function	Description
ALM-	Alarm output negative	
ALM+	Alarm output positive	
PED-	In place output negative	
PED+	In place output positive	
ENA-	Enable signal: This input signal is used to enable or disable; Alternatively, can be used to clear the drive alarm. When ENA+ is connected to +5V and ENA- is connected to low level, the driver will	Low level 0 ~ 0.5V is effective

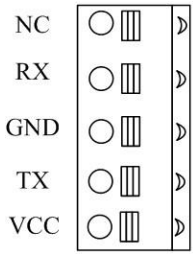
Symbols	Function	Description
ENA+	cut off the current of each phase of the motor to make the motor in the free state. At this time, the pulse will not be responding and the alarm can be cleared. When this function is not needed, the enable signal end can be suspended.	High level 4 ~ 5V works
DIR-	Direction signal: high/low level signal, to ensure reliable commutation of the motor, the direction signal should be established at least 6us before the pulse signal.	Low level 0 ~ 0.5V is effective
DIR+		High level 4 ~ 5V works
PUL-	Pulse control signal: The rising edge of the pulse is effective, and the pulse width should be greater than 2.5us in order to reliably respond to the pulse signal	Low level 0 ~ 0.5V effective
PUL+		High level 4 ~ 5V works

5.2 Power Port



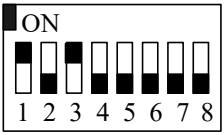
Signage	Symbol	name	Description
Power supply Input	DC+	Power supply positive	20VDC80VDC(according to the corresponding model of motor technical indicators to choose the voltage supply)
	GND	Power supply negative	

5.3 232 serial communication wiring diagram



Definition	Description	Company wiring colors
NC	Dangling	/
RX	Receiver	Brown and white
GND	Power negative	blue
TX	Sender	Blue and White
VCC	Power positive	/

5.4 Instructions for setting the dial switch



1. Setting of code subdivision

Subdivision Settings are as follows. When SW1, SW2, SW3, and SW4 are all set to on, user-defined subdivision is effective. This value can be set through our servo software.

Dial switch / Subdivision	SW1	SW2	SW3	SW4
Default	on	on	on	on
800	off	on	on	on
1600	on	off	on	on
3200	off	off	on	on
6400	on	on	off	on
12800	off	on	off	on
25600	on	off	off	on
51200	off	off	off	on
1000	on	on	on	off
2000	off	on	on	off
4000	on	off	on	off
5000	off	off	on	off
8000	on	on	off	off
10000	off	on	off	off
20000	on	off	off	off
40000	off	off	off	off

2 Enter along Settings

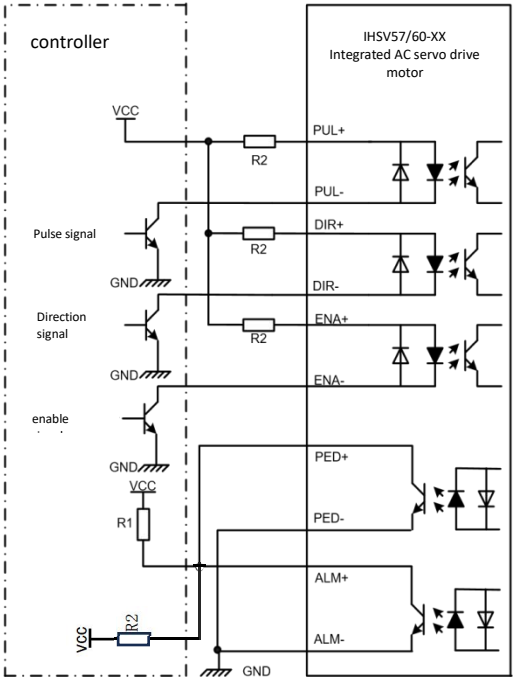
SW5 dial switch sets the input edge, off indicates that the rising edge is valid, and on indicates that the falling edge is valid.

3. Logical direction setting

When the SW6 dial switch is switched off or on, the direction of the current motor motion can be changed, off = CCW (forward turn), on=CW (reverse).

Chapter 6 control signal wiring

6.1 Control signal single-ended common anode wiring



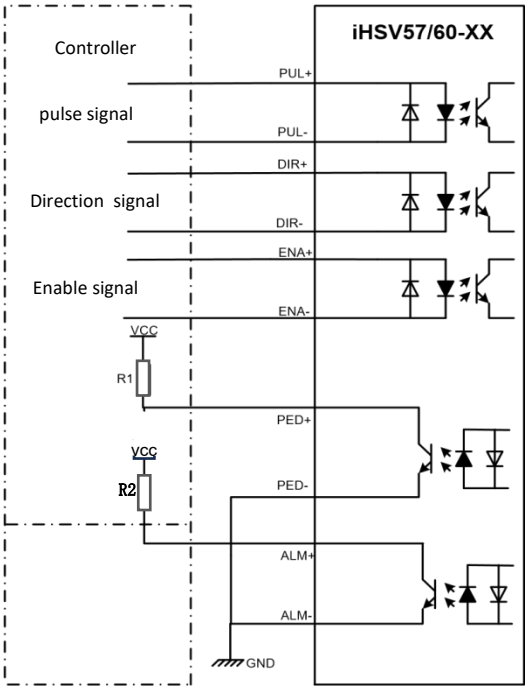
Note:

The VCC is compatible with 5V~24V.

The recommended resistance value of resistance R1 connected to the control signal is 3 ~ 5K.

When the VCC is 24V, the recommended resistance R2 is 1~1.5K; No resistor when it is 5V

6.2 Control signal differential wiring mode



Note:

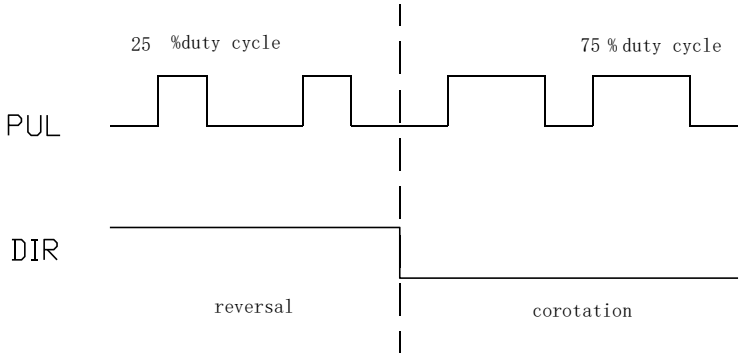
The VCC is compatible with 5V~24V.

The pulse, direction, and enable signals in the diagram use the 5V standard.

Resistor R1 is connected to the control signal end, and the resistance is

3~5K.

6.3 PWM duty cycle speed control mode



1. this control mode through the pulse duty cycle to control the speed, the effective duty cycle speed range is 10% ~ 90%, the corresponding speed range is 0 ~ (P06-40 setpoint) *10. The recommended pulse frequency range is 1K ~ 20K. The corresponding formula between duty cycle and target speed is as follows:

PU duty cycle % = (target speed/((P06-40 setpoint) *10)) * 80 + 10

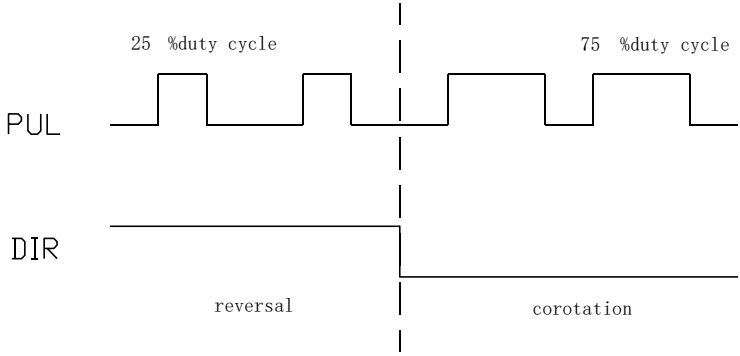
For example: requires speed 2000, P06-40 set to 300

PU duty cycle % = (2000/ (300*10)) * 80 + 10 = 63.3%

Parameter setting form

Parameters	Set points	Description
P01-01	1	Speed control mode
P04-00	3	Speed PWM control mode
P06-40	Custom	Speed The maximum speed in PWM control mode is: P06-40 value *10

6.4 PWM Duty Cycle Torque Control mode (to be added later)



1.this control mode through the pulse duty cycle to control the torque, the effective duty cycle torque range is 10% ~ 90%, the corresponding torque range is 0 ~ (P06-43 setpoint) *10. The recommended pulse frequency range is 1K ~ 20K. The corresponding formula between duty cycle and target torque is as follows:

Duty cycle % = (target speed/(P06-43 setpoint *10)) * 80 + 10

For example: Torque required: 50% rated, P06-43 set to 10

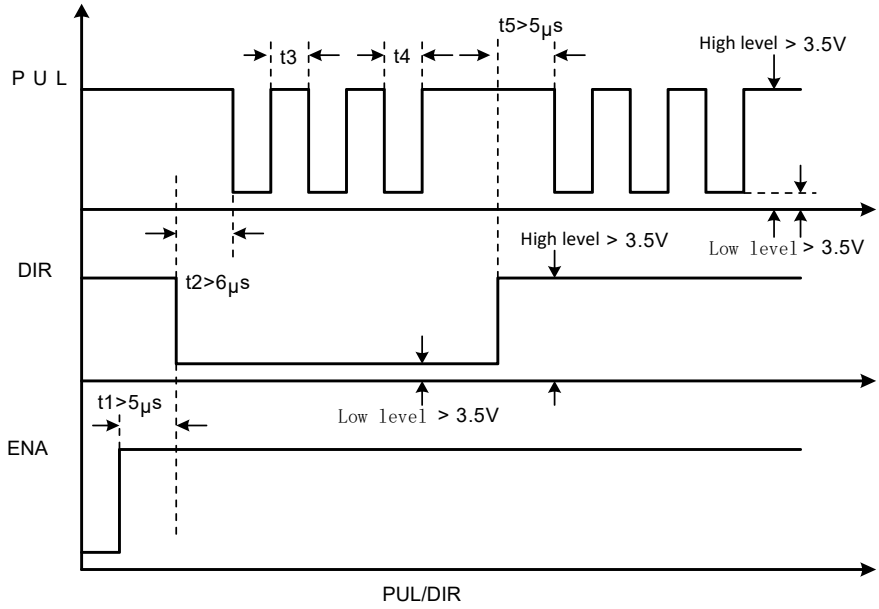
Duty cycle = (50/ (10*10)) * 80 + 10 = 50%

Parameter setting form

Parameters	Set points	Description
P01-01	2	Torque control mode
P05-00	1	Torque PWM control mode
P06-43	Custom	Torque The maximum torque in PWM control mode is: P06-43 value *10

6.5 Control signal timing diagram

In order to avoid some malfunction and deviations, PUL, DIR and ENA should meet certain requirements, as shown in the following figure:



Notes:

(1)t1: ENA (enable signal) should DIR at least 5μs in advance, determined as high. In general, ENA+ and ENA- dangling are recommended.

(2)t2: DIR at least 6μs ahead of the PUL count edge to determine its state high or low.

(3)t3: pulse width is not less than 2.5μs.

(4)t4: low level width is not less than 2.5μs.

Chapter 7 parameters and functions

7.1 List of parameters

P00-xx indicates motor and driver parameters

P01-xx main control parameters

P02-xx indicates the gain class parameters

P03-xx indicates position parameters

P04-xx indicates the speed parameter

P05-xx indicates the torque parameter

P06-xx indicates I/O parameters

P08-xx indicates advanced functional parameters

Tip: The opening and modification of parameters in Chapter 7 requires the use of debugging software, and the use of debugging software is referred to the Appendix

Type	Function Code	Name	Setting range	Default	Unit	Effect time
Motor and drive parameters	P00-00	Motor No.	0-65535	---		Restate
	P00-01	Motor rated speed	1-6000	---	rpm	Restate
	P00-02	Motor rated torque	0.01-655.35	---	N.M	Restate
	P00-03	Motor current rating	0.01-655.35	---	A	Restate
	P00-04	Motor moment of inertia	0.01-655.35	---	kg.cm²	Restate
	P00-05	Motor pole number	1-31	---	Antipode	Restate
	P00-10	Number of lines for incremental encoder	0-65535	---		Restate

Type	Function Code	Name	Setting range	Default	Unit	Effect time
Motor and drive parameters	P00-11	Incremental encoder Z pulse electrical Angle	0-65535	---		Restate
	P00-12	The initial rotor Angle is 1	0-360	---	1 degree	Restate
	P00-13	Rotor initial Angle 2	0-360	---	1 degree	Restate
	P00-14	Rotor initial Angle 3	0-360	---	1 degree	Restate
	P00-15	Rotor initial Angle 4	0-360	---	1 degree	Restate
	P00-16	Rotor initial Angle 5	0-360	---	1 degree	Restate
	P00-17	Rotor initial Angle 6	0-360	---	1 degree	Restate
	P00-21	RS232 communication baud rate	0-3	2	---	Restate
Main control parameter	P01-01	Control Mode Setting	0-2	0	---	Immediate

Type	Function Code	Name	Setting range	Default	Unit	Effect time
Main control parameter	P01-02	Automatically adjust modes in real time	0-3	1	---	Immediate
	P01-03	Automatic adjustment of rigidity Settings in real time	0-31	13	---	Immediate
	P01-04	Moment of inertia ratio	0-100.00	1	1 times	Immediate
Gain class parameters	P02-00	Position control gain 1	0-3000.0	48.0	1/S	Immediate
	P02-01	Position control gain 2	0-3000.0	57.0	1/S	Immediate
	P02-03	Speed feedforward gain	0-100.0	30.0	1.0%	Immediate

Type	Function Code	Name	Setting range	Default	Unit	Effect time
Gain class parameters	P02-04	Speed feedforward smoothness constant	0-64.00	0.5	1ms	Immediate
	P02-10	Speed proportional gain 1	1.0-2000.0	27.0	1Hz	Immediate
	P02-11	Speed integration constant 1	0.1-1000.0	10.0	1ms	Immediate
	P02-12	Pseudodifferential feedforward control coefficient 1	0-100.0	100.0	1.0%	Immediate
	P02-13	Speed proportional gain of 2	1.0-2000.0	27.0	1Hz	Immediate
	P02-14	Velocity integration constant 2	0.1-1000.0	1000.0	1ms	Immediate

Type	Function Code	Name	Setting range	Default	Unit	Effect time
Gain class parameters	P02-15	Pseudodifferential feedforward control coefficient 2	0-100.0	100.0	1.0%	Immediate
	P02-19	Torque feedforward gain	0-30000	0	1.0%	Immediate
	P02-20	Torque feedforward smoothness constant	0-64.00	0.8	1ms	Immediate
	P02-30	Gain Switching mode	0-10	0	---	Immediate
	P02-31	Gain Switching level	0-20000	800	---	Immediate
	P02-32	Gain switching hysteresis	0-20000	100	---	Immediate

Type	Function Code	Name	Setting range	Default	Unit	Effect time
	P02-33	Gain switching delay	0-1000.0	10.0	1ms	Immediate
	P02-34	Position gain switching time	0-1000.0	10.0	1ms	Immediate
	P02-41	Mode Switch level	0-20000	10000	---	Immediate
Location Parameters	P03-00	Location Command Source	0-1	0	---	Immediate
	P03-03	Command pulse to negate	0-1	0	---	Immediate
	P03-04	Position pulse filter	0-3	2	---	Immediate

Type	Function Code	Name	Setting range	Default	Unit	Effect time
Location Parameters	P03-05	Positioning to complete the judging condition	0-2	1	---	Immediate
	P03-06	Positioning completion range	0-65535	30	Encoder unit	Immediate
	P03-09	Number of pulses to command the motor to rotate one turn	0-65535	4000	Pulse	Restart
	P03-10	Numerator of electronic gear 1	1-65535	4000	---	Restart
	P03-11	The denominator of electronic gear 1	1-65535	4000	---	Restart
	P03-15	Position deviation is too large set	0-65535	0	Instruction units *10	Immediate
	P03-16	Position command smoothing filter time constant	0-1000	0	1ms	Immediate

Type	Function Code	Name	Setting range	Default	Unit	Effect time
Speed Parameters	P04-00	Speed Command source	0-3	1	---	Immediate
	P04-02	Numeric Speed Given value	- 6000-6000	0	1rpm	Immediate
	P04-05	Overspeed alarm value	0-6500	6400	1rpm	Immediate
	P04-06	Forward speed limit	0-6000	5000	1rpm	Immediate
	P04-07	Reverse speed limit	0-6000	- 5000	1rpm	Immediate
	P04-10	Zero speed check out value	0-200.0	40	1rpm	Immediate
	P04-14	Speed-up time	0-10000	500	1ms/1000rpm	Immediate

Type	Function Code	Name	Setting range	Default	Unit	Effect time
	P04-15	Deceleration time	0-10000	500		Immediate
Torque Parameters	P05-10	Internal positive torque limiting value	0-300.0	200.0	1.0%	Immediate
	P05-11	Internal reverse torque limiter	0-300.0	200.0	1.0%	Immediate
I/O Parameters	P06-00	Enable input port effective level	0-4	1	---	Restate
	P06-20	Alarm output port effective level	0-1	1	---	Restate
	P06-22	Position output port effective level	0/1	1	---	Restate
	P06-40	PWM width input speed gain	10-2000	300	rpm/ duty cycle	Immediate

Type	Function Code	Name	Setting range	Default	Unit	Effect time
	P06-43	PWM width input torque gain	10-2000	300	%/ duty cycle	Immediate
Advanced Feature Parameters	P08-19	Feedback speed low-pass filter constant	0-25.00	0.8	1ms	Immediate
	P08-20	Torque command filter constant	0-25.00	0.84	1ms	Immediate
	P08-25	Perturbed torque compensation gain	0-100.0	0	%	Immediate
	P08-26	Disturbance torque filter time constant	0-25.00	0.8	1ms	Immediate

7.2 Parameter parsing Instructions

7.2.1 Parameters of P00-xx motor and driver

Function Code	Name	Description
P00-00	Motor No.	Factory set, no need to set

Function Code	Name	Description
P00-01	Motor rated speed	Setting range: 1-6000, unit: rpm Factory has been set, no need to set
P00-02	Motor rated torque	Setting range: 0.01-655.35 in N.M According to the motor setting, the factory has been set
P00-03	Motor current rating	Set range: 0.01-655.35, unit: A According to the motor setting, the factory has been set
P00-04	Motor moment of inertia	Setting range: 0.01-655.35, unit: kg.cm² According to the motor setting, the factory has been set
P00-05	Motor pole number	Set range: 1-31, unit: antipole According to the motor setting, the factory has been set
P00-10	Number of lines for incremental encoder	According to the motor setting, factory set
P00-11	Incremental encoder Z pulse electrical Angle	According to the motor setting, factory set
P00-12	Initial rotor Angle 1	According to the motor setting, factory set
P00-13	Rotor initial Angle 2	According to the motor setting, factory set
P00-14	Rotor initial Angle 3	According to the motor setting, factory set
P00-15	Rotor initial Angle 4	According to the motor setting, factory set
P00-16	Rotor initial Angle 5	According to the motor setting, the factory has been set
P00-17	Rotor initial Angle 6	According to the motor setting, factory set
P00-21	RS232 communication baud rate selection	Set range: 0-3 Select the baud rate when communicating with the PC 0:9600 1:19200 2:57600 3:115200

7.2.2 P01-xx main control parameters

Function Code	Name	Description
P01-01	Control Mode Setting	Set range: 0-2 0: Position control mode 1: Speed control mode 2: Torque control mode
P01-02	Automatically adjust modes in real time	Set range: 0-2 0: Manually adjust rigidity. 1: Standard mode automatically adjusts rigidity. In this mode, the parameters P02-00, P02-01, P02-10, P02-11, P02-13, P02-14, P08-20 will be automatically set according to the rigidity level set in P01-03, manual adjustment of these parameters will not work. The following parameters are set by the user: P02-03 (speed feedforward gain), P02-04 (speed feedforward smoothing constant). 2: Positioning mode automatically adjusts rigidity. In this mode, in this mode, the parameters P02-00, P02-01, P02-10, P02-11, P02-13, P02-14, P0820 will be automatically set according to the rigidity level set in P01-03, manual adjustment of these parameters will not work. The following parameters will be fixed values and cannot be changed: P02-03 (Speed feedforward gain) : 30.0% P02-04 (speed feedforward smoothing constant) : 0.50
P01-03	Automatically adjust rigidity Settings in real time	Setting range: 0-31 Built-in 32 gain class parameters, when P01-02 is set to 1, or 2 to work. It can be called directly according to the actual situation. The larger the value is, the stronger the rigidity is.

Function Code	Name	Description
P01-04	Moment of inertia ratio	Set range: 0-100 in times Set the load inertia ratio of the corresponding motor, the setting method is as follows: P01-04= load inertia/motor moment of inertia

7.2.3 P02-xx gain class parameters

Function Code	Name	Description
P02-00	Position control gain 1	Setting range: 0-3000.0, unit: 1/S ‣ The proportional gain of the position ring regulator, the larger the parameter value, the higher the gain proportion, the greater the stiffness, the smaller the position tracking error, and the faster the response. However, if the parameter is too large, it will easily cause vibration and overshoot. ‣ This parameter is for steady-state response.
P02-01	Position control gain 2	Set range: 0-3000.0, unit: 1/S ‣ The proportional gain of the position ring regulator, the larger the parameter value, the higher the gain proportion, the greater the stiffness, the smaller the position tracking error, and the faster the response. However, if the parameter is too large, it will easily cause vibration and overshoot. ‣ This parameter is for dynamic response.

Function Code	Name	Description
P02-03	Speed feedforward gain	Set range: 0-100.0 in 1.0% units The feedforward gain of the speed loop, the larger the parameter value, the smaller the system position tracking error, and the faster the response. However, if the feedforward gain is too large, the position loop of the system will be unstable, and it is easy to produce overshoot and oscillation.
P02-04	Speed feedforward smoothness constant	Set range: 0-64.00 in ms This parameter is used to set the speed loop feedforward filtering time constant. The larger the value, the larger the filtering effect, but at the same time the phase lag increases.
P02-10	Speed proportional gain 1	Set range: 1.0-2000.0 in Hz ‣ The greater the speed proportional gain, the greater the servo stiffness and the faster the speed response, but too large is easy to produce vibration and noise. ‣ Under the condition that the system does not produce vibration, try to increase the value of this parameter. ‣ This parameter is for static response.
P02-11	Speed integration constant 1	Set range: 1.0-1000.0 in ms ‣ Speed regulator integration time constant, the smaller the setting value, the faster the integration speed, the greater the stiffness, too small easy to produce vibration, noise. ‣ In the case of no shock in the system, reduce this parameter value as far as possible. ‣ This parameter is for steady-state response.

Function Code	Name	Description
P02-12	Pseudo-differential feedforward control coefficient 1	Set range: 0-100.0, unit: 1.0% ‣ When set to 100.0%, the speed loop adopts PI control, and the dynamic response is fast; When set to 0, the integral effect of the speed loop is obvious, which can filter the low-frequency interference, but the dynamic response is slow. ‣ By adjusting this coefficient, the speed loop can have a better dynamic response, and can increase the resistance to low-frequency interference.
P02-13	Speed proportional gain 2	Set range: 1.0-2000.0 in Hz ‣ The greater the speed proportional gain, the greater the servo stiffness and the faster the speed response, but too large is easy to produce vibration and noise. ‣ Under the condition that the system does not produce vibration, try to increase the value of this parameter. ‣ This parameter is for dynamic response.
P02-14	Velocity integration constant 2	Set range: 1.0-1000.0 in ms ‣ Speed regulator integration time constant, the smaller the setting value, the faster the integration speed, the greater the stiffness, too small easy to produce vibration, noise. ‣ In the case of no shock in the system, reduce this parameter value as far as possible. ‣ This parameter is for dynamic response.

<table>
<tr><th>Function Code</th><th>Name</th><th>Description</th></tr>
<tr><td>P02-15</td><td>Pseudo-differential feedforward control coefficient 2</td><td>Set range: 0-100.0, unit: 1.0%
‣When it is set to 100.0%, the speed loop adopts PI control and has fast dynamic response. When set to 0, the integral effect of the speed loop is obvious, which can filter the low-frequency interference, but the dynamic response is slow.
‣By adjusting this coefficient, the speed loop can have a better dynamic response, and can increase the resistance to low-frequency interference.</td></tr>
<tr><td>P02-19</td><td>Torque feedforward gain</td><td>Set range: 0-30000, unit: 1.0%
Set the current loop feedforward weighting value. This parameter is added to the current loop after weighting the differential of the speed command.</td></tr>
<tr><td>P02-20</td><td>Torque feedforward smoothness constant</td><td>Set range: 0-64.00 in ms
This parameter is used to set the torque feedforward filtering time constant.</td></tr>
<tr><td>P02-30</td><td>Gain Switching mode</td><td>Set range: 0-10
Set the conditions for the first, second gain switching
<table>
<tr><th>value</th><th>Toggle condition</th><th>Remarks</th></tr>
<tr><td>0</td><td>Fixed as First gain</td><td>P02-00, P02-10, P02-11, P02-12</td></tr>
<tr><td>1</td><td>Fixed as Second gain</td><td>P02-01, P02-13, P02-14, P02-15</td></tr>
<tr><td>2</td><td>Using DI input switch</td><td>Need to set DI port to 9 (gain switching input)
Invalid: First gain
Effective: Second gain</td></tr>
</table></td></tr>
</table>

Function Code	Name	Description			
			3	Torque command is large	Switch to second gain when the torque command is greater than the threshold (determined by P02-31 and P02-32). Less than the threshold, while exceeding the P0233 delay setting, switch to the first gain.
			4	Speed commands vary a lot	Switch to second gain when the speed command changes more than the threshold (determined by P02-31 and P02-32). Less than the threshold, while exceeding the P0233 delay setting, switch to the first gain.
			5	Speed command large	Switch to second gain when the speed command is greater than the threshold (determined by P02-31 and P02-32). Less than the threshold, while exceeding the P0233 delay setting, switch to the first gain.
			6	Large deviation in position	Switch to the second gain when the position deviation is greater than the threshold (determined by P02-31 and P02-32). Less than the threshold, while exceeding the P0233 delay setting, switch to the first gain.
			7	Have location instructions	Switch to second gain when there is a position command. When the position command is over while the P02-33 delay setting is exceeded, switch to first gain.

Function Code	Name	Description			
			8	Incomplete positioning	Switch to the second gain when localization is incomplete. When positioning is complete while exceeding the P02-33 delay setting, switch to first gain.
			9	Large actual speed	Switch to second gain when the actual speed is greater than the threshold (determined by P02-31 and P02-32). Less than the threshold, while exceeding the P02-33 delay setting, switch to the first gain.
			10	There are position commands + actual speed	Switch to second gain when there is a position command. When there is no position command and the actual speed is less than the threshold (determined by P0231 and P02-32), while exceeding the P02-33 delay setting, switch to the first gain.
P02-31	Gain Switching level	Set range: 0-20,000 Judgment threshold value for gain switching. Torque unit: 1000bit=25% rated torque Speed unit: 1000bit=200 RPM Position unit: 4000bit per turn			
P02-32	Gain switching hysteresis	Setting range: 0-20000 Hysteresis level for gain switching Torque unit: 1000bit=25% rated torque Speed unit: 1000bit=200 RPM Position unit: 4000bit per turn			

Function Code	Name	Description
P02-33	Gain switching delay	Set range: 0-1000.0 in ms When switching from gain 2 to gain 1, the time from when the trigger condition is met to the actual switching.
P02-34	Position gain switching time	Set range: 0-1000.0 in ms Position control gain 1 smoothen the time to switch to position control gain 2
P02-41	Mode Switch level	Setting range: 0-20000 Set the threshold for switching. Torque unit: 1000bit=25% rated torque Speed unit: 1000bit=200 RPM Position unit: 4000bit per turn

7.2.4P03-xx position parameters

Function Code	Name	Description
P03-00	Location Command Source	0: Pulse command 1: Digital given, communication control when used.
P03-03	Command pulse to negate	Used to adjust pulse instruction count direction 0: Normal. 1: Reverse direction
P03-04	Position pulse filter Settings	Set range: 0-3 in us 0:0.1 us. 1:0.8 us 2:1.6us 3:3.2us

Function Code	Name	Description
P03-05	Positioning to complete the judging condition	0: the position deviation is less than the P03-06 set value when the output 1: The position is given and the position deviation is less than the set value of P03-06 2: the position is given (after filtering), and the position deviation is less than the P03-06 set value output
P03-06	Positioning completion range	Set range: 0-65535, unit: encoder unit Used to set the threshold value of the positioning completion output. Using incremental encoder motor, then each turn is calculated by the number of encoder lines *4.
P03-09	Number of pulses to command the motor to rotate one turn	Set range: 0-65535 It is used to set the pulse number of motor rotation one turn. When this parameter is set to 0, the parameters of P03-10 and P03-11 are effective.
P03-10	Numerator of electronic gear 1	Formula for calculating the electronic gear ratio of incremental motor: $G = \frac{molecule}{denominator} = \frac{C \times 4}{P}$ C：Number of encoder lines；P：Input number of pulses per revolution Example: the number of encoder lines is 2500; The number of pulses per revolution of input is 3200; Calculate the electronic gear ratio? Note: $G = \frac{C \times 4}{P} = \frac{2500 \times 4}{3200} = \frac{10000}{3200} = \frac{25}{8}$
P03-11	The denominator of electronic gear 1	
P03-15	Position deviation is too large set	Setting range: 0-65535, unit: instruction unit *10 Set the number of pulses that allow deviation, exceeding the set value will alarm. Example: Set the value 20, then when the following deviation exceeds 20*10, the driver will alarm AL.501 (position deviation is too large)

Function Code	Name	Description
P03-16	Position command smoothing filter constant	Set range: 1000, unit: ms Set the time constant of the position command smoothing filter

7.2.5P04-xx speed parameters

Function Code	Name	Description
P04-00	Speed Command source	0: Reserved 1: Digital instruction (parameter setting) Reserve 2: Reserved 3: PWM speed control
P04-02	Numeric Speed Given value	Set range: -6000-6000 in rpm When P04-00 is set to 1, P04-02 is the speed control set point
P04-05	Overspeed alarm value	Set range: 0-6500 in rpm Set to allow the highest speed value, more than the set value will be AL. 420 overspeed alarm
P04-06	Forward speed limit	Set range: 0-6000 in rpm Limit the motor forward speed value
P04-07	Reverse speed limit	Set the range: 0-6000, the unit: the RPM Limit the motor reverse speed value
P04-14	Speed-up time	Set range: 0-10000, unit: 1ms/1000rpm Acceleration at the set speed control
P04-15	Deceleration time	Set the range: 0-10000, the unit: 1 ms / 1000 RPM Setting speed control speed reduction

7.2.6 P05-xx torque parameters

Function Code	Name	Description
P05-00	Torque command source	0: Reserved 1: PWM torque control 2: Reserved 3: Reserved
P05-10	Internal positive torque limit value	Set the range: 0-300.0, unit: 1.0% 100 said 1 times limit motor positive efforts, torque, 300 3 times said torque When the torque output reaches the limit value, the output signal can be detected by the DO port output torque limit
P05-11	Internal reverse torque limiter	Set range: 0-300.0, unit: 1.0% 100 said 1 times limit motor reverse output, torque, 300 3 times said torque When the torque output reaches the limit value, the output signal can be detected through the DO port output torque limit

7.2.7 P06-xx I/O parameters

Function Code	Name	Description
P06-00	Can make effective level output port	Setting range: 0-1, factory setting: 1
P06-20	Alarm output port effective level	Setting range: 0-1, factory setting: 1

P06-22	Position output port effective level	Set the range: 0-1, factory Settings: 1
P06-40	The width of the PWM input speed gain	Set range: 10-2000 This control mode controls the torque through the pulse duty cycle. The effective duty cycle torque range is 10% ~ 90%, and the corresponding torque range is 0 ~ (P06-43 setpoint) *10. The recommended pulse frequency range is 1K ~ 20K
P06-43	PWM width input torque gain	Set range: 0-100.0 in 1% units This kind of control mode through pulse duty ratio control torque, effective duty cycle torque range of 10% ~ 90%, and the corresponding torque range of 0 ~ (P06-43) * 10. The recommended pulse frequency range is 1K ~ 20K.

7.2.8 P08-xx Advanced Functional Parameters

Function Code	Name	Description
P08-19	Feedback speed low-pass filter constant	Set the range: 0-25.00, unit: ms Low-pass filtering time constant feedback speed, when the motor running in the noise, can be appropriately set the value.
P08-20	Torque command filter constant	Set the range: 0-25.00, unit: ms Torque command filter time constant, when the motor running in the noise, can be appropriately set the value.
P08-25	Perturbed torque compensation gain	Set range: 0-100.0 Disturbance torque observation value gain factor. This value, the greater is the stronger the ability to resist disturbance torque, but the action could also increase the noise.

Function Code	Name	Description
P08-26	Disturbance torque filter time constant	Set the range: 0-25.00, unit: ms The larger the value, the stronger the filtering effect, and the action noise can be suppressed. But will cause the phase delay, influence of disturbance torque inhibition effect.

7.3 List of monitoring items

Note: The following items can be monitored through the debugging software

Display	Display items	Description	Unit
d00.C.PU	Sum of position command pulses	This parameter monitors the number of pulses sent by the user to the servo driver, which can be used to confirm whether pulse loss has occurred	Instruction unit
d01.F.PU	Sum of position feedback pulses	This parameter can monitor the number of pulses fed back by the servo motor. The unit is consistent with the user input command unit	Instruction unit
d02.E.PU	Number of position deviation pulses	This parameter can monitor the number of pulses lagging position servo system in the process of running. Units in accordance with user input command unit	Instruction unit
d03.C.PE	Position/given pulse combined Gantry motor feedback pulse	This parameter can monitor the number of pulses sent by the user to the servo driver. Unit: when using the absolute value of motor, each lap calculate by 4000 - bit. Motor using incremental encoder, each lap calculated at encoder line number * 4.	Encoder unit / Instruction unit

Display	Display items	Description	Unit
d04.F.PE	Sum of Position feedback pulses /	This parameter can monitor the number of pulses fed back by the servo motor. Unit: when using the absolute value of motor, each lap calculate by 4000 - bit. Motor using incremental encoder, each lap calculated at encoder line number * 4.	Encoder unit / Instruction unit
d05.E.PE	Number of position deviation pulses / Gantry pulse deviation	This parameter can monitor the number of pulses lagging position servo system in the process of running. Unit: when using the absolute value of motor, each lap calculate by 4000 - bit. Using an incremental encoder motor, then each turn is calculated by the number of encoder lines *4.	Encoder unit / Instruction unit
d06.C.Fr	Pulse command input frequency	This parameter monitors the external pulse command input frequency	KPPS
d07.C.SP	Speed control command		rpm
d08.F.SP	Motor speed	This parameter can monitor the speed of the servo motor when it is running	rpm
d09. C.tQ	Torque command	This parameter can monitor servo motor torque at runtime	%
d10. F.tQ	Torque feedback value	This parameter can monitor the feedback torque of the servo motor when it is running	%
d11.AG.L	Average torque	This parameter monitors the average torque of the servo motor over the past 10 seconds	%
d12.PE.L	Peak torque	This parameter can monitor at the electric servo motor torque	%
d13.oL	Overload load factor	This parameter can monitor the load occupancy rate of the servo motor over the past 10 seconds	%
d18.AnG	Motor mechanical point of view	Mechanical point of view, this parameter can monitor motor rotate one circle is 360 degrees	0.1 degrees

Display	Display items	Description	Unit
d19.HAL	Motor UVW phase sequence	This parameter can monitor the phase sequence position of the incremental encoder motor	
d23.dcp	Main circuit voltage	This parameter can monitor the voltage value of the main loop	V
d25.tiE	Cumulative run time	This parameter can monitor the drive running time, the unit is in seconds	Seconds

Chapter 8 Fault analysis and processing

8.1 Fault alarm information table

Alarm types	Serial code	Alarm contents
Hardware failure	AL.051	Abnormal EEPROM parameter
	AL.053	Failed initialization
	AL.063	Overcurrent detection
	AL.071	Current sampling fault
	AL.105	Electronic gear set wrong
	AL.110	Power on again after parameter setting
	AL.402	Overvoltage
	AL.410	Overload (instantaneous maximum load)
	AL.412	Motor overload (continuous maximum load)
	AL.420	Over speed
	AL.421	Out of control check out
	AL.501	Excessive deviation in position
Encoder failure	AL.610	The incremental encoder is off-line
warning	AL.941	Parameter changes that require power to be switched back on

Note: The relevant alarm should be displayed through the debugging software, please refer to the appendix

8.2 Cause and disposal of fault alarm

AL.051: Abnormal EEPROM parameters

Cause of fault alarm	Fault alarm check	The disposal measures
Abnormal EEPROM data of servo unit	Check the wiring	Wire properly and power it back on If it keeps coming up, replace the drive

AL., 053: initialization failed

Cause of failure alarm	Fault alarm check	Disposal measures
The main control MCU failed to initialize the power on	Check the wiring Immediate	If appear all the time, the change drivers

AL.063: Overcurrent detection

Cause of fault alarm	Fault alarm check	Disposal measures
Excessive current in the power module of the servo unit		If appear all the time, the change drivers

AL., 071: current sampling of failure

Cause of fault alarm	Fault alarm check	Disposal measures
Current sensor sampling data anomalies		If appear all the time, the change drivers

AL.105: Electronic gear set incorrectly

Cause of fault alarm	Fault alarm check	The disposal measures
Electronic gear ratio set wrong	Check the electronic gear ratio setting parameters. P03-10,P03-11	Set the electronic gear ratio correctly

AL., 110: after parameter set to electricity

Fault alarm reason	Fault alarm check	The disposal measures
After the servo parameter setting, should be electricity can only take effect on anew	Power the drive back on	Power the drive back on

AL.402: Overvoltage

Cause of fault alarm	Fault alarm check	Disposal measures

The input voltage of the main loop is higher than the rated voltage value	Use a voltmeter to test whether the main loop input voltage is correct	Use the correct voltage source or concatenated stabilizer
Driver hardware failure	Alarm if the input voltage is correct	Please return to the dealer or the original factory for maintenance

AL.410: Overload (instantaneous maximum load)

Cause of fault alarm	**Fault alarm check**	**Disposal measures**
Motor startup machinery in a stuck state	Check the mechanical connection for jammed	Adjustment of mechanical structure
Drive a hardware failure	Mechanical part is normal still report to the police	Please return to the dealer or the original factory for maintenance

AL.412: Motor Overload (continuous maximum load)

Fault alarm reason	**Fault alarm check**	**Disposal measures**
Use continuously over the rated load of the drive	It can be monitored through d13.oL. In Monitor mode	In motor or lower load
Improper control system parameter setting	1. Whether the mechanical system is installed properly 2, the acceleration set constant is too fast 3. Whether the gain parameters are set correctly	1. Adjust the gain of the control loop 2, deceleration setting time to slow down

AL., 420: speed

Cause of fault alarm	**Fault alarm check**	**The disposal measures**
High input speed command	Use a signal detector to check whether the input signal is normal	Adjust the frequency of the input signal
A speed determine parameters set is not correct	To test whether P04-05 (overspeed alarm value) setting is reasonable	Set P04-05 (overspeed alarm value) correctly

AL.501: Excessive position deviation

Cause of failure alarm	**Fault alarm check**	**Disposal measures**
Positional deviation is too large set up parameter set is too small	Confirm P03-15 (position deviation is too big) parameter setting	Increase P03-15 (position deviation is too large) value

The gain value is set too small	Confirm whether gain parameters setting is reasonable	Re-adjust the gain class parameters correctly
The internal torque limiter value set is too small	Confirm the value within the torque limiter	To properly adjust the internal torque limit value
Excessive external load	Check for external loads	Lighten the load or change the high power motor

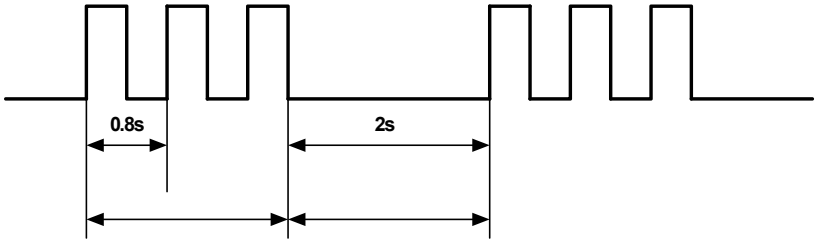
AL., 610: incremental encoder to take off the line

Cause of fault alarm	**Fault alarm check**	**The disposal measures**
Incremental encoder HallU,HallV, HallW signal abnormalities	Check the encoder connection	Correct connection

AL., 941: after parameter set to electricity

Cause of fault alarm	**Fault alarm check**	**Disposal measures**
Once the parameters have been set, they need to be re-powered to take effect	Power the drive back on	Power the drive back on

8.3 alarm lamp flicker frequency corresponding to the alarm and processing method



The red light flashing	Alarm Instructions	Disposal Measures number
2	Drive overflow	If there is a short circuit motor UVW line
3	Drive position deviation exceeds set point	Check that the drive "position deviation" parameter is set correctly

4	Drive the encoder alarm	Check that the encoder wire is properly connected
7	Drive overload	Check whether the motor UVW wire is connected correctly
10	Other alarm	Connect the computer read the specific alarm code, check processing according to the report to the police

8.4 Common problems and fault analysis

1. The power lamp is not on

- Check that the power supply has input and that the lines are connected correctly.
- The input voltage is too low.
- The input voltage is too high to burn out the servo drive motor.

2. 11.2 Power on and flash red light for alarm

- Servo drive motor input power supply voltage is too high or too low.
- Whether there has been a pulse input before the servo drive motor is powered on, resulting in out-of-tolerance alarm.

3. Red light alarm on the run after turning a small Angle

- Servo motor configuration parameters, the motor of logarithm and number of lines in the encoder matches (a logarithmic is: 4, encoder line number is: 1000).
- Whether the pulse input speed is greater than the rated speed of the motor, the position is out of tolerance.

4. After the input pulse is not turning

- Servo drive motor pulse at the input wiring is reliable.
- Whether the servo drive motor is enabled to release, whether the enable signal has input.
- Whether the electronic gear ratio is set too large.

Appendix 1: debug software using simple introduction

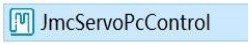
1 installation

1.1 installation environment

Operating system: Window XP(required. .net Framework 4), Windows 7 x64, Windows 10 x64 and above.

.NET Framework 4 or above.

1.2 Installation Steps

1, version 1, open the folder, double-click "  ", you can run the software.

1.3 Installation Problems

Installation problem: The software won't open

Possible cause: Missing software running frame. NET4

Solution: Go to Microsoft's official website to download and install.

NET4 framework (WinXP system also need to install WindowsInstaller3.1,.net3.5) or from the network disk share access. WinXP: link: https://pan.baidu.com/s/1fqI38nV4Po03ATiIrnQdtQ extracted code: 0 a84

Windows 7: link: https://pan.baidu.com/s/1aT_TGTVGDj4uak6KRYSiWA extracted code: 5 e3e

2 Quick Start

This software is mainly communication Settings, parameter Settings, monitoring function, oscilloscope function, alarm/fault function 5 major functional modules. 1, first of all, must be connected to the communication, through the custom connection mode, just set the serial

number, station

number, product series, you can quickly connect.

2, bottom status bar status description:

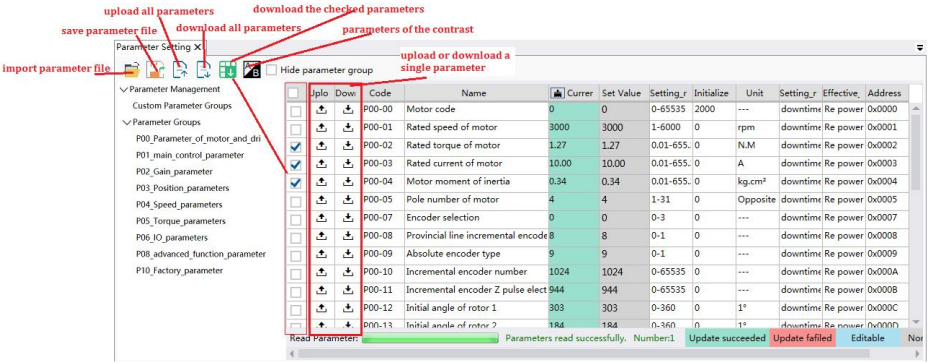
Online: software connection is successful, the green light, vice versa.

Servo enable: servo enable is the green light, vice versa.

Drive failure: drive failure is red light, otherwise gray light.

Drive warning: Drive alarm is red light, otherwise gray light.

3. The parameter setting module can upload and download parameters. The user can modify the parameter value in the "Set value" column.



3 Features

3.1Communication Settings

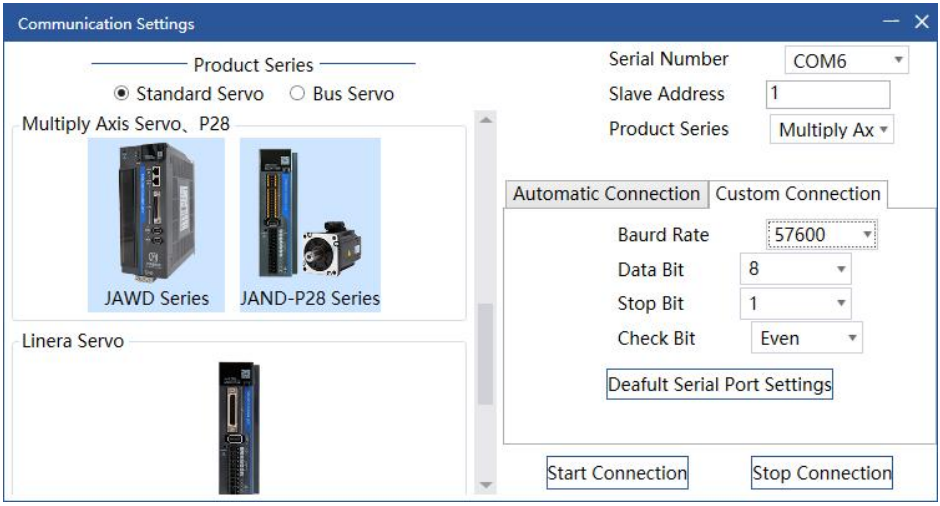
3.1.1Automatic Connection mode

Just set the serial port number, slave address, and product series.

Click "Start connection" and the system will connect automatically.

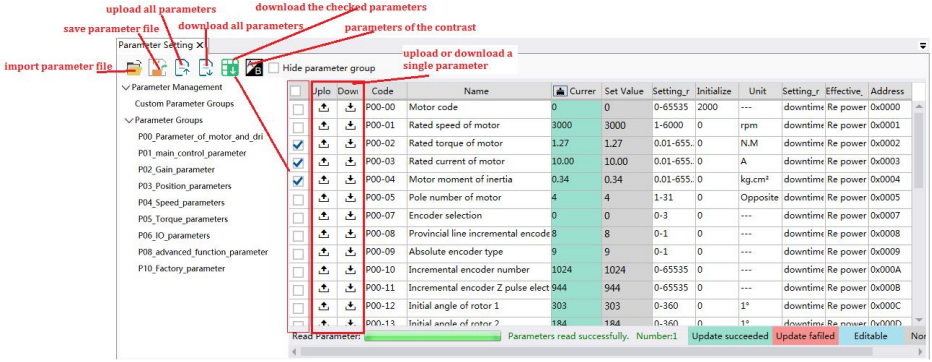
3.1.2Custom connection mode

needs to set the serial port parameters in detail: baud rate, data bit, stop bit, check bit.



3.2Parameter setting

Parameter setting module is mainly to read and download, compare and save parameters.



3.2.1Basic functions of parameter setting

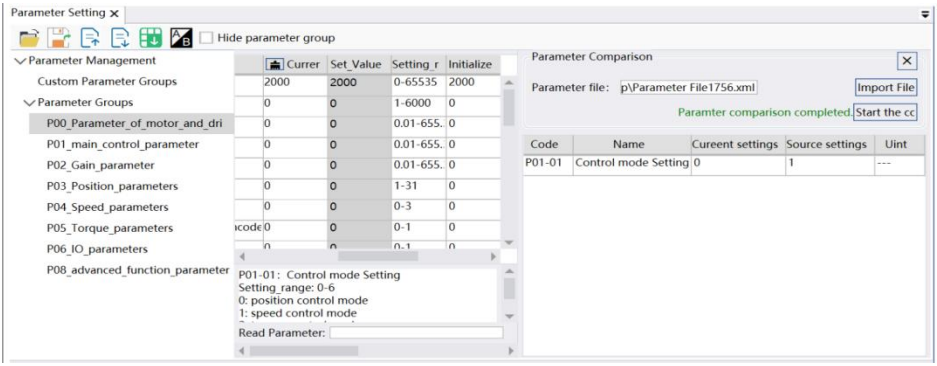
1) Upload and download a single parameter. Button " Upload Downloa " only upload or download a single parameter.

2) Upload and download of selected parameters. According to your needs, check the parameters and click " " download.

3) Upload and download all parameters.

4) Open and save the parameters file.

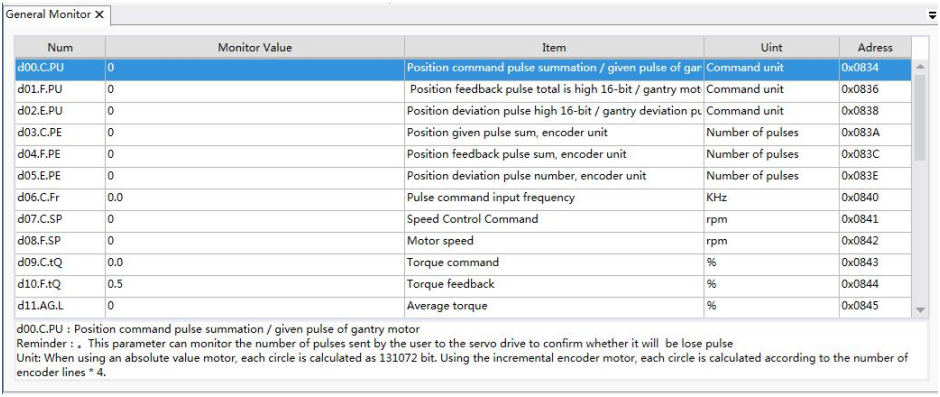
5) Parameters comparison. Import the comparison parameter table and compare with the current parameters (as shown below



3.3 Monitoring function

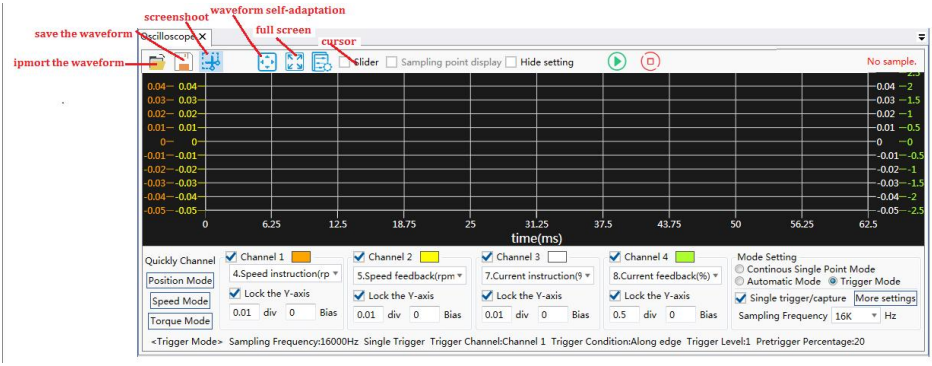
3.3.1 General monitoring

General monitoring mainly monitors all the data.



3.4 the oscilloscope to monitor

The oscilloscope monitoring module mainly performs waveform sampling and analysis. There are three sampling modes: continuous single point mode, automatic mode and trigger mode.



3.4.1 track waveform sampling

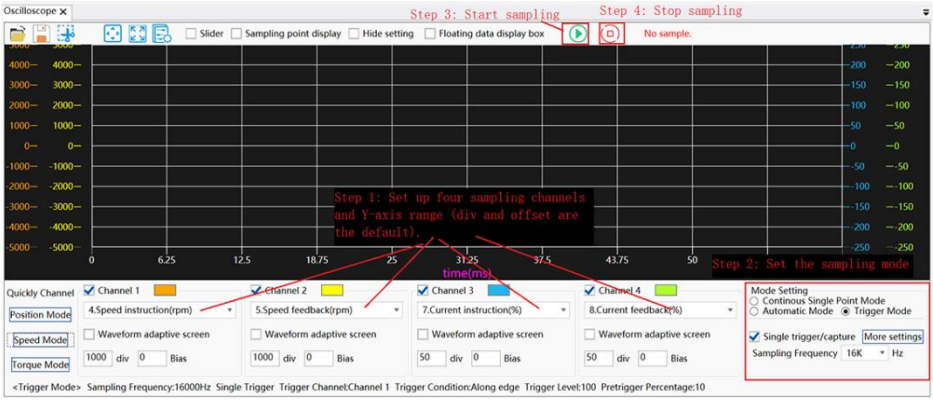
waveform sampling analysis using steps:

1) choose the sampling channel
2) Y scale size

3) sampling mode

4) start sampling. Click " " , oscilloscope to start sampling.

5) Stop sampling. Click " " and the oscilloscope stops sampling.



3.4.2 Waveform assist function

3.4.2.1 Open or save waveform files

Click " " to import the waveform file. Click " " and save the waveform as an execl file.

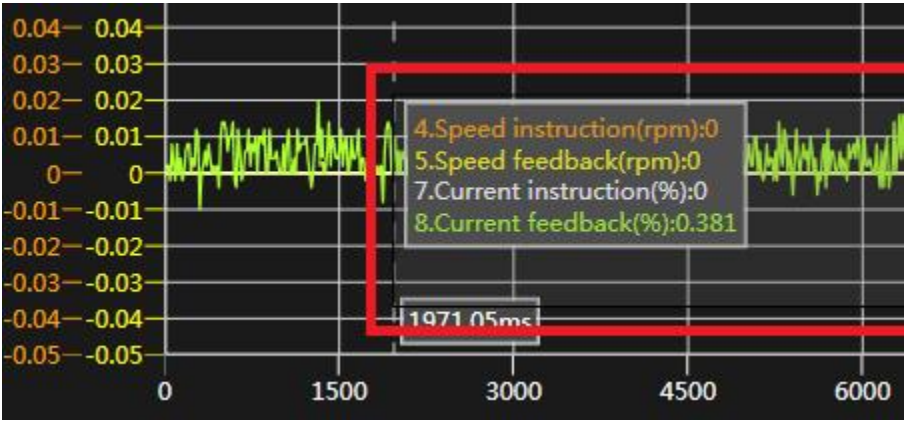
3.4.2.2 Screenshot

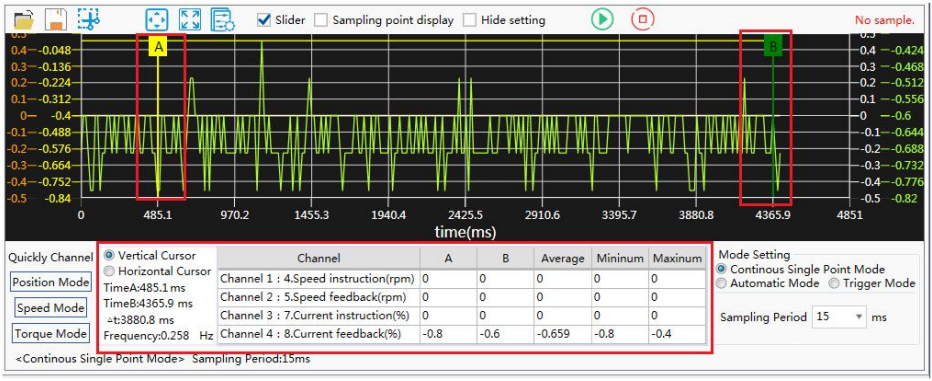
Click " " or right click" Screenshot "(waveform display area) to save the waveform as a picture file in png, jpg, or bmp format.

3.4.2.3 Partial display of waveform

Left click and drag out the selection box. After selecting the desired waveform, release the left button to display the waveform of the selected area.

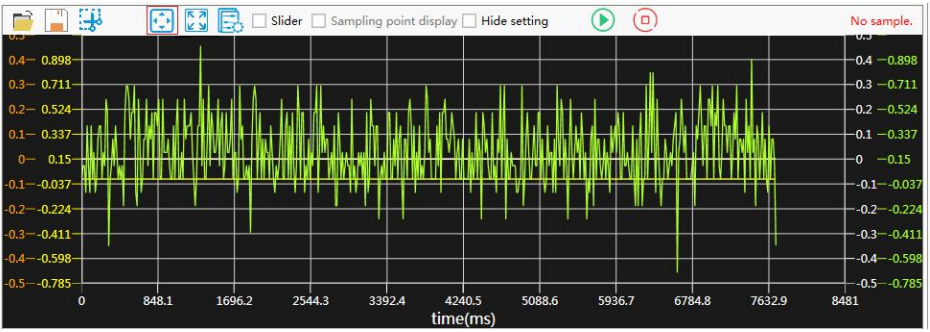
3.4.2.4 cursor click " Slider ", the cursor data area will be displayed. You can drag the "A" and "B" cursor to select the measurement area for waveform analysis.





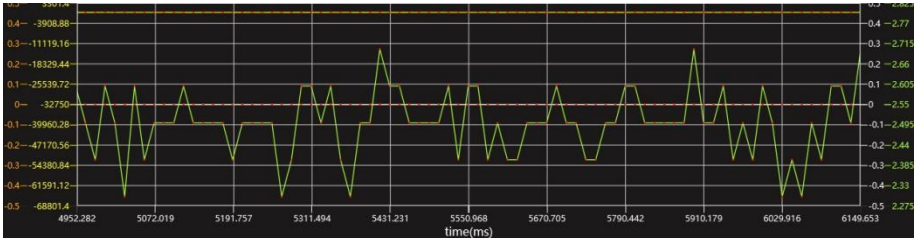
3.4.2.5 Waveform adaptation

Click " or right click" Adapt to screen "(waveform display area) to center and display the data of all channels in the waveform display area



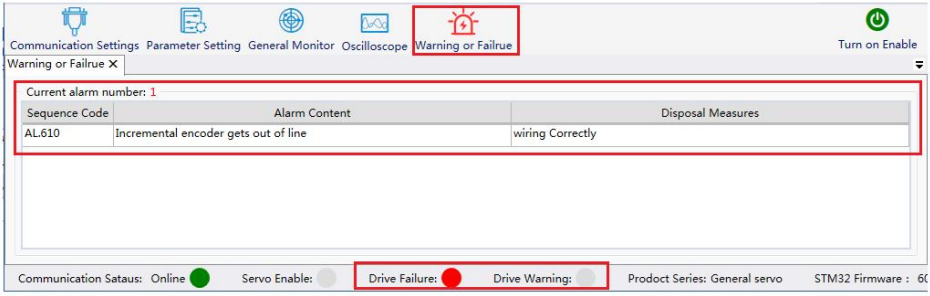
3.4.2.6 Sample point display

Check " ☑ Sampling point display " to display the actual valid data points. Uncheck " ☐ Sampling point display " and the data points will be hidden.



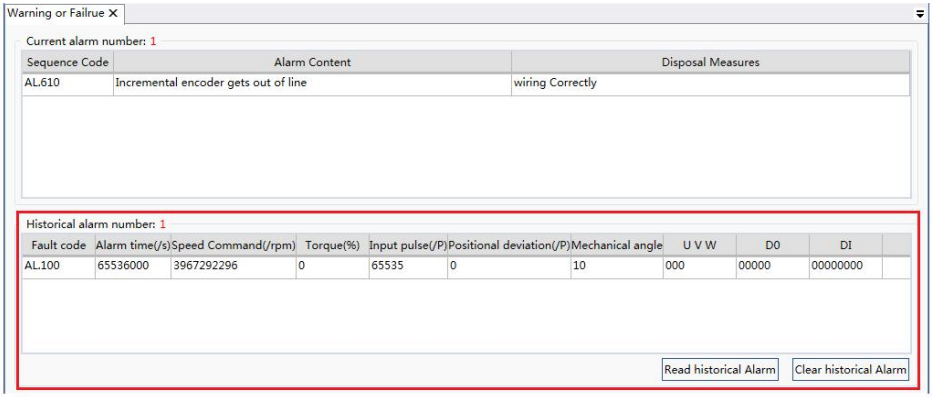
3.5 Alarm/Fault function

When there is an alarm or failure in the drive, "Warning/Failure" will turn red and flash, and "Drive Failure" or "Drive Warning" will also turn red in the status bar below.



3.5.2 Historical Alarms (Universal Servos)

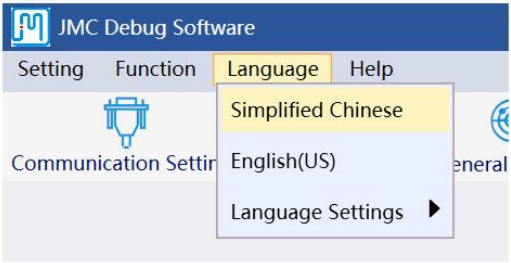
In Universal Servo, historical alarms can be read or deleted.



4 Language

The initial language of this software is simplified Chinese and English, and you can also customize to add languages.

1. Switch languages: Click "Language" to switch.


JMC Debug Software
Setting
Function
Language
Help
Simplified Chinese
English(US)
Language Settings
Communication Settir
eneral

Appendix 2: communication wire configuration tables and self-control

1 Communication wire configuration sheet

IHSV integrated communication cable configuration:

USB-RS232-HL340

JMC-RS232-ISV

2 Make your own communication line instructions

Note: The company's products are RS232 communication, first must support RS232 computer or USB to RS232 connection cable. After that, you can use the following connection method to make a cable to connect with the driver.

Schematic diagram of IHSV integrated communication line connection: