

Laifual



ROTARY ACTUATORS

> ONE AND FOR ALL

LOW VOLTAGE

Zhejiang Laifual Drive Co., Ltd.
www.laifualgroup.com

Preface

- Thank you very much for using our low-voltage series products.
- Incorrect operation and improper use of this product may lead to accidents and shorten the product's lifespan. To ensure long-term and safe use of this product, please read this manual carefully before use.
- Our company reserves the right to change the contents of this manual without notice.
- Company names and product names mentioned in this manual are generally registered trademarks or trademarks of their respective companies.
- Please keep this manual properly. Make sure to deliver this manual to the end user.

Safety Precautions for Safe Use

To ensure the safe and correct use of this product, please read the "Safety Precautions for Safe Use" and the main text thoroughly before use, and fully understand the contents.

Symbol Explanation

The safety-related warnings provided here are important. Please be sure to follow them diligently.

 Warning	Indicates that incorrect operation may result in death or serious injury.
 Caution	Indicates that incorrect operation may result in injury or property damage.
Warning	Indicates measures that should be taken or avoided to prevent malfunction,

Usage Restrictions

This product is not recommended for the following applications. If necessary, please consult with our company in advance.

Aerospace equipment · Aircraft equipment · Nuclear equipment · Vacuum equipment · Automotive equipment · Gaming facilities · Equipment directly affecting the human body · Household equipment and appliances · Equipment intended for transporting people · Equipment for special environments
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Precautions for Using Actuators

Design Precautions

 Caution	Please use within the specified environment. Actuators are designed for indoor use. Please adhere to the following conditions: ● Operating temperature: 0~40 °C / Storage temperature: -20~60 °C ● Ambient humidity: 20~80 %RH(non-condensation) ● Vibration: below 25m/s² ● No exposure to water, oil, etc. ● No corrosive or explosive gases Please install using the specified method. ● Ensure accurate centering of the actuator and the passive machinery as per the technical documentation. ● Misalignment may cause vibration and damage to the output shaft.
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Usage Precautions

 Warning	Do not exceed the permissible torque. ● The applied torque should not exceed the maximum torque. ● When attaching mechanical arms or similar directly to the output shaft, avoid collisions as they can render the output shaft uncontrollable. Do not plug directly into an outlet. ● The actuator will not operate without connecting to a dedicated driver. ● Direct connection to commercial power sources must be strictly avoided to prevent actuator damage and fire hazards. Do not strike the actuator. ● The actuator is directly connected to an encoder; do not strike with tools such as mallets. ● Damage to the encoder can cause the actuator to become uncontrollable. Do not pull on the wires. ● Pulling on the wires can damage the connections, leading to actuator malfunction.
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Disposal Instructions

 Caution	Please dispose of this product according to industrial waste disposal standards. When discarding the product, disassemble it as much as possible. Components with material markings should be sorted according to the markings and disposed of following industrial waste standards
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Chapter 1: Overview

The low-voltage series comprises servo rotary modules that deliver high torque and precise rotational movements. These modules are composed of LHG-type reducers, motors, and encoders, available in models ranging from 14 to 40.

These products are widely used in the following fields: CNC machine tools, Laser processing, Electronics and semiconductors, Factory automation, Medical devices, Robotics, Logistics automation, Solar photovoltaic systems, LED equipment, Testing devices, Printing machinery, Precision measuring instruments, Aerospace equipment, Aircraft-related applications, FPD (Flat Panel Display) manufacturing equipment. Advantages:

Power Supply Voltage

- DC48V

Excellent Environmental Adaptability

- IP54 protection rating
- Compliance with neutral salt spray requirements
- Operating temperature: 0~40 °C / Storage temperature: -20~60 °C
- Alternating damp heat

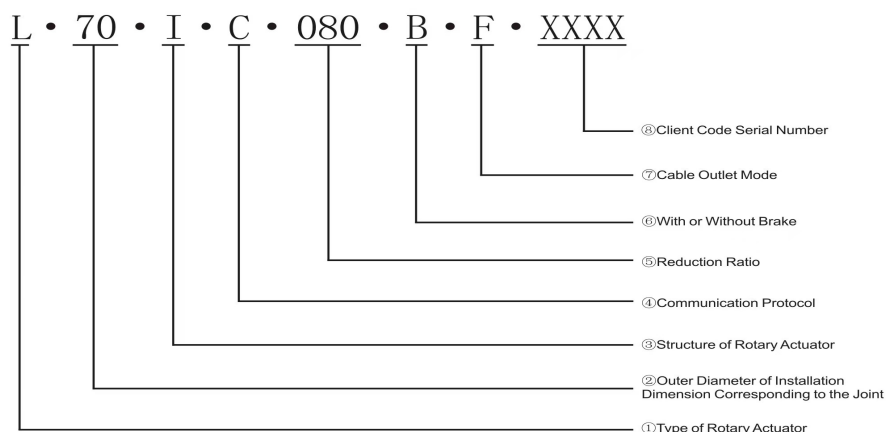
Highly Integrated Product Design

- Combines harmonic reducer, motor, encoder, and driver
- Extra-large hollow hole for easy wiring, piping, and laser routing
- Flange mounting structure

Outstanding Product Performance

- More than 20% torque increase in the same volume
- Excellent dynamic performance with very low noise and vibration
- Maintenance-free throughout the entire usage period
- Ultra-high product precision

Chapter2 Model Naming Rules



Rule Description:

① Rotary actuator Type:

LIS: Low voltage I joint (Dual encoder, built-in driver with brake)	LTS: Low voltage T joint (Dual encoder, built-in driver with brake)
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② Joint mounting Outer Diameter:

I/T Series:	14: 70mm	17: 80mm	20: 90mm
	25: 110mm	32: 142mm	40: 170mm

③ Communication protocol

C:CANopen Communication	E:EtherCat Communication
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④ Ratio

030: 31:1	050: 51:1	080: 81:1
100: 101:1	120: 121:1	160: 161:1

⑤ Customer and Serial number

XXXX: Customised products only

Chapter3 Performance Specifications

The performance specifications of the low-voltage series modules are as follows:

Model			L701		
Reduction Ratio			51	81	101
Input Voltage		V	48 (±10%)		
Maximum Torque	N · m		46	61	70
	kgf · m		4.69	6.22	7.14
Permissible Continuous Torque	N · m		9	14	14
	kgf · m		0.92	1.43	1.43
Peak Starting Torque	N · m		23	30	36
	kgf · m		2.35	3.06	3.67
Maximum Speed		r/min	107.8	67.9	54.5
Rated Speed		r/min	58.8	37.0	29.7
Torque Constant	N · m/A		0.08	0.08	0.08
	kgf · m/A		0.0082	0.0082	0.0082
Maximum Current		A	8.25	6.77	6.52
Permissible Continuous Current		A	3.23	3.16	2.53
Back EMF Constant		V/Krpm	6.15		
Phase Resistance(20		Ω	0.39		
Phase Inductance		mH	0.3		
Moment of Inertia	GD ² /4	kg · mm ²	37.6		
	J	kgf · cm · s ²	37.6*10 ⁻⁴		
Repeatability ^{*1}		Arc-sec	20		
Positioning Accuracy ^{*2}		Arc-sec	60		
Bus Communication Protocol		/	Canopen/Ethercat		
Encoder Resolution	Single-turn Detector		17bit (131072pulses per revolution)		
	Multi-turn Detector		16bit (-32768~32767turns)		
Output Shaft Resolution		Pulses per Revolution	6684672	10616832	13238272
Mass		kg	1.0KG		
Ambient Conditions			Operating Temperature: 0~40 °C/Storage Temperature: -20~60 °C		

	Operating/Storage Humidity: 20 – 80% RH (non-condensing) Vibration Resistance: 25m/s ² (Frequency: 10~400Hz) Shock Resistance: 300 m/s ² No dust, metal powder, corrosive gases, flammable gases, or oil mist Indoor use, avoid direct sunlight Altitude below 1000 m
Design Life (H)	10000
Motor Insulation	Insulation Resistance: Above 500 MΩ Withstand Voltage: AC1500 V / 1 min Insulation Class: Class F (155° C)
Installation Direction	Can be installed in all directions
Protection Level	Totally enclosed, self-cooling type (IP54)

Model		L801			
Reduction Ratio		51	81	101	121
Input Voltage	V	48 (±10%)			
Maximum Torque	N · m	91	113	143	112
	kgf · m	9. 29	11. 53	14. 59	11. 43
Permissible Continuous Torque	N · m	34	35	51	51
	kgf · m	3. 47	3. 57	5. 20	5. 20
Peak Starting Torque	N · m	44	56	70	70
	kgf · m	4. 49	5. 71	7. 14	7. 14
Maximum Speed	r/min	98. 04	61. 73	49. 50	41. 32
Rated Speed	r/min	58. 82	37. 04	29. 70	24. 79
Torque Constant	N · m/A	0. 09	0. 09	0. 09	0. 09
	kgf · m/A	0. 0092	0. 0092	0. 0092	0. 0092
Maximum Current	A	13. 48	10. 80	10. 83	9. 04
Permissible Continuous Current	A	10. 42	6. 75	7. 89	6. 59
Back EMF Constant	V/Krpm	6. 67			
Phase Resistance(20	Ω	0. 14			
Phase Inductance	mH	0. 3			
Moment of	GD²/4	kg · mm²	58		
Inertia	J	kgf · cm · s²	58*10 ^{^-4}		
Repeatability*1		Arc-sec	20		

Positioning Accuracy ^{*2}	Arc-sec	60			
Bus Communication Protocol	/	Canopen/Ethercat			
Encoder Resolution	Single-turn Detector	17bit (1310722 pulses per revolution)			
	Multi-turn Detector	16bit (~32768~32767turns)			
Output Shaft Resolution	Pulses per Revolution	6684672	10616832	13238272	15859712
Mass	kg	1.6KG			
Ambient Conditions		Operating Temperature: 0~40 °C/Storage Temperature: -20~60 °C Operating/Storage Humidity: 20 - 80% RH (non-condensing) Vibration Resistance: 25m/s ² (Frequency: 10~400Hz) Shock Resistance: 300 m/s ² No dust, metal powder, corrosive gases, flammable gases, or oil mist Indoor use, avoid direct sunlight Altitude below 1000 m			
Design Life (H)		10000			
Motor Insulation		Insulation Resistance: Above 500 MΩ Withstand Voltage: AC1500 V / 1 min Insulation Class: Class F (155° C)			
Installation Direction		Can be installed in all directions			
Protection Level		Totally enclosed, self-cooling type (IP54)			

Model		L90I			
Reduction Ratio		51	81	101	121
Input Voltage	V	48 (±10%)			
Maximum Torque	N · m	127	165	191	191
	kgf · m	12.96	16.84	19.49	19.49
Permissible Continuous Torque	N · m	44	61	64	64
	kgf · m	4.49	6.22	6.53	6.53
Peak Starting Torque	N · m	73	96	107	113
	kgf · m	7.45	9.80	10.92	11.53
Maximum Speed	r/min	78.4	49.4	39.6	33.1
Rated Speed	r/min	58.8	37.0	29.7	24.8
Torque Constant	N · m/A	0.10	0.11	0.11	0.11
	kgf · m/A	0.0112	0.0112	0.0112	0.0112
Maximum Current	A	19.59	15.15	13.54	11.94

Permissible Continuous Current		A	11. 81	9. 63	8. 10	6. 76
Back EMF Constant		V/Krpm	6. 78			
Phase Resistance(20		Ω	0. 11			
Phase Inductance		mH	0. 24			
Moment of Inertia	GD ² /4	kg · mm ²	106. 3			
	J	kgf · cm · s ²	106. 3*10 ^{^-4}			
Repeatability* ¹		Arc-sec	20			
Positioning Accuracy* ²		Arc-sec	60			
Bus Communication Protocol		/	Canopen/Ethercat			
Encoder Resolution		Single-turn Detector	17bit (131072 pulses per revolution)			
		Multi-turn Detector	16bit (-32768~32767turns)			
Output Shaft Resolution		Pulses per Revolution	6684672	10616832	13238272	15859712
Mass		kg	2KG			
Ambient Conditions			Operating Temperature: 0~40 °C/Storage Temperature: -20~60 °C			
			Operating/Storage Humidity: 20 - 80% RH (non-condensing)			
			Vibration Resistance: 25m/s²(Frequency: 10~400Hz)			
			Shock Resistance: 300 m/s²			
			No dust, metal powder, corrosive gases, flammable gases, or oil mist			
			Indoor use, avoid direct sunlight			
			Altitude below 1000 m			
Design Life (H)			10000			
Motor Insulation			Insulation Resistance: Above 500 MΩ			
			Withstand Voltage: AC1500 V / 1 min			
			Insulation Class: Class F (155° C)			
Installation Direction			Can be installed in all directions			
Protection Level			Totally enclosed, self-cooling type (IP54)			

Model		L110I			
Reduction Ratio		51	81	101	121
Input Voltage	V	48 (±10%)			
Maximum Torque	N · m	242	332	369	395
	kgf · m	24.69	33.88	37.65	40.31
Permissible	N · m	72	113	140	140

Continuous Torque		kgf · m	7.35	11.53	14.29	14.29
Peak Starting Torque	N · m		127	178	204	217
	kgf · m		12.96	18.16	20.82	22.14
Maximum Speed		r/min	78.4	49.4	39.6	33.1
Rated Speed		r/min	58.8	37.0	29.7	24.8
Torque Constant	N · m/A		0.11	0.11	0.11	0.11
	kgf · m/A		0.0112	0.0112	0.0112	0.0112
Maximum Current		A	32.42	28.61	26.30	23.35
Permissible Continuous Current		A	18.38	18.16	18.05	15.07
Back EMF Constant		V/Krpm	6.88			
Phase Resistance(20		Ω	0.033			
Phase Inductance		mH	0.11			
Moment of Inertia	GD ² /4	kg · mm ²	201			
	J	kgf · cm · s ²	201*10 ⁻⁴			
Repeatability* ¹		Arc-sec	20			
Positioning Accuracy* ²		Arc-sec	60			
Bus Communication Protocol		/	Canopen/Ethercat			
Encoder Resolution	Single-turn Detector		17bit (131072 pulses per revolution)			
	Multi-turn Detector		16bit (-32768~32767turns)			
Output Shaft Resolution		Pulses per Revolution	6684672	10616832	13238272	15859712
Mass		kg	3.1KG			
Ambient Conditions			Operating Temperature: 0~40 °C/Storage Temperature: -20~60 °C Operating/Storage Humidity: 20 - 80% RH (non-condensing) Vibration Resistance: 25m/s ² (Frequency: 10~400Hz) Shock Resistance: 300 m/s ² No dust, metal powder, corrosive gases, flammable gases, or oil mist Indoor use, avoid direct sunlight Altitude below 1000 m			
Design Life (H)			10000			
Motor Insulation			Insulation Resistance: Above 500 MΩ Withstand Voltage: AC1500 V / 1 min Insulation Class: Class F (155° C)			
Installation Direction			Can be installed in all directions			

Protection Level	Totally enclosed, self-cooling type (IP54)
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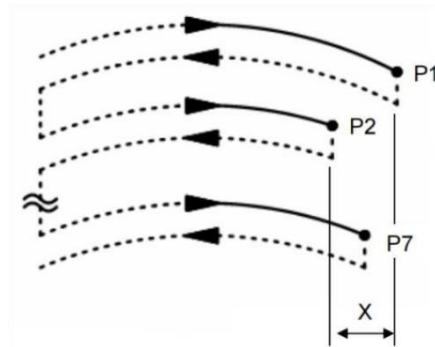
Model			L142I			
Reduction Ratio			51	81	101	121
Input Voltage		V	48（±10%）			
Maximum Torque		N · m	497	738	841	892
		kgf · m	50. 71	75. 31	85. 82	91. 02
Permissible Continuous Torque		N · m	140	217	281	281
		kgf · m	14. 29	22. 14	28. 67	28. 67
Peak Starting Torque		N · m	281	395	433	459
		kgf · m	28. 67	40. 31	44. 18	46. 84
Maximum Speed		r/min	58. 8	37. 0	29. 7	24. 8
Rated Speed		r/min	39. 2	24. 7	19. 8	16. 5
Torque Constant		N · m/A	0. 17	0. 17	0. 17	0. 17
		kgf · m/A	0. 0173	0. 0173	0. 0173	0. 0173
Maximum Current		A	38. 93	34. 45	30. 29	26. 80
Permissible Continuous Current		A	19. 40	18. 93	19. 66	16. 41
Back EMF Constant		V/Krpm	11. 2			
Phase Resistance(20		Ω	0. 036			
Phase Inductance		mH	0. 12			
Moment of Inertia	GD ² /4	kg · mm ²	625			
	J	kgf · cm · s ²	625*10 ⁻⁴			
Repeatability ^{*1}		Arc-sec	20			
Positioning Accuracy ^{*2}		Arc-sec	60			
Bus Communication Protocol		/	Canopen/Ethercat			
Encoder Resolution		Single-turn Detector	17bit (131072 pulses per revolution)			
		Multi-turn Detector	16bit (-32768~32767turns)			
Output Shaft Resolution		Pulses per Revolution	6684672	10616832	13238272	15859712
Mass		kg	5. 3KG			
Ambient Conditions			Operating Temperature: 0~40 °C/Storage Temperature: -20~60 °C			
			Operating/Storage Humidity: 20 - 80% RH (non-condensing)			
			Vibration Resistance: 25m/s ² (Frequency: 10~400Hz)			

	Shock Resistance: 300 m/s ² No dust, metal powder, corrosive gases, flammable gases, or oil mist Indoor use, avoid direct sunlight Altitude below 1000 m
Design Life (H)	10000
Motor Insulation	Insulation Resistance: Above 500 MΩ Withstand Voltage: AC1500 V / 1 min Insulation Class: Class F (155° C)
Installation Direction	Can be installed in all directions
Protection Level	Totally enclosed, self-cooling type (IP54)

Model			L170I			
Reduction Ratio			51	81	101	121
Input Voltage		V	48 (±10%)			
Maximum Torque		N · m	892	1270	1400	1530
		kgf · m	91. 02	129. 59	142. 86	156. 12
Permissible Continuous Torque		N · m	225	369	484	586
		kgf · m	22. 96	37. 65	49. 39	59. 80
Peak Starting Torque		N · m	523	675	738	802
		kgf · m	53. 37	68. 88	75. 31	81. 84
Maximum Speed		r/min	49. 0	30. 9	24. 8	20. 7
Rated Speed		r/min	39. 2	24. 7	19. 8	16. 5
Torque Constant		N · m/A	0. 17	0. 17	0. 17	0. 17
		kgf · m/A	0. 0173	0. 0173	0. 0173	0. 0173
Maximum Current		A	84. 01	68. 27	59. 86	54. 30
Permissible Continuous Current		A	40. 96	37. 32	39. 26	39. 67
Back EMF Constant		V/Krpm	11. 56			
Phase Resistance (20		Ω	0. 014			
Phase Inductance		mH	0. 067			
Moment of Inertia	GD ² /4	kg · mm ²	/			
	J	kgf · cm · s ²	/			
Repeatability*1		Arc-sec	20			
Positioning Accuracy*2		Arc-sec	60			
Bus Communication Protocol		/	Canopen/Ethercat			

Encoder Resolution	Single-turn Detector	17bit (131072pulses per revolution)			
	Multi-turn Detector	16bit (-32768~32767 turns)			
Output Shaft Resolution	Pulses per Revolution	6684672	10616832	13238272	15859712
Mass	kg	/			
Ambient Conditions		Operating Temperature: 0~40 °C/Storage Temperature: -20~60 °C Operating/Storage Humidity: 20 - 80% RH (non-condensing) Vibration Resistance: 25m/s ² (Frequency: 10~400Hz) Shock Resistance: 300 m/s ² No dust, metal powder, corrosive gases, flammable gases, or oil mist Indoor use, avoid direct sunlight Altitude below 1000 m			
Design Life (H)		10000			
Motor Insulation		Insulation Resistance: Above 500 MΩ Withstand Voltage: AC1500 V / 1 min Insulation Class: Class F (155° C)			
Installation Direction		Can be installed in all directions			
Protection Level		Totally enclosed, self-cooling type (IP54)			

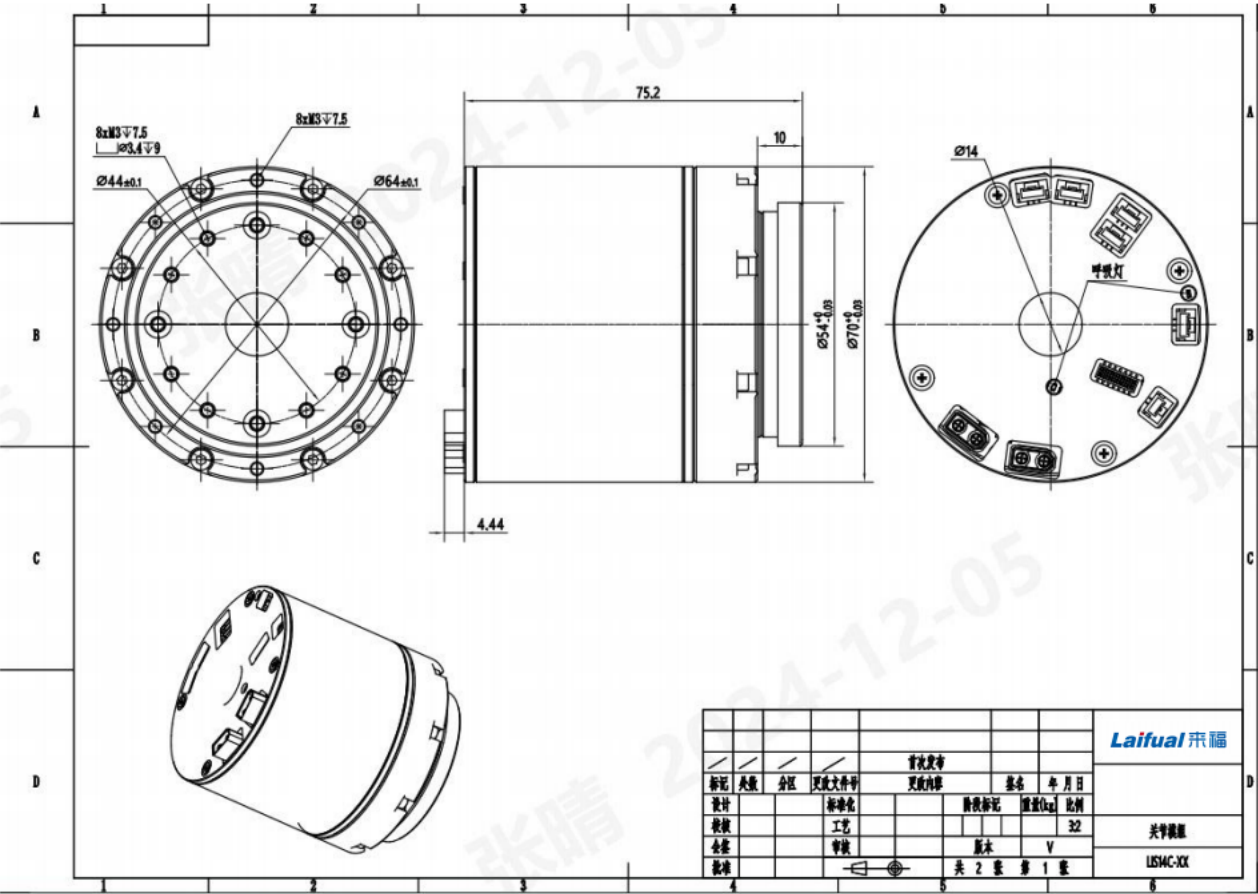
*1 Repeatability: Refers to the precision with which the output shaft can return to a specific position after performing seven repeated positioning operations from the same direction. This measurement is taken at four different positions on the output shaft, and the maximum difference among these positions is calculated.



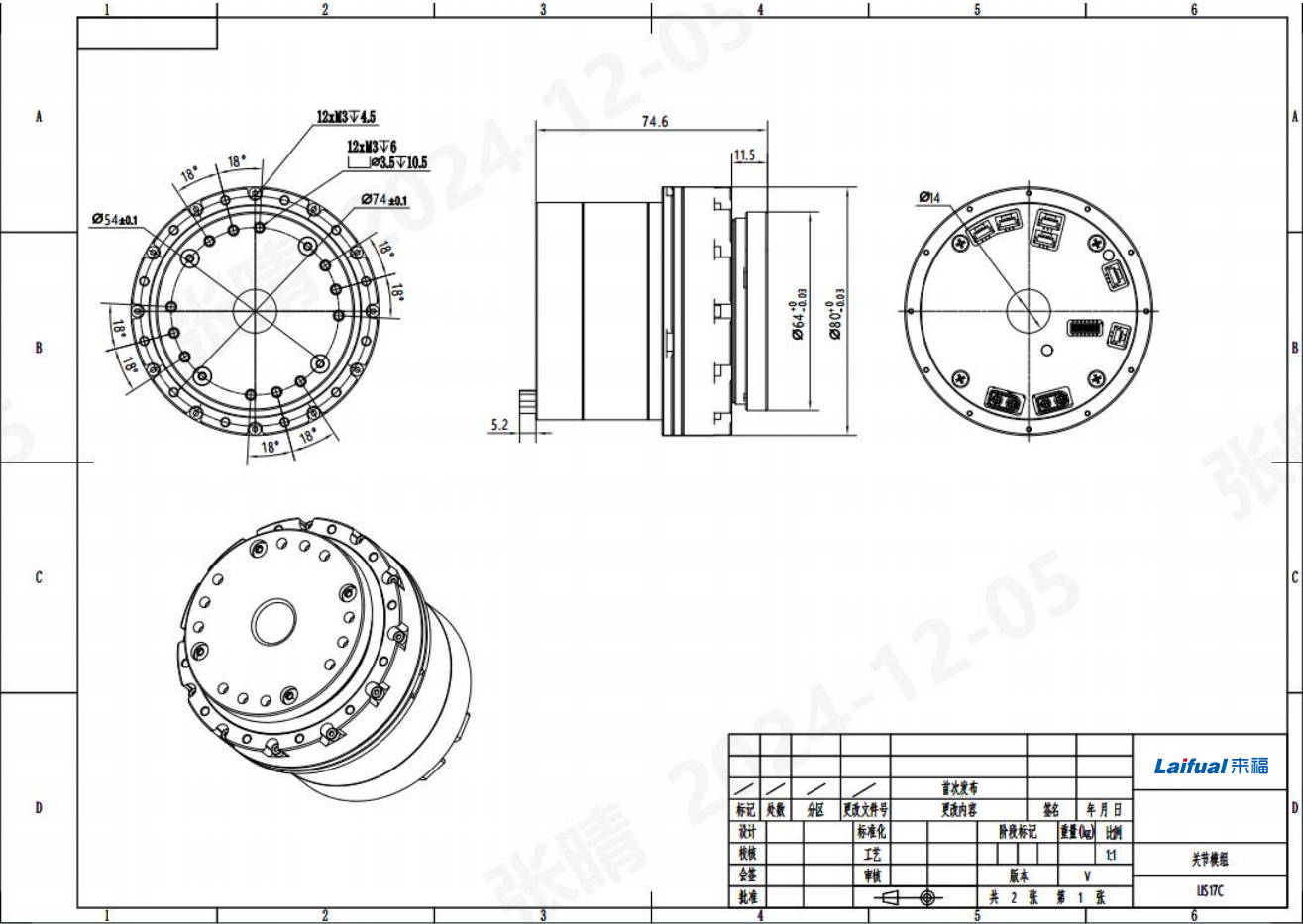
*2Positioning Accuracy: Refers to the precision of positioning in a fixed rotational direction. At each position, the difference between the actual rotational angle and the intended rotational angle relative to a reference position is calculated. The maximum value of these differences within one full rotation is then recorded.

Chapter4 Dimensions

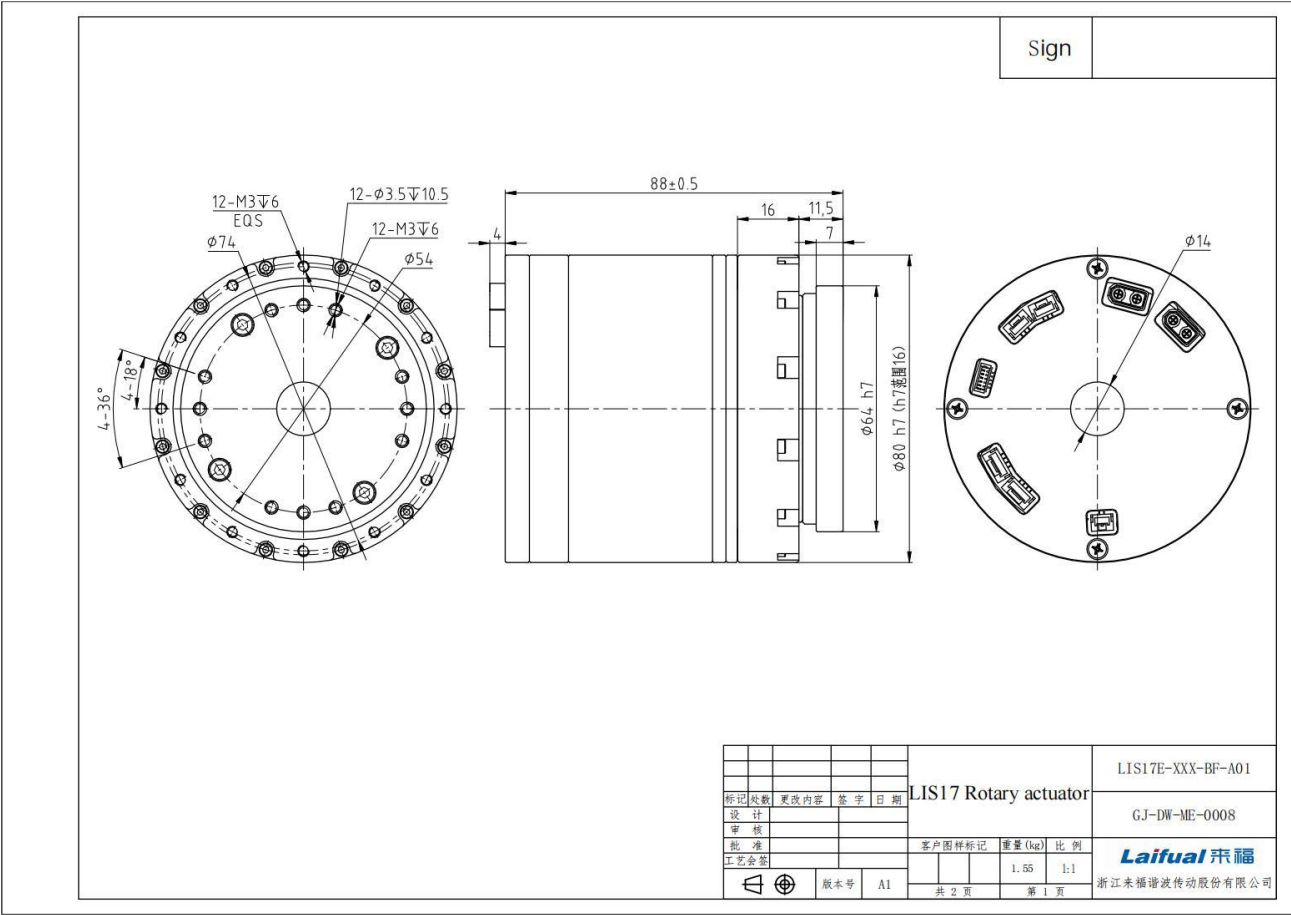
L-70-I-C-XX



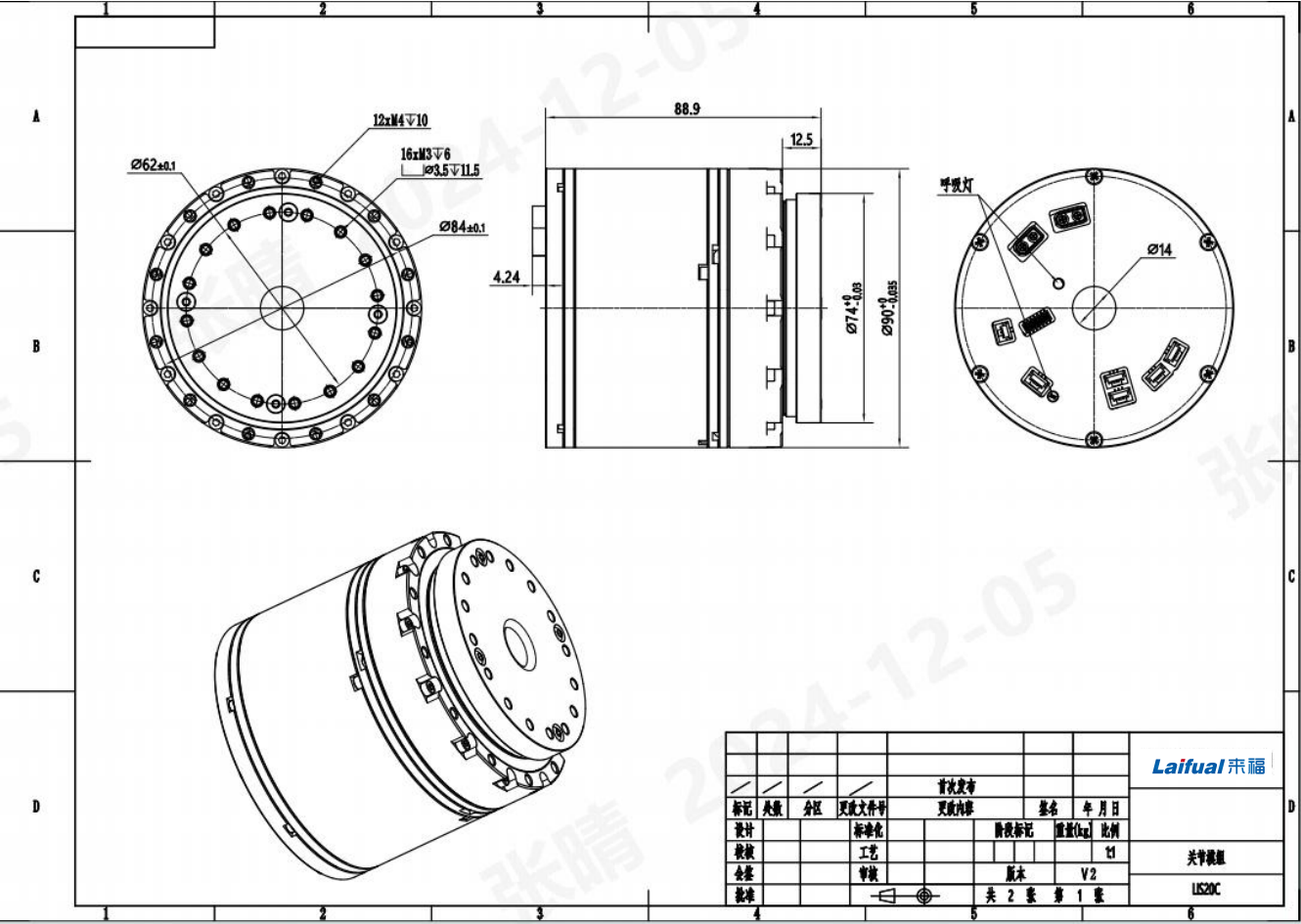
L-80-I-C-XX



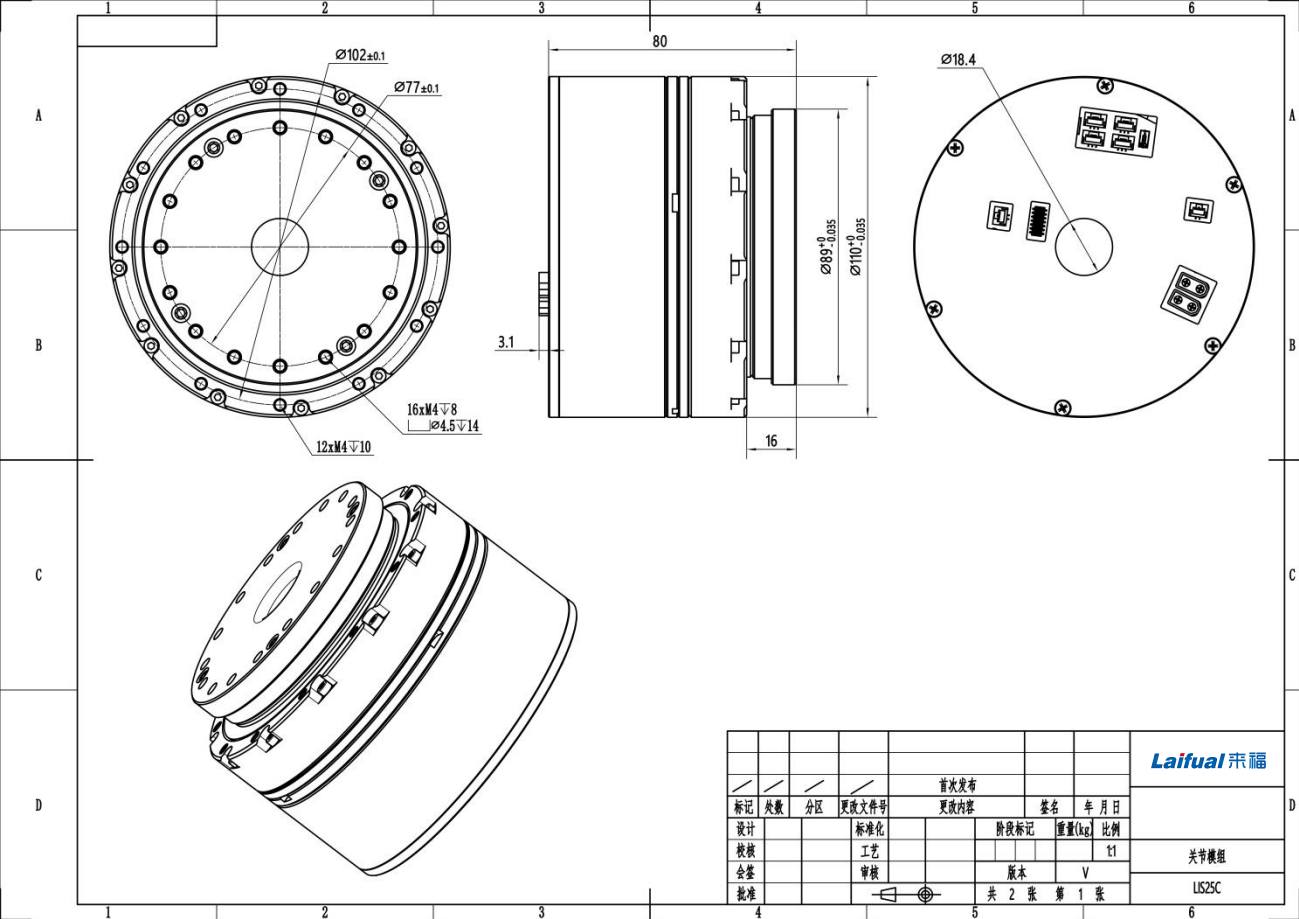
L-80-I-E-XX



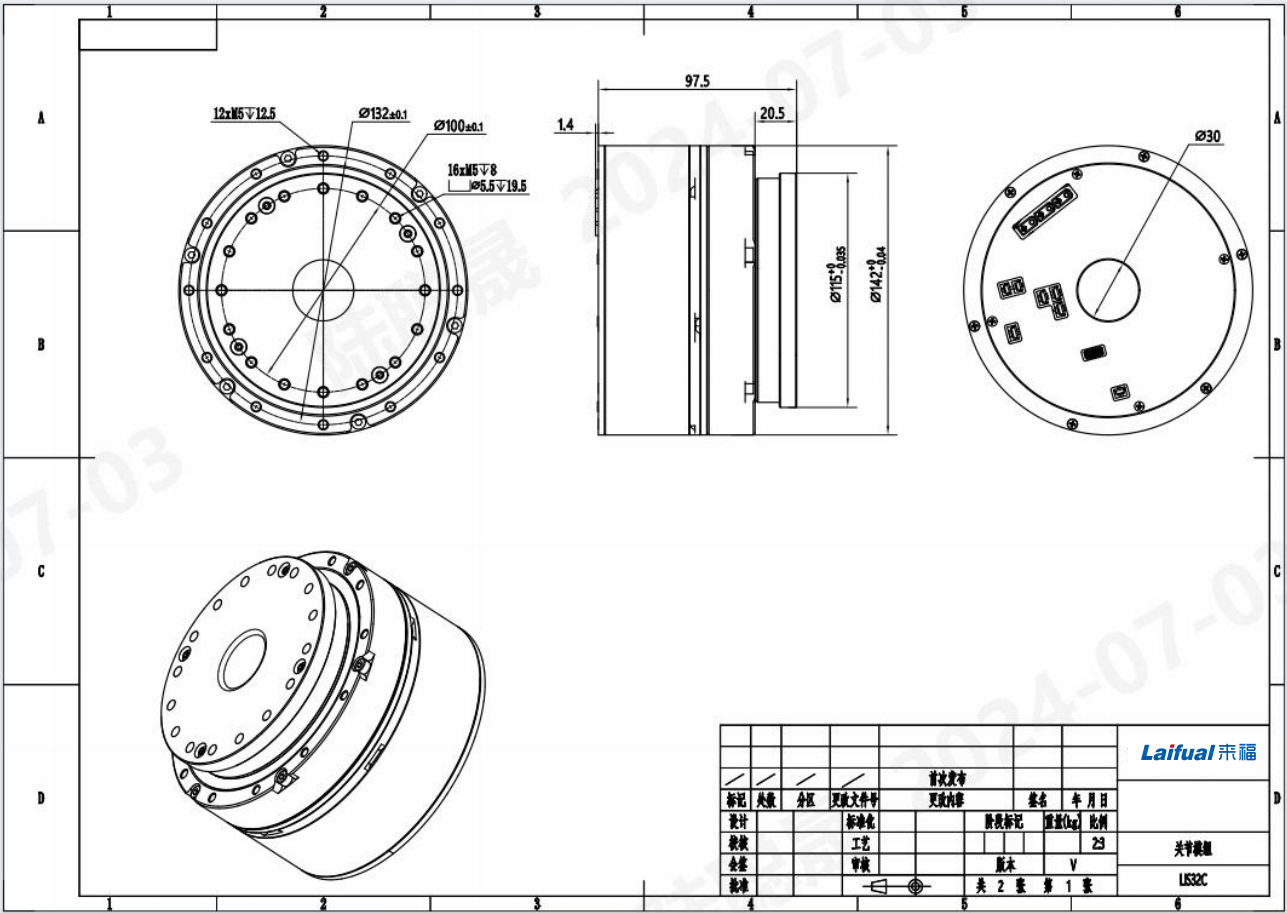
L-90-I-C-XX



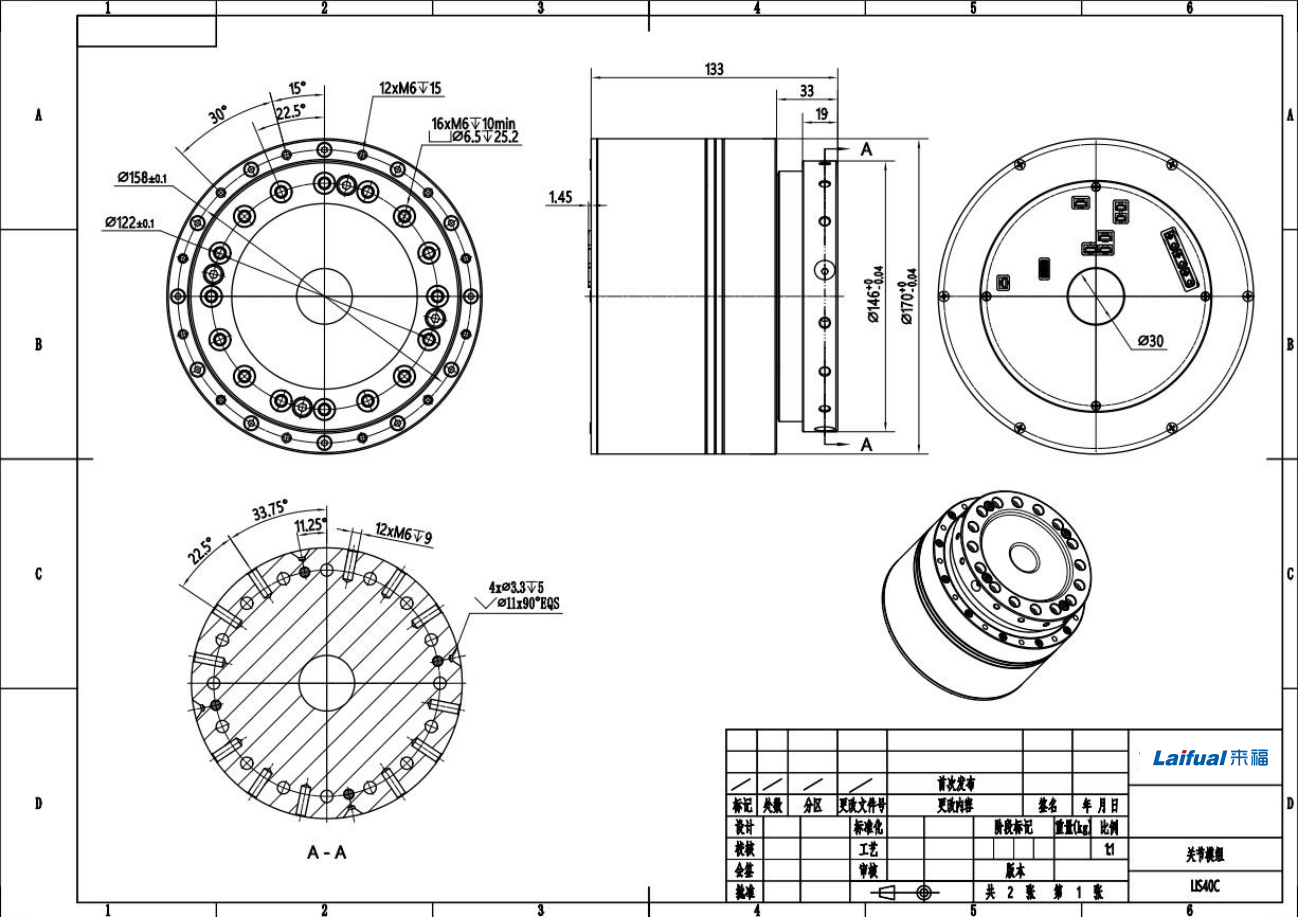
L-110-I-C-XX



L-142-I-C-XX



L-170-I-C-XX



注：请检查确认图或与我们联系，以了解未显示的尺寸公差。

Note: Please refer to the confirmation drawings or contact us to obtain information about the dimensional tolerances not shown.

Chapter5 Mechanical Accuracy

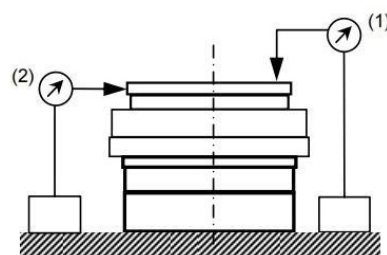
The mechanical accuracy of the output shaft and mounting flange for the low-voltage series modules is as follows:

Accuracy Items	L70I	L80I	L90I	L110I	L142I	L170I
1. Output Shaft End Deviation	0.015	0.015	0.015	0.015	0.015	0.015
2. Output Shaft Runout	0.02	0.02	0.02	0.02	0.02	0.02
3. Parallelism between Output Shaft and Mounting Surface	0.040	0.050	0.050	0.050	0.050	0.050
4. Coaxiality between Output Shaft and Mounting Fitting	0.040	0.050	0.050	0.050	0.050	0.050

Measurement Methods:

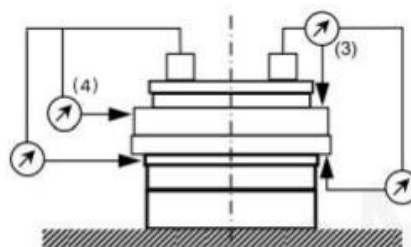
1-Output Shaft End Deviation

Measure the axial deviation (maximum amplitude) of the outermost circumference of the output shaft during one full rotation using an indicator fixed in place.



2-Output Shaft Runout

Measure the radial deviation (maximum amplitude) of the output shaft during one full rotation using an indicator fixed in place.



3-Parallelism between Output Shaft and Mounting Surface

Measure the axial deviation (maximum amplitude) of the outermost circumference of the mounting surface (both the output shaft side and the opposite side) during one full rotation using an indicator installed on the rotating part of the output.

4-Coaxiality between Output Shaft and Mounting Fitting

Measure the radial deviation (maximum amplitude) of the mounting fitting (both the output shaft side and the opposite side)

during one full rotation using an indicator installed on the rotating part of the output.

Chapter6 Encoder Specifications

The built-in encoder in the low-voltage series is a multi-turn absolute encoder capable of recording absolute positions and absolute rotation counts. It consists of a single-turn detector (17-bit) for detecting the motor shaft's rotational position and a multi-turn detector (16-bit) for detecting the number of rotations. This encoder continuously detects the mechanical absolute position, regardless of the power ON/OFF status of the driver and external controller, and utilizes battery backup for data preservation. As long as the origin positioning is performed during mechanical installation, there is no need for origin resetting upon each power-up. It is also easy to restore after power outages or malfunctions. The encoder communicates directly with the internal drive board, eliminating the need for any additional configuration operations.

Specifications

Type	Magnetic sensor / electronic battery backup system
Single-turn Detector	2 ¹⁷ :131072pulses
Multi-turn Detector	2 ¹⁶ :65536(-32768~32767)
Maximum Permissible Encoder Speed	7000 r/min ^{*1}
Safety and Redundancy	Matching detection method based on dual single-turn detectors Matching detection method based on dual cumulative rotation counters
External Battery Backup Duration	5 years (when not powered) ^{*2}

^{*1}:The maximum speed at which the encoder can rotate, which is distinct from the speed at which the motor can drive.

^{*2}:This value applies when the motor shaft is not moving. If the shaft rotates frequently while the system is unpowered, the external battery will deplete more quickly

Output Shaft Resolution

Encoder Resolution		17bit(217:131072Pulses)					
Reduction Ratio		1:31	1:51	1:81	1:101	1:121	1:161
Output Shaft Resolution	Pulses per Revolution	4063232	6684672	10616832	13238272	15859712	21102592
Single Pulse Angle	seconds	approx 0.3	approx 0.2	approx 0.12	approx 0.1	approx 0.082	approx 0.061

Absolute Position Data

'Absolute Position': Refers to the absolute position within one rotation of the motor shaft.

'Multi-turn Rotation': Indicates the number of rotations of the motor.

The position of the output shaft of the transmission device can be calculated using the following formula:

Transmission Device Output Shaft Position=(Absolute Position+Multi-turn Rotation Data×Encoder Resolution)÷Reduction Ratio

Chapter 7 Environment and Installation

Operating Environment

The operating conditions for the low-voltage series modules are as follows:

- Operating Temperature: 0-40° C

The temperature inside the cabinet may be higher than the ambient temperature, depending on the power dissipation of the enclosed equipment and the size of the cabinet.

Plan the cabinet size, cooling system, and equipment placement to ensure the ambient temperature remains at or below 40° C.

- Operating Humidity: 20%-80%

Ensure no condensation. Note that condensation may occur with significant day-to-night temperature changes or frequent starting and stopping of actuators.

- Vibration: 24.5 m/s² (2.5G) (10-400Hz)

The module cannot operate in applications subjected to continuous shock.

- Operating Environment: No dust, condensation, metal powder, corrosive gases, water, oil mist, etc.
- Protection Rating: IP54
- Altitude: Below 1000 meters
- Leakage Measures:

Oil seals in rotating and sliding areas cannot completely prevent lubricant leakage. If the actuator is used in clean rooms or similar environments, additional oil leakage prevention measures should be provided.

- Installation Location:

Should be installed indoors or in protected outdoor areas, avoiding direct exposure to sunlight.

Installation Steps

When installing the module, do not hit the module with a hammer. The module's reducer is a precision mechanism, and the module is equipped with an encoder. Excessive impact may damage the reduction mechanism and the encoder.

1.Align the Module Output and Load Shaft Precisely.

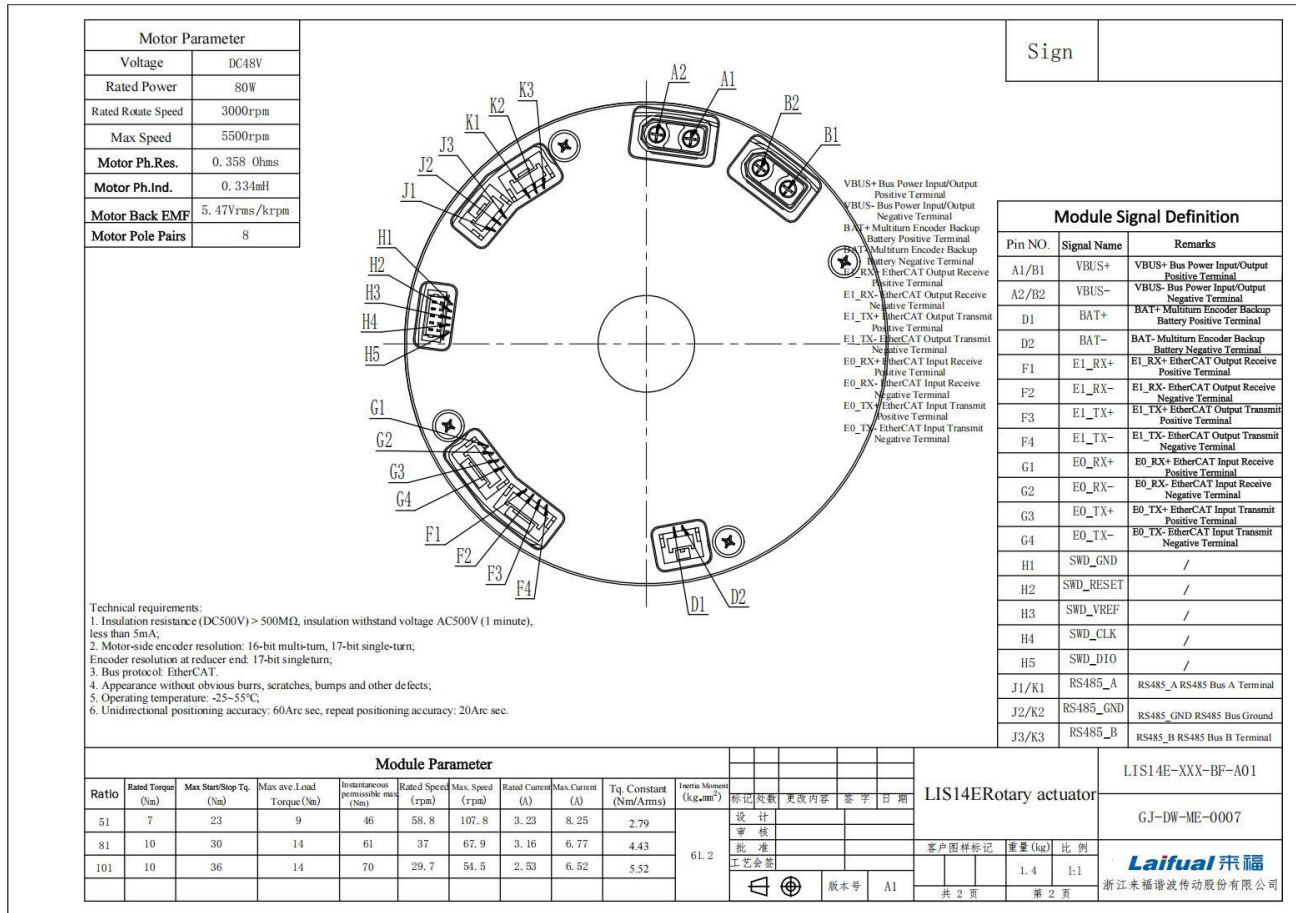
Note: Perform this alignment carefully, especially when using rigid couplings. Even slight misalignment can cause the actuator to exceed the allowable load, leading to damage to the output shaft.

2.Use flat washers and high-strength bolts to secure the module flange to the load end,Tighten them with a torque wrench to control the tightening torque.

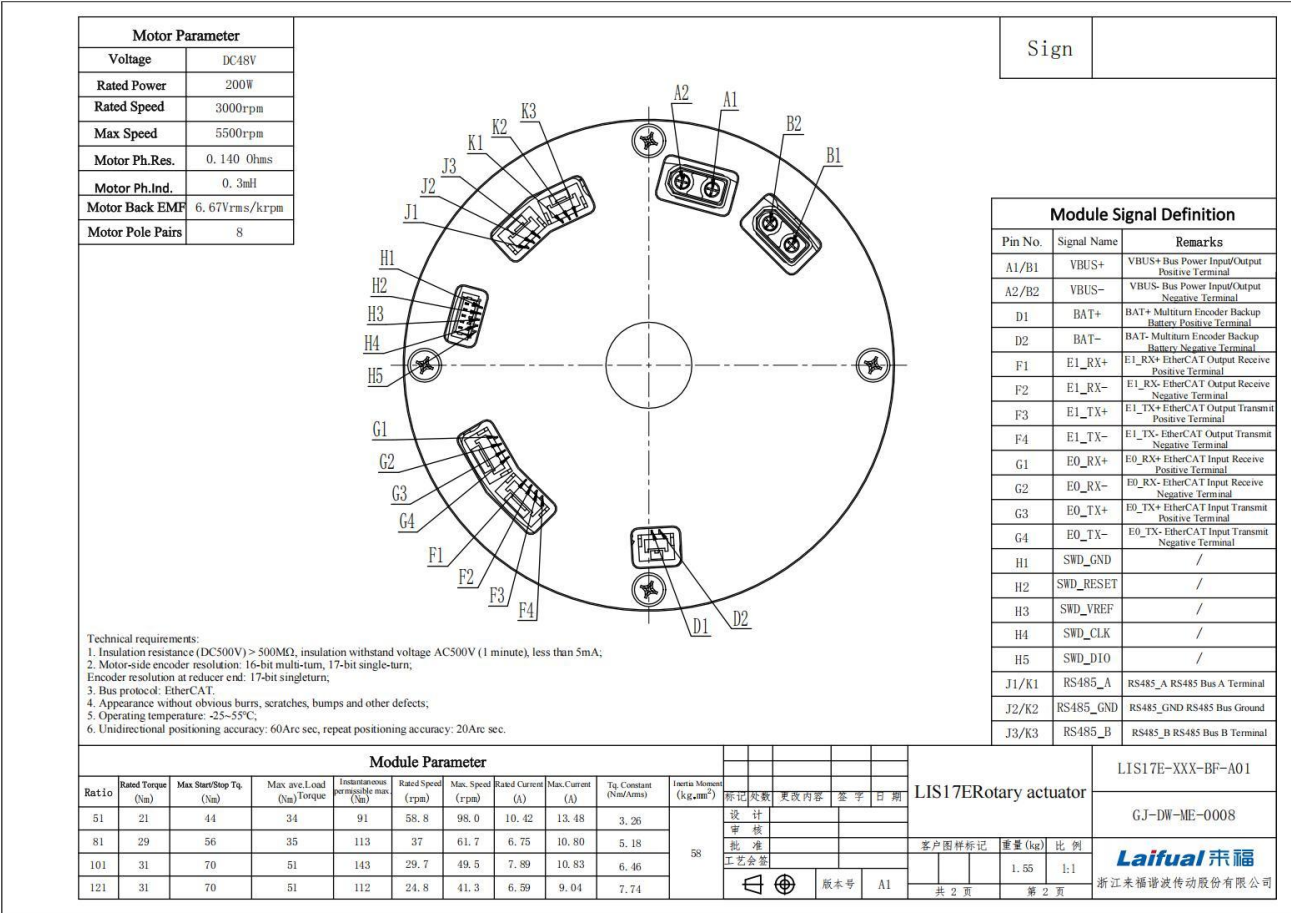
The tightening torque is shown in the table below

Module Item		L-70-I		L-80-I		L-90-I		L-110-I		L-142-I		L-170-I	
		Output shaft	Flange	Output shaft	Flange	Output shaft	Flange	Output shaft	Flange	Output shaft	Flange	Output shaft	Flange
Tightening Torque	Bolt Specification	M3	M3	M3	M3	M3	M4	M4	M4	M5	M5	M6	M6
	Hole Depth	16.5	7.5	16.5	4.5	17.5	10	22	10	27.5	12.5	/	/
	N*m	1.5	1.5	1.5	1.5	1.5	3	3	3	6	6	/	/
	Kgf*cm	15.3	15.3	15.3	15.3	15.3	30.6	30.6	30.6	61.2	61.2	/	/

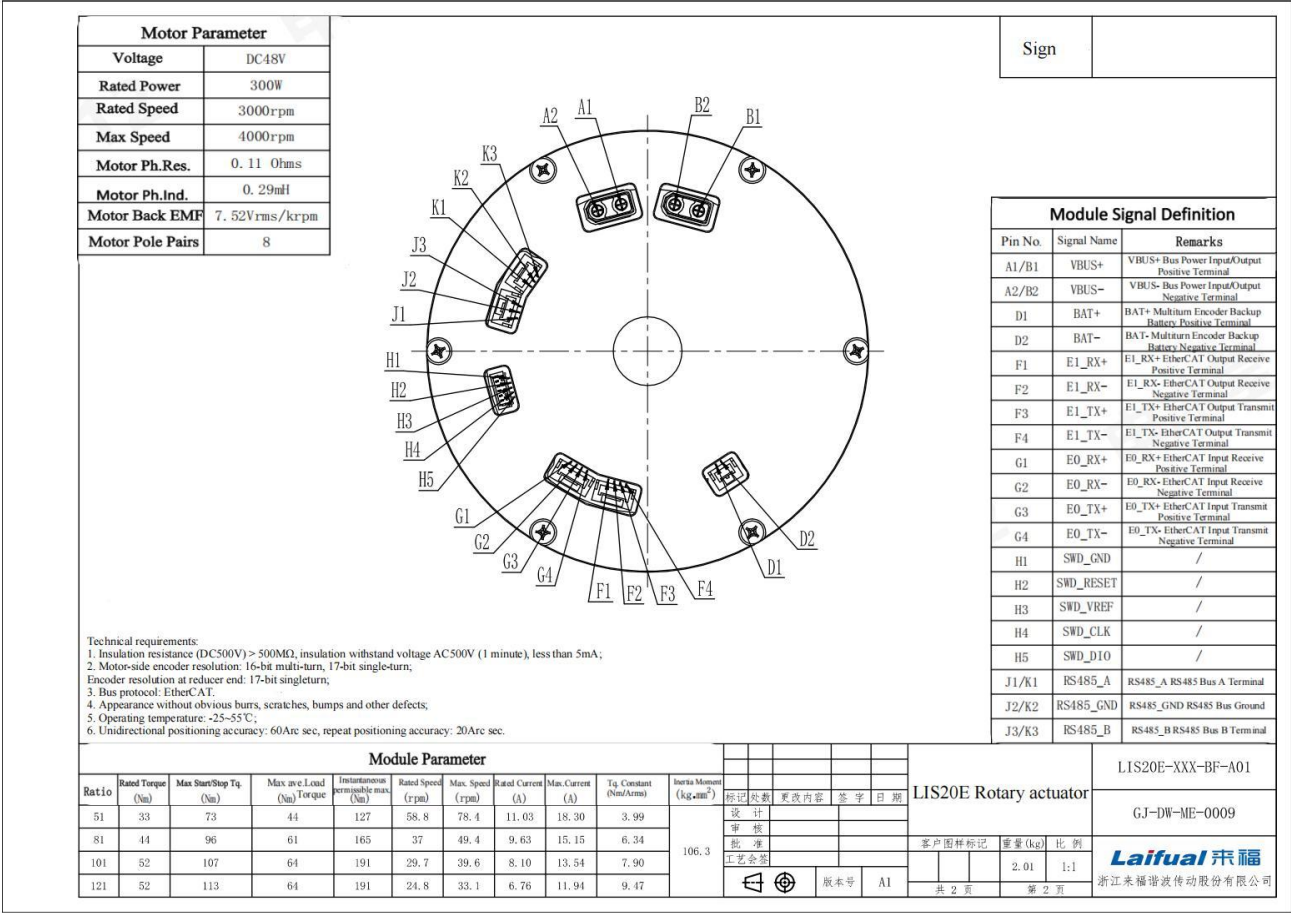
L-70-I-E-XX



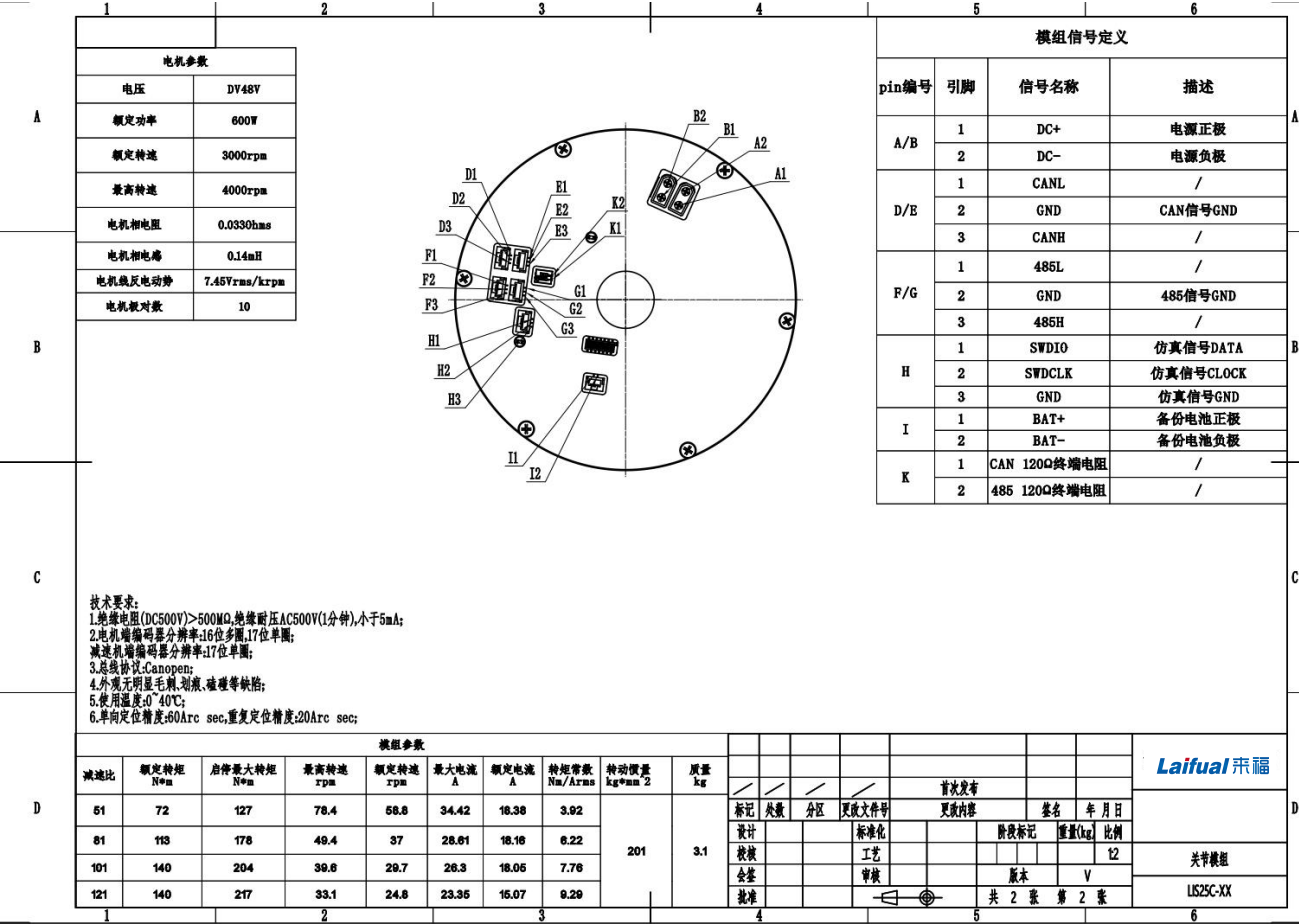
L-80-I-E-XX



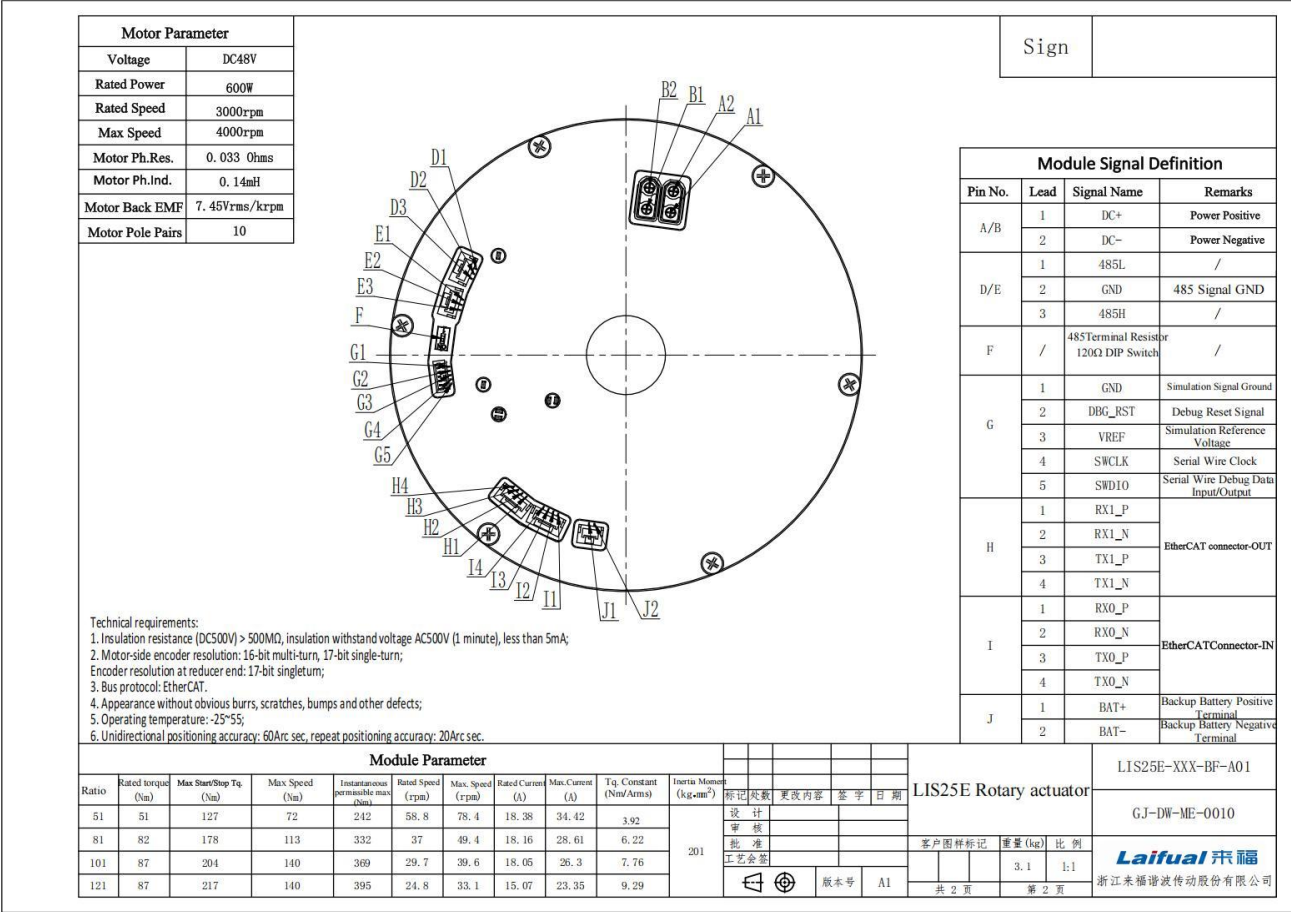
L-90-I-E-XX



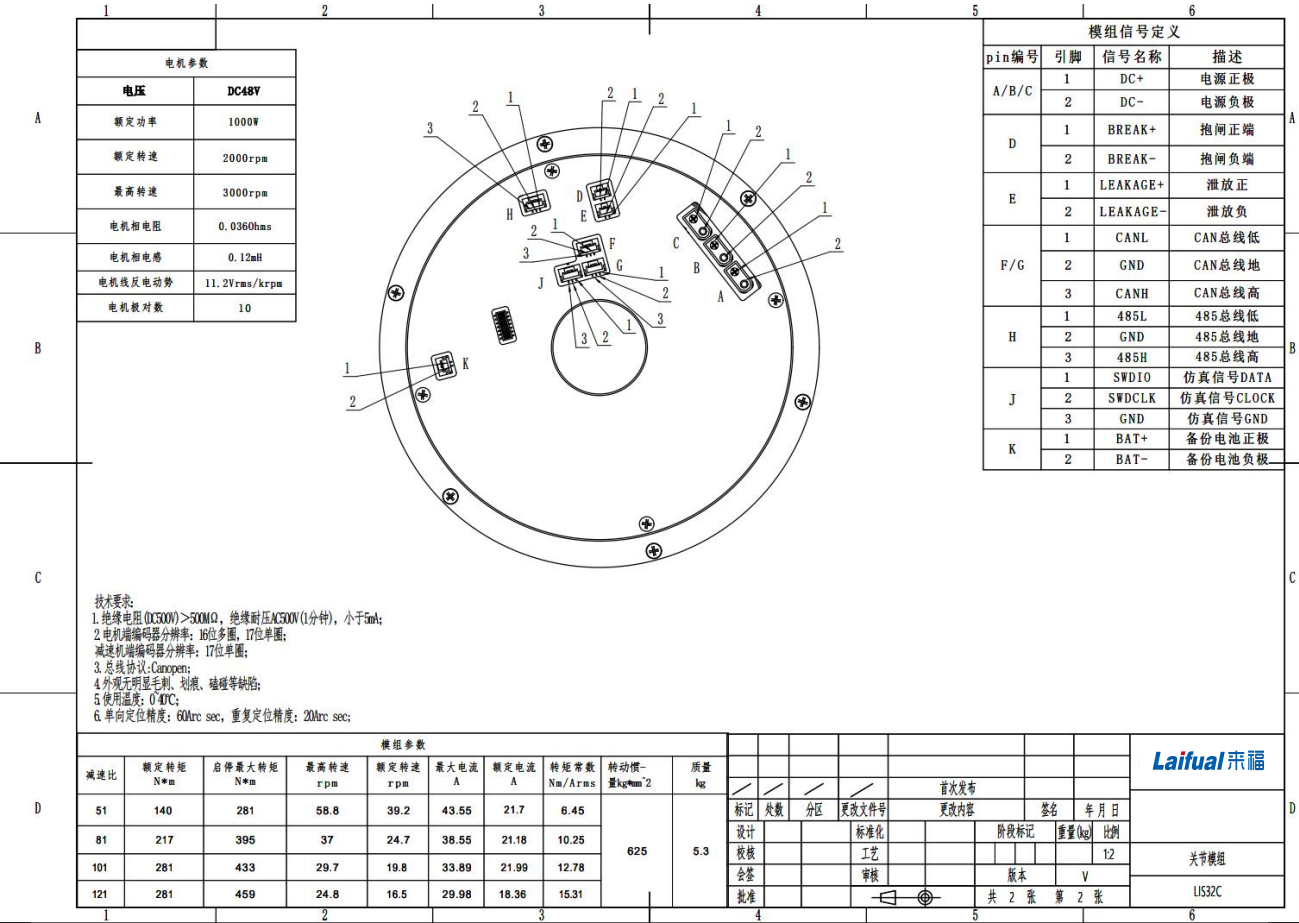
L-110-I-C-XX



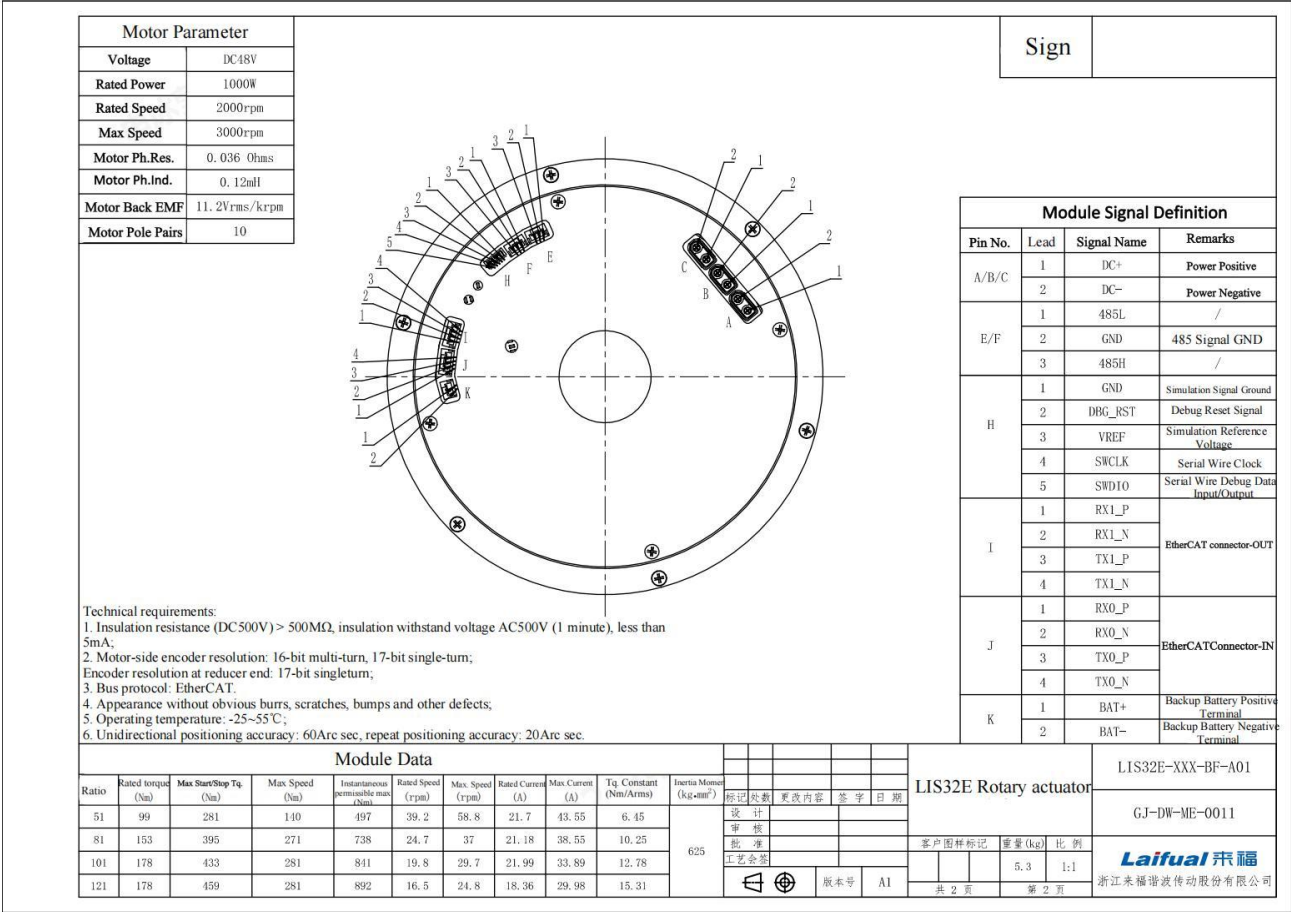
L-110-I-E-XX



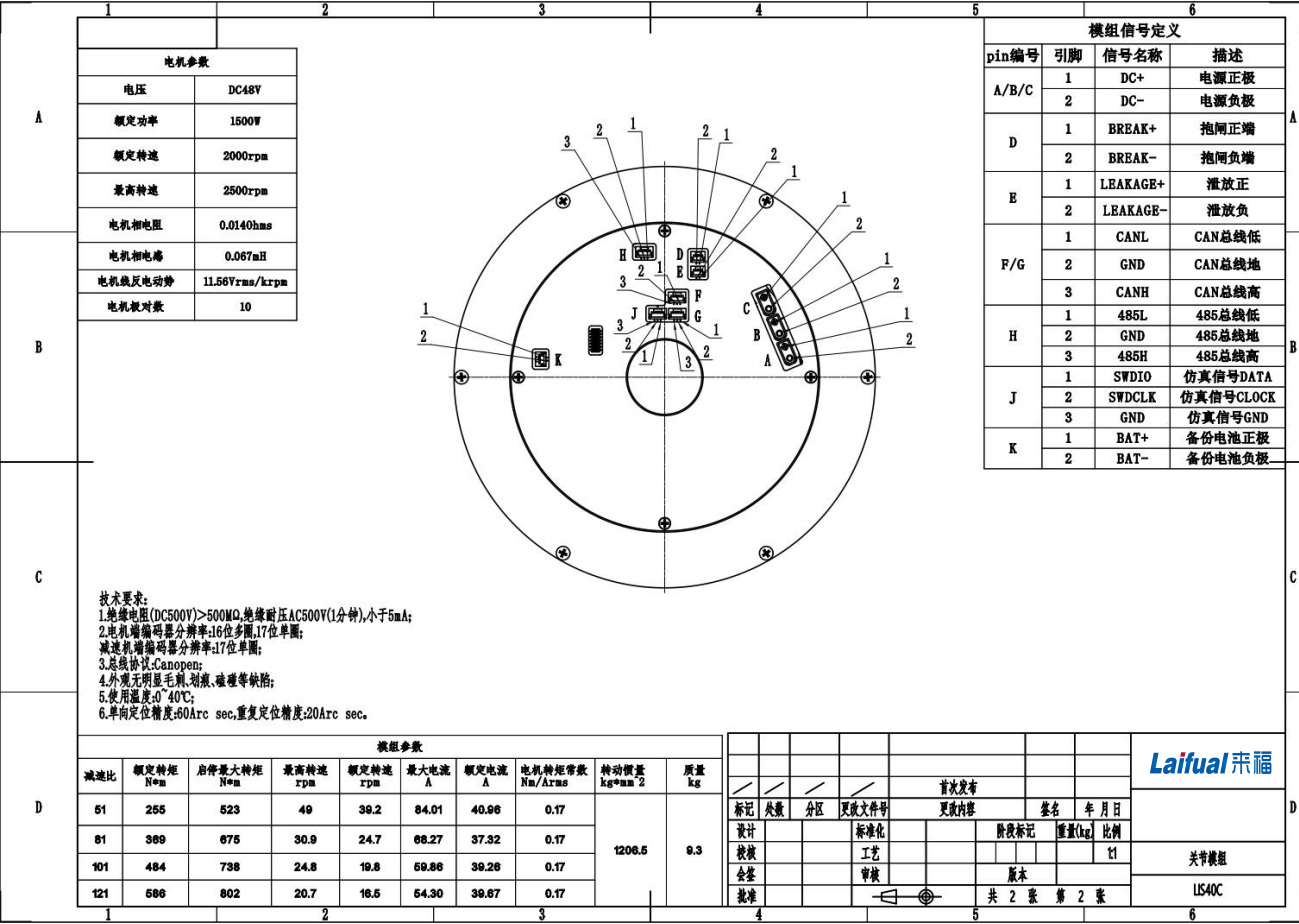
L-142-I-C-XX



L-142-I-E-XX



L-170-I-C-XX



Chapter9 Debugging and Operation

Introduction

This manual provides instructions on how to use the AthDrive PC software developed, designed, and implemented by Nanjing Kaimaide Robot Technology Co., Ltd., including usage methods, precautions, and other relevant information. Please read it carefully before operation.

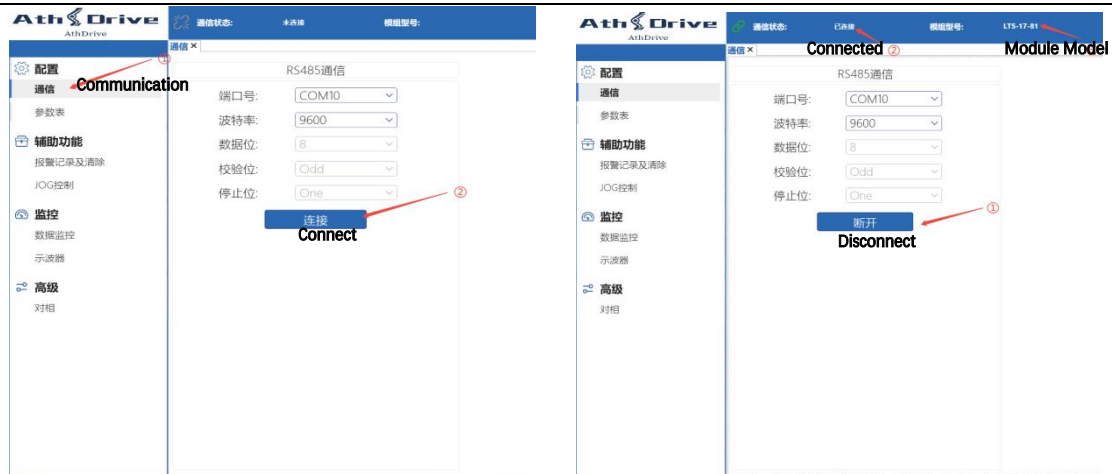
AthDrive is a professional software specifically developed for Laifual's low-voltage series modules. The software includes various functions such as parameter settings, phase searching, and jogging tests. The interface is clean, with clear functional areas, a low learning curve, and allows users to quickly debug and use the low-voltage modules.

Installation

Download from the official website www.laifualdrive.com under "Services & Support" - "Download Center."

Parameter Confirmation and Recovery

1. Open the PC software, select "Configuration" - "Communication."
Click the "Connect" button. Once connected successfully, the "Communication Status" will display as "Connected," and the corresponding "Module Model" will be shown.
(If "Open port failed" appears, please unplug and reinsert the USB interface, then try reconnecting.)



2, Click the "Advanced User" button, enter the password "123456", and click "OK" to enter advanced user mode.



3、Phase operation

3.1 Open "Parameter Table", click "Upload" button to upload motor parameters.

Ath Drive
AthDrive

通信状态: 已连接 模组型号: LTS-17-81

会员 简体中文

参数表 ×

查询参数:

Upload

参数表 Parameter table

全部参数

自定义

P0.XX

P1.XX

P2.XX

P3.XX

P4.XX

P5.XX

P6.XX

P7.XX

P8.XX

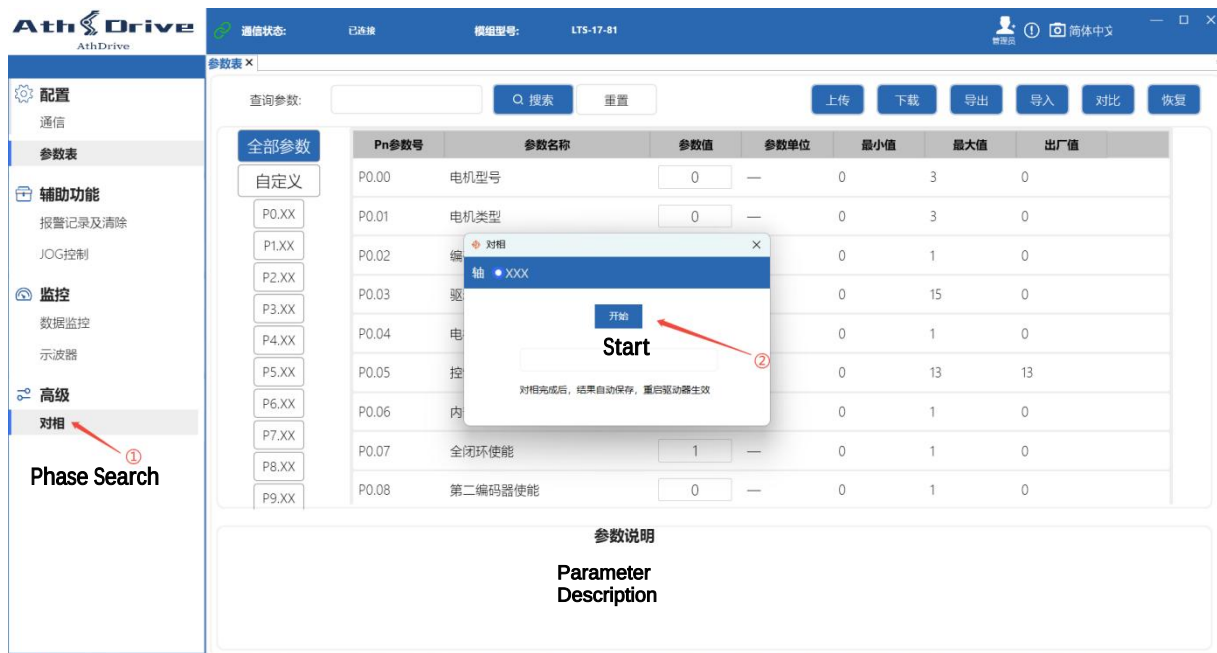
P9.XX

Pn参数号	参数名称	参数值	参数单位	最小值	最大值	出厂值
P0.00	电机型号		—	0	3	0
P0.01	电机类型		—	0	3	0
P0.02	编码器类型		—	0	1	0
P0.03	驱动器型号		—	0	15	0
P0.04	电机旋转正方向		—	0	1	0
P0.05	控制模式旋转		—	0	13	13
P0.06	内部使能指令		—	0	1	0
P0.07	全闭环使能		—	0	1	0
P0.08	第二编码器使能		—	0	1	0

参数说明

3.2. Open "Phase Search", click the "Start" button to begin the phase search operation. Once the phase search is complete, the phase value will be displayed in the pop-up

window.



3.3. Click the "Start" button again to perform the secondary phase search.

The results of both phase searches should be similar. If the difference is large, please confirm whether the encoder calibration has been completed.

3.4. After both phase searches are completed, power off and restart the module. At this point, the phase search operation is complete.

4、Confirmation of parameters

Click upload 'parameter table' after power off and restart, confirm whether the following parameters in the 'parameter table' correspond to the module, and whether they are the same as the phase values shown in the 'phase pairing' operation.

Ath Drive 通信状态: 已连接 模组型号: LTS-17-81 管理员 简体中文

参数表 X

查询参数:

全部参数

自定义

P0.XX

P1.XX

P2.XX

P3.XX

P4.XX

P5.XX

P6.XX

P7.XX

P8.XX

P9.XX

Pn参数号	参数名称	参数值	参数单位	最小值	最大值	出厂值
P0.00	电机型号 Motor Module	0	—	0	3	0
P0.01	电机类型 Motor Type	0	—	0	3	0
P0.02	编码器类型 Encoder Type	1	—	0	1	0
P0.03	驱动器型号 Driver Type	1	—	0	15	0
P0.04	电机旋转正方向 Motor rotation positive direction	0	—	0	1	0
P0.05	控制模式旋转 Control mode rotation	—	—	0	13	13
P0.06	内部使能指令 Internal enable command	0	—	0	1	0
P0.07	全闭环使能 Full closed-loop enable	—	—	0	1	0
P0.08	第二编码器使能 Secondary encoder enable	0	—	0	1	0

参数说明

P0.01 重启生效
选用的电机参数表格
[0]LTS
[1]LIS

Restart to take effect
Selected motor parameter table

Ath Drive 通信状态: 已连接 模组型号: LTS-17-81 管理员 简体中文

参数表 X

查询参数:

全部参数

自定义

P0.XX

P1.XX

P2.XX

P3.XX

P4.XX

P5.XX

P6.XX

P7.XX

P8.XX

P9.XX

Pn参数号	参数名称	参数值	参数单位	最小值	最大值	出厂值
P0.00	电机型号	0	—	0	3	0
P0.01	电机类型	0	—	0	3	0
P0.02	编码器类型	1	—	0	1	0
P0.03	驱动器型号 Driver Type	1	—	0	15	0
P0.04	电机旋转正方向	0	—	0	1	0
P0.05	控制模式旋转	13	—	0	13	13
P0.06	内部使能指令	0	—	0	1	0
P0.07	全闭环使能	1	—	0	1	0
P0.08	第二编码器使能	0	—	0	1	0

参数说明

P0.03 重启生效
P0.03驱动器类型 (0是14模组; 1是17模组; 2是20模组; 3是25模组; 4是32模组; 40模组5)

P0.03 Restart to take effect
P0.03 Driver Type (0 is 14 module; 1 is 17 module; 2 is 20 module; 3 is 25 module; 4 is 32 module; 5 is 40 module)

Ath Drive

通信状态: 已连接 模组型号: LTS-17-81

管理

简体中文

配置

通信

参数表

辅助功能

报警记录及清除

JOG控制

监控

数据监控

示波器

高级

对相

参数表

自定义

P0.XX

P1.XX

P2.XX

P3.XX

P4.XX

P5.XX

P6.XX

P7.XX

P8.XX

P9.XX

PA.XX

查询参数:

Q 搜索

重置

上传

下载

导出

导入

对比

恢复

Pn参数号	参数名称	参数值	参数单位	最小值	最大值	出厂值
PA.0F	电流环增益	2570	1	30000	3000	
PA.10	电流环积分系数	57	0	1000	50	
PA.11	电流单位	200	0	400	400	
PA.12	模拟上电	0	0	1	0	
PA.13	相位	12366	0	65535	11800	
PA.14	Kisp1	1	1	10	1	
PA.15	Kisp2	100	1	1000	100	
PA.16	异步拖动幅值	500	10	1000	1000	

参数说明

PA.13 重启生效

PA.13 Restart

If the parameter value does not match the module information, click 'Recovery' and 'Recovery Successful' will be displayed, then power off and restart to confirm the module parameters again.

Ath Drive

通信状态: 已连接 模组型号: LTS-17-81

管理

简体中文

配置

通信

参数表

辅助功能

报警记录及清除

JOG控制

监控

数据监控

示波器

高级

对相

参数表

全部参数

自定义

P0.XX

P1.XX

P2.XX

P3.XX

P4.XX

P5.XX

P6.XX

P7.XX

P8.XX

P9.XX

查询参数:

Q 搜索

重置

上传

下载

导出

导入

对比

恢复

Pn参数号	参数名称	参数值	参数单位	最小值	最大值	出厂值
P0.00	电机型号	0	—	0	3	0
P0.01	电机类型	0	—	0	3	0
P0.02	编码器类型	1	—	0	1	0
P0.03	驱动器型号	1	—	0	15	0
P0.04	电机旋转正方向	0	—	0	1	0
P0.05	控制模式旋转	13	—	0	13	13
P0.06	内部使能指令	0	—	0	1	0
P0.07	全闭环使能	1	—	0	1	0
P0.08	第二编码器使能	0	—	0	1	0

参数说明



JOG Test Run

Open "JOG Control", click the "OFF" button to enable the servo, and click the right-side rotation arrow (hold the left mouse button for 8 seconds before releasing) to perform the rotation test.

参数表

Pn参数号	参数名称	参数值	参数单位	最小值	最大值	出厂值
P2.05	JOG 速度(旋转)	1000	Jmin-1 范围: 0~10000	3	0	0
P2.06	软启动加速时间	1000	ms 范围: 0~10000	1	0	0
P2.07	软启动减速时间	1000	ms 范围: 0~10000	15	0	0

运行

① JOG Control

② 使能 2.Enable

③ 顺时针运行 3.Clockwise rotation

④ 逆时针运行 4.Counterclockwise rotation

⑤ 持续运动锁定状态 5.Continuous motion locked state

The program JOG

The program JOG can be executed by sequentially writing and modifying the following parameters in the "AthDrive PC Software" - "Parameter Table":

1 **P7.00** Bus Mode 0 (No Bus)

2 **P0.05** Control Module 12

3 **P6.00** JPOS0 Position Control Pulse (High) 1310

(Set the value of the first position, where the value multiplied by 10000 and added to the low-value will give the target position pulse.)

P6.01 JPOS0 Position Control Pulse (Low) 7200

P6.02 JPOS1 Position Control Pulse (High) -1310

(Set the value of the second position, where the value multiplied by 10000 and added to the low-value will give the target position pulse.)

P6.03 JPOS1 Position Control Pulse (Low) -7200

P6.20 JPOS0 Position Speed Control 2000 (Speed control for the first position, in rpm)

P6.21 JPOS1 Position Speed Control 2000 (Speed control for the second position, in rpm)

P6.30 JPOS0 Position Filter Time 1000 (Filter time for the first position, in 0.1ms)

P6.31 JPOS1 Position Filter Time 1000 (Filter time for the second position, in 0.1ms)

P6.40 JPOS0 Position Stop Time 20 (Stop time from the current position to the next position, in 50ms)

P6.41 JPOS1 Position Stop Time 20 (Stop time from the current position to the next position, in 50ms)

4 **P4.18** Servo ON Wait Time 0

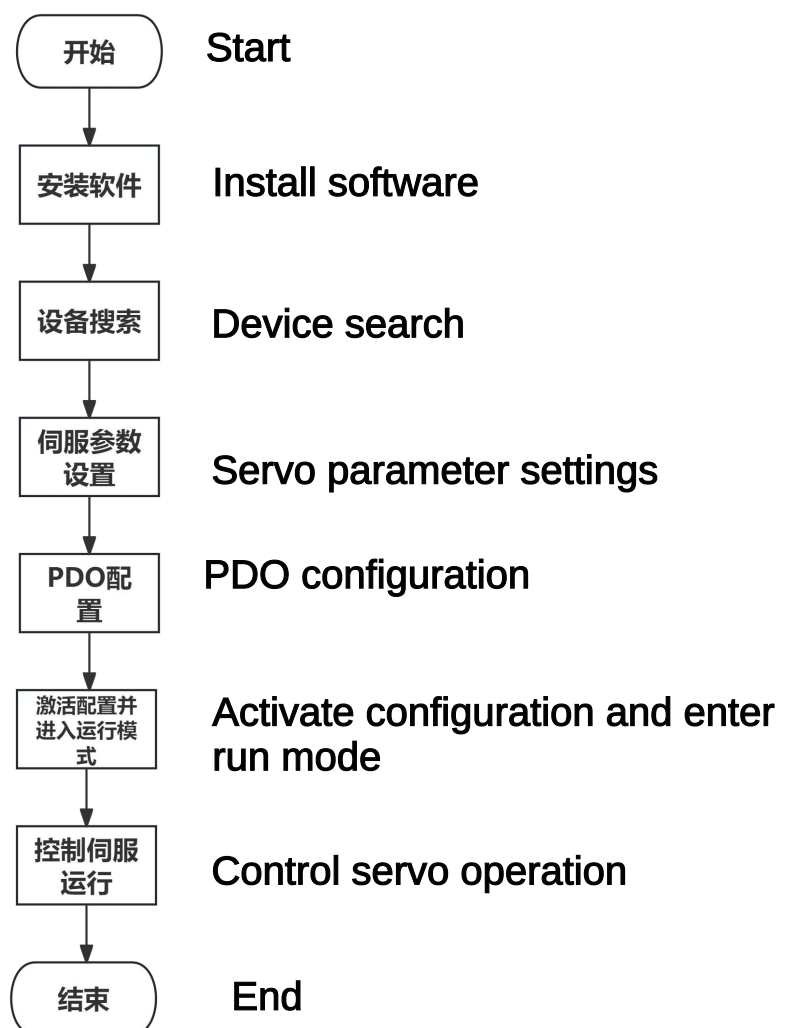
5 **P5.01** Set to 1 to start the operation

Chapter10 Communication Configuration

Example

Operation example with Beckhoff controller.

The following will describe the simple configuration and usage process of the module, using Beckhoff's TwinCAT 3 master station as an example.

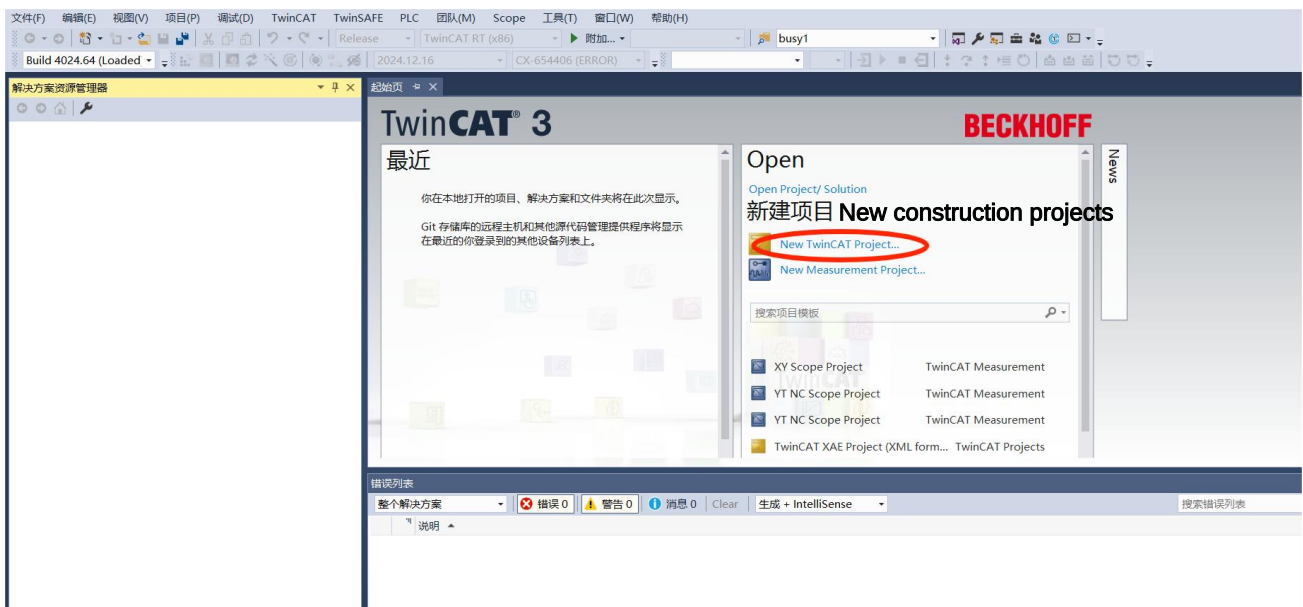


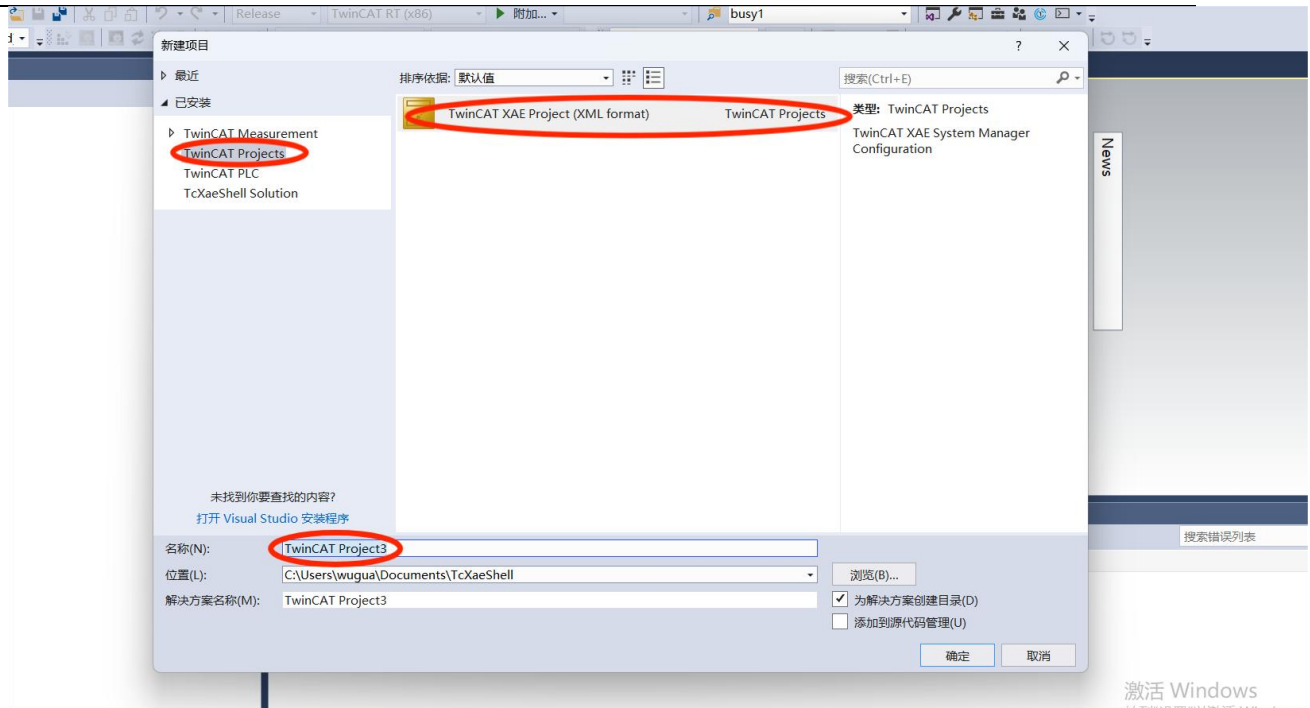
Beckhoff Controller Module Configuration Flowchart

Install TwinCAT Software

The TwinCAT 3 software can be obtained from the Beckhoff official website, and it supports Windows 7, Windows 10, and Windows 11 systems.

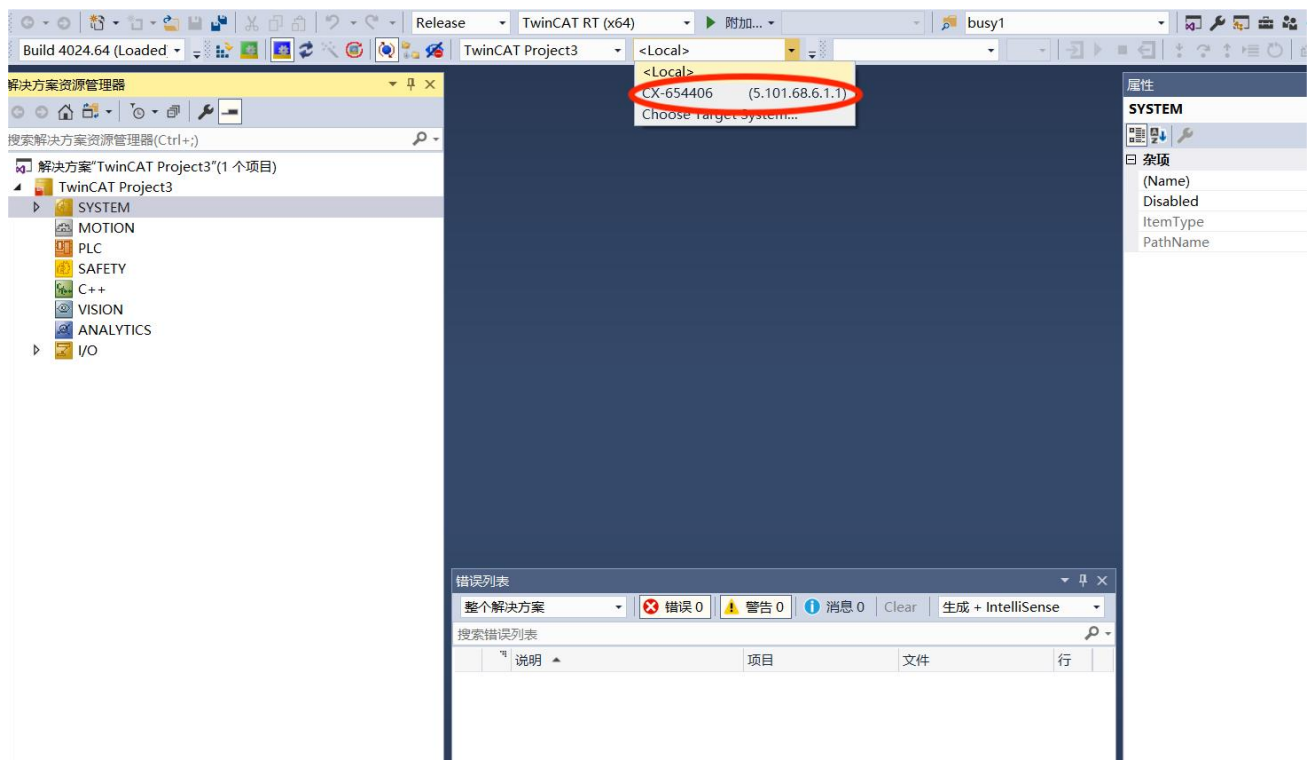
1. Copy the EtherCAT configuration file of the module () to the TwinCAT installation directory:
TwinCAT\3.1\Config\Io\EtherCAT.
2. Open EtherCAT 3 and create a new **New TwinCAT Project**.



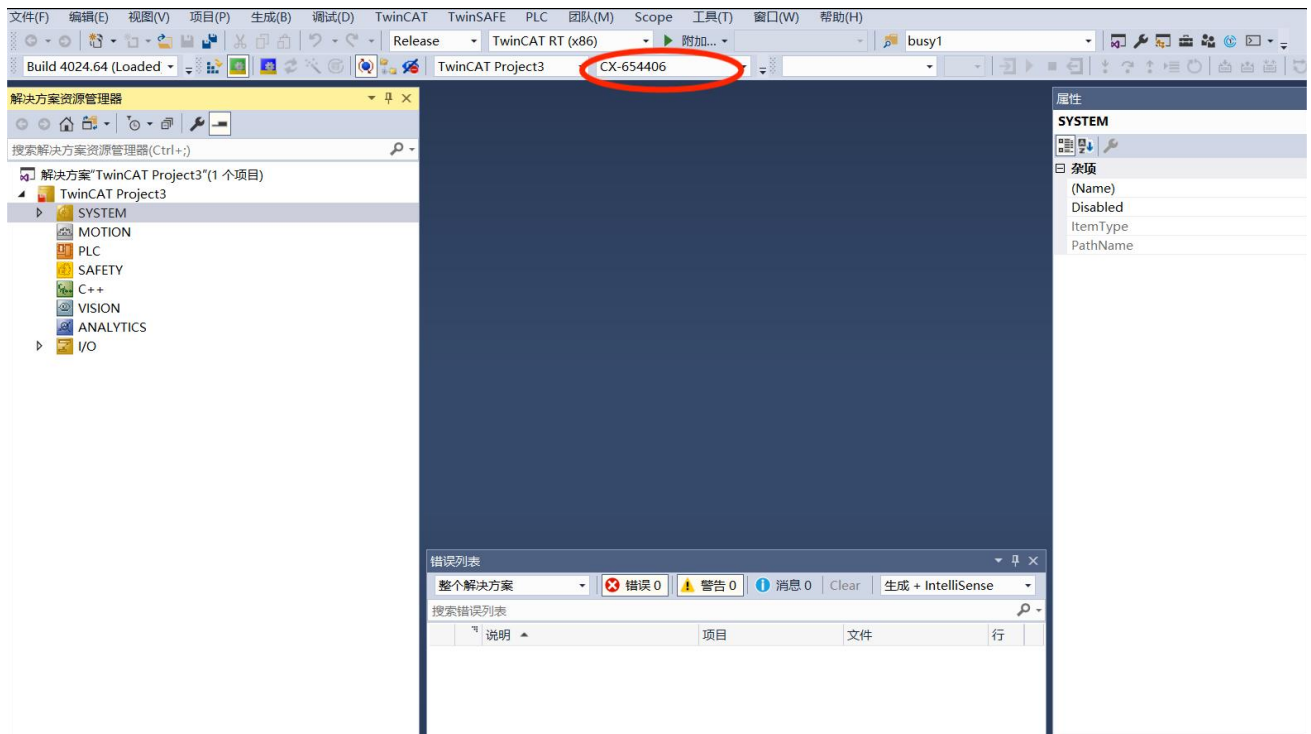


Device Search

1.Connecting Beckhoff controller

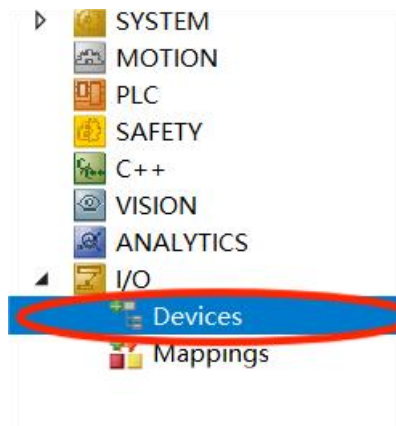


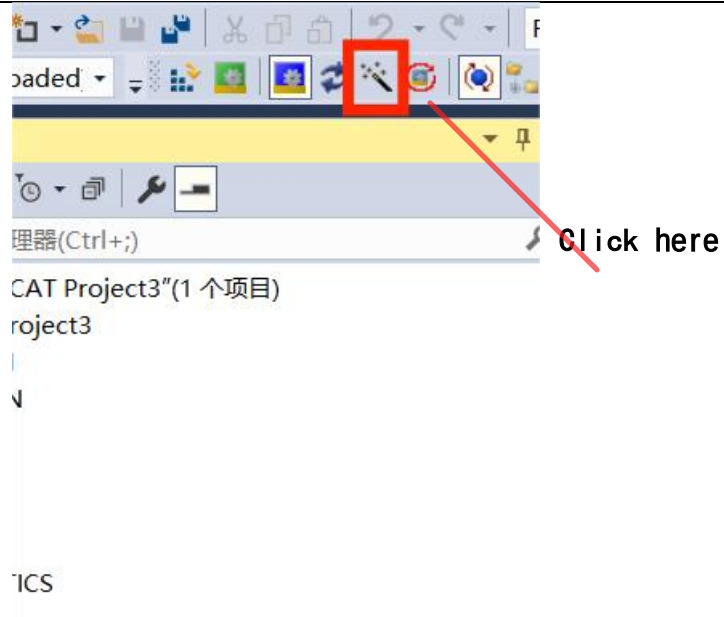
2.Connected successfully as below



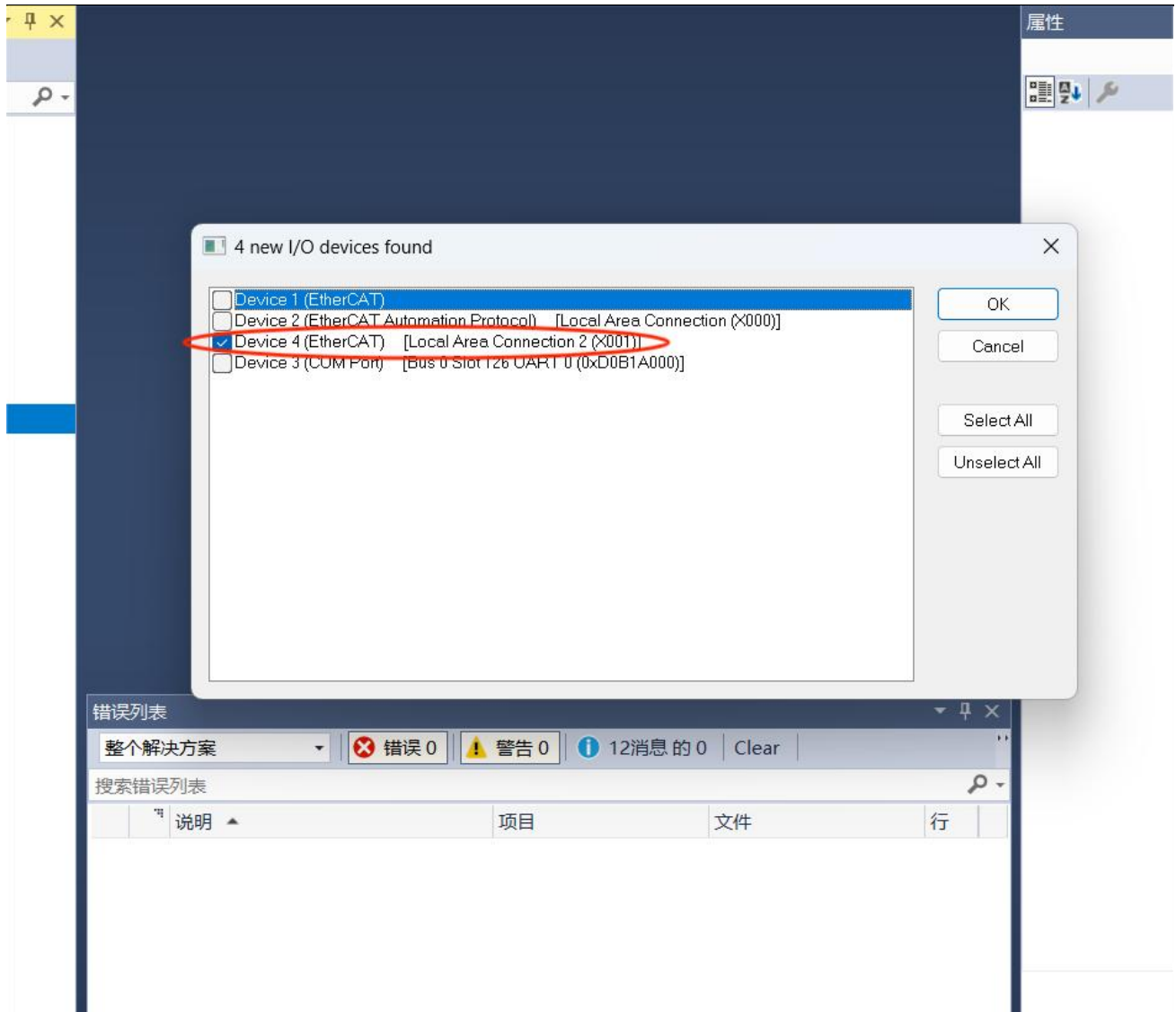
3.Start searching for devices

Choose the Devices

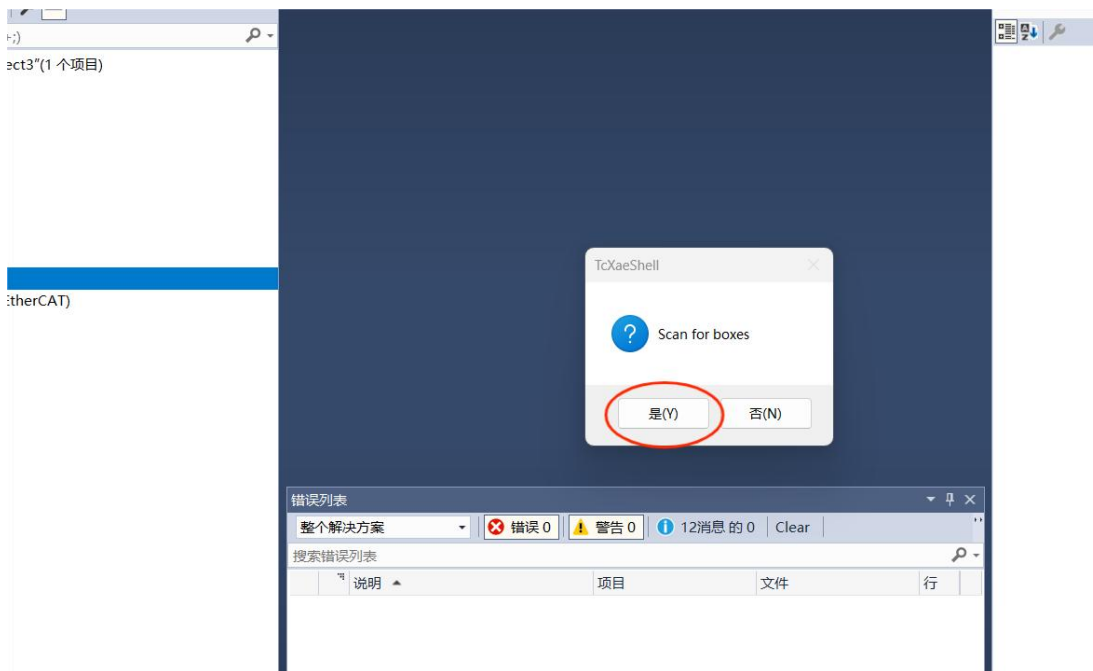




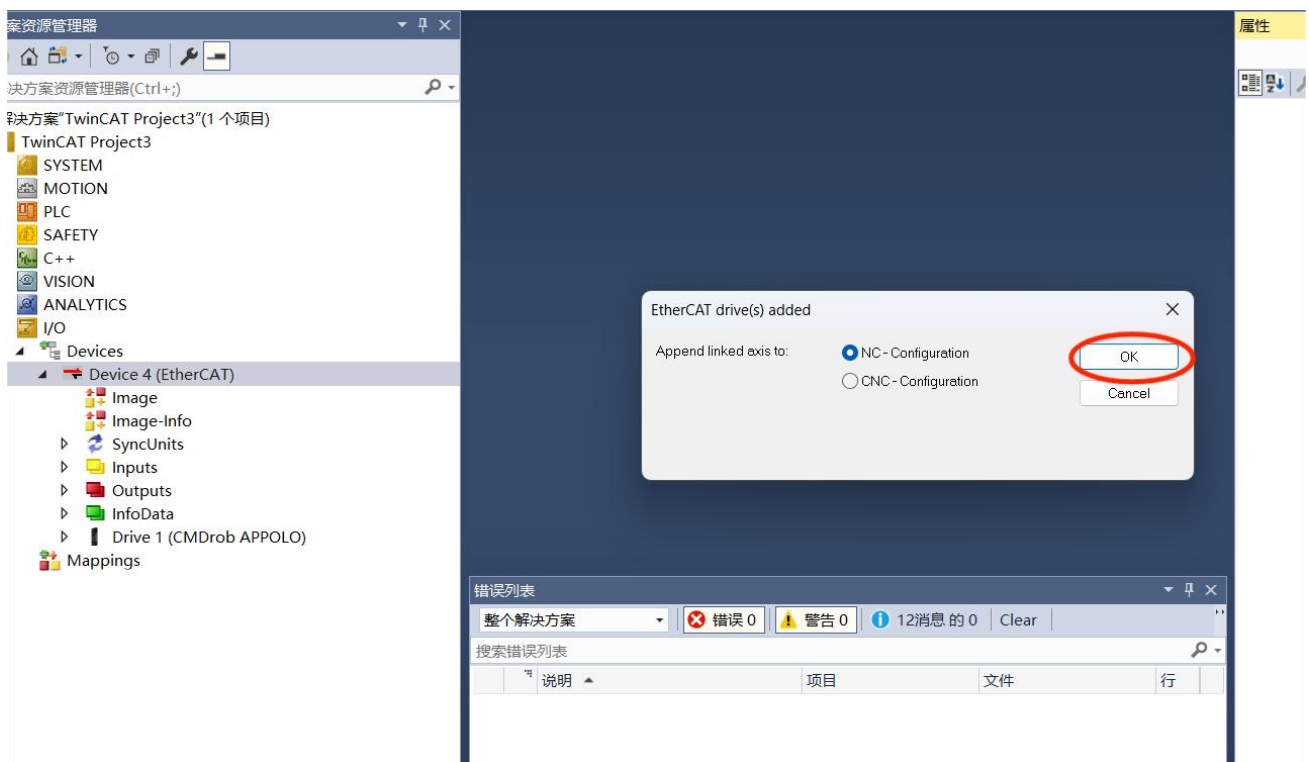
4. Check the master station port, such as Device4 (EtherCAT), which is the port number for connecting the module to the controller.



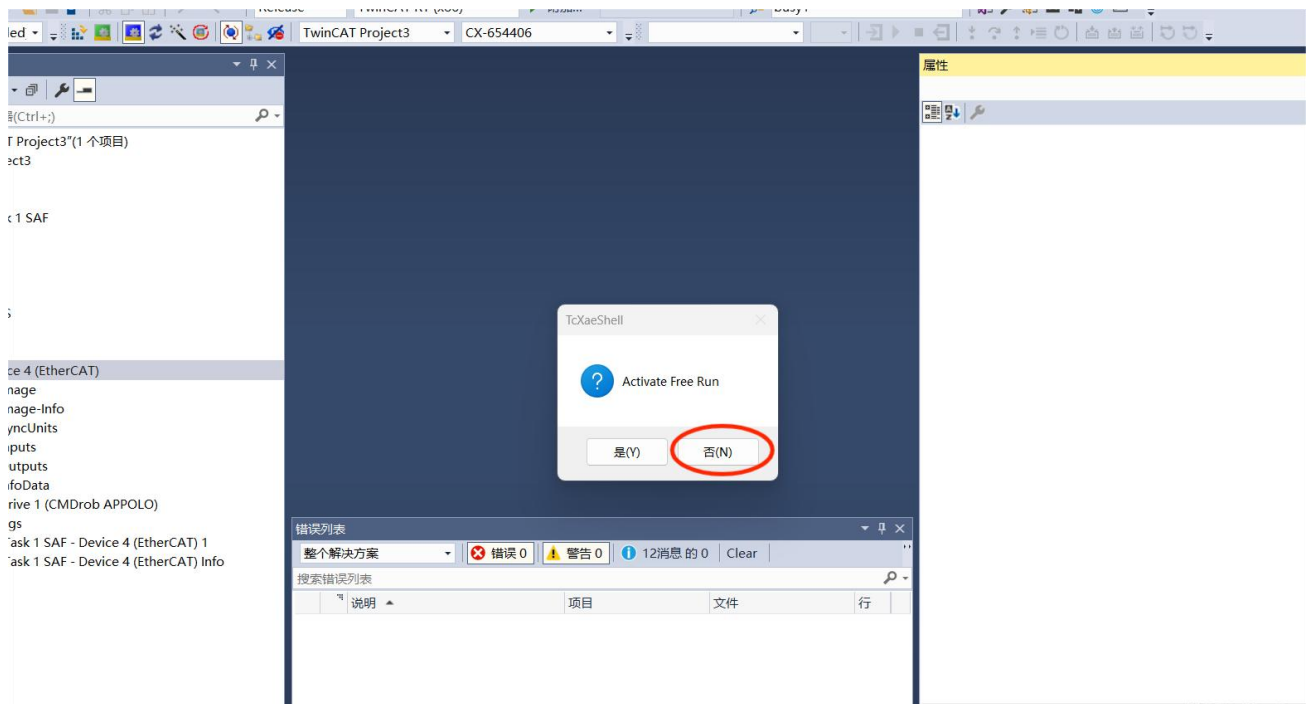
5. Click "Yes".



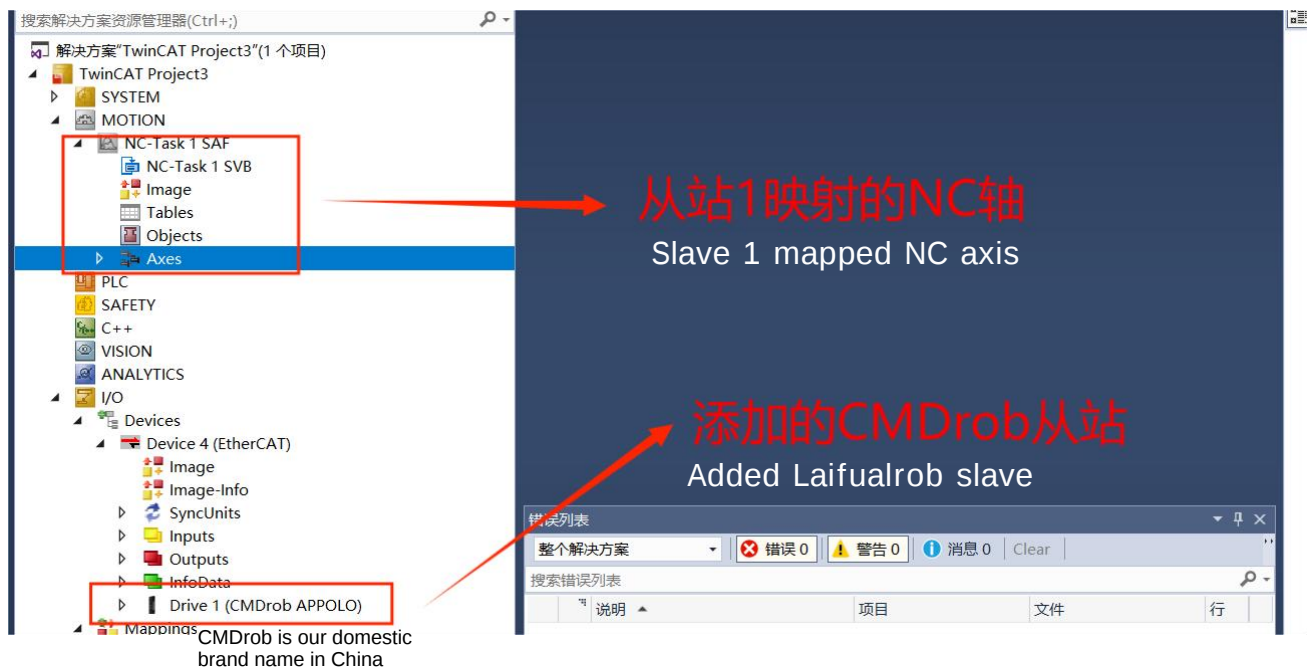
6. Click "OK".



7. Click "NO".

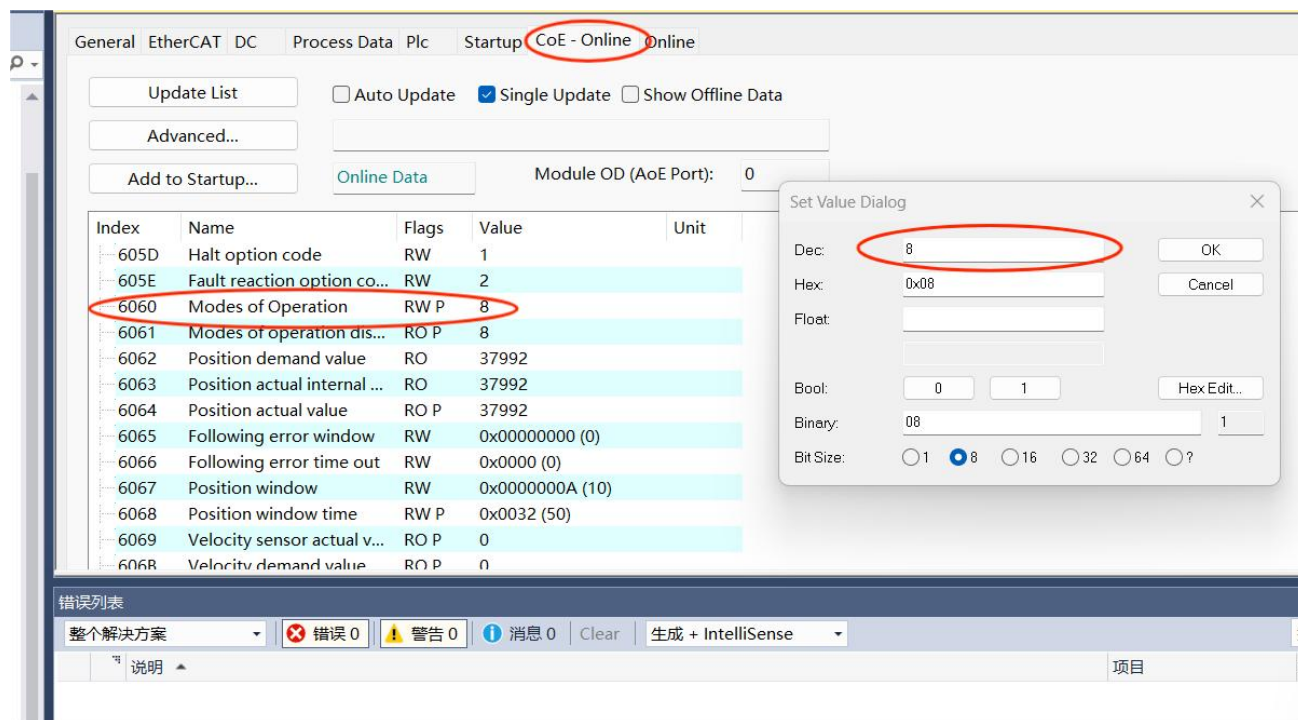


Device addition is complete, as shown in the figure below.



Servo Parameter Configuration

In the "CoE-Online" interface, set the parameters through SDO communication. For example, change 6060h to Sync Position Mode (8), and the steps are as follows:



PDO Configuration

As shown in the figure, check 0x1602 and 0x1A02 for the axis. If the current PDO meets your requirements, there is no need to change it. Otherwise, you need to modify the PDO list to fit your mode. If you need to modify it, right-click in the PDOContent window, select "Del" to delete the unnecessary default PDOs, and "Add New Item" to add the required PDO.

General EtherCAT DC Process Data Plc Startup CoE - Online Online

Sync Manager:

SM	Size	Type	Flags
0	128	MbxOut	
1	128	MbxIn	
2	12	Outputs	
3	26	Inputs	

PDO List:

Index	Size	Name	Flags	SM	SU
0x1A00	8.0	CiA402 PV Mode (TX)			0
0x1A01	8.0	CiA402 PP Mode (TX)			0
0x1A02	26.0	CoE CSP Mode (TX)		3	0
0x1A03	2.0	HM(TX)			0
0x1600	6.0	CiA402 PV Mode (RX)			0
0x1601	6.0	CiA402 PP Mode (RX)			0
0x1602	12.0	CoE CSP Mode (RX)		2	0
0x1603	2.0	HM (RX)			0

PDO Assignment (0x1C13):

☐ 0x1A00
☒ 0x1A02
☐ 0x1A03

Download

☒ PDO Assignment
☒ PDO Configuration

PDO Content (0x1A02):

Index	Size	Offs	Name	Type	Default (h...
0x6041:00	2.0	0.0	Statusword	UINT	
0x6064:00	4.0	2.0	Position actual value	DINT	
0x6077:00	2.0	6.0	Torque actual value	INT	
0x60F4:00	4.0	8.0	FollowingErrorActualValue	DINT	
0x6100:00	2.0	12.0	Touch Probe Status	UINT	

Predefined PDO Assignment: (none)

Load PDO info from device

Sync Unit Assignment...

General EtherCAT DC Process Data Plc Startup CoE - Online Online

Sync Manager:

SM	Size	Type	Flags
0	128	MbxOut	
1	128	MbxIn	
2	12	Outputs	
3	26	Inputs	

PDO List:

Index	Size	Name	Flags	SM	SU
0x1A00	8.0	CiA402 PV Mode (TX)			0
0x1A01	8.0	CiA402 PP Mode (TX)			0
0x1A02	26.0	CoE CSP Mode (TX)		3	0
0x1A03	2.0	HM(TX)			0
0x1600	6.0	CiA402 PV Mode (RX)			0
0x1601	6.0	CiA402 PP Mode (RX)			0
0x1602	12.0	CoE CSP Mode (RX)		2	0
0x1603	2.0	HM (RX)			0

PDO Assignment (0x1C12):

☐ 0x1600
☐ 0x1601
☒ 0x1602
☐ 0x1603

Download

☒ PDO Assignment
☒ PDO Configuration

PDO Content (0x1602):

Index	Size	Offs	Name	Type	Default (h...
0x6040:00	2.0	0.0	Controlword	UINT	
0x607A:00	4.0	2.0	Target Position	DINT	
0x60B8:00	2.0	6.0	Touch Probe Function	UINT	
0x60FE:01	4.0	8.0	Physical Output	UDINT	
	12.0				

Predefined PDO Assignment: (none)

Load PDO info from device

Sync Unit Assignment...

Name	Online	Type	Size	>Addr...	In/Out	User ...	Linked to
Statusword	X	UINT	2.0	95.0	Input	0	nState1, nState2
Position actual ...	X	DINT	4.0	97.0	Input	0	nDataIn1, In, Inputs, ...
Torque actual ...	X	INT	2.0	101.0	Input	0	nDataIn3[0], nDataIn3 ...
FollowingError...	X	DINT	4.0	103.0	Input	0	nDataIn1, In, Inputs, ...
Touch Probe S...	X	UINT	2.0	107.0	Input	0	nState5, nState6

PDO Assignment (0x1C12):

☐ 0x1600
☐ 0x1601
☒ 0x1602
☐ 0x1603

Download

☒ PDO Assignment
☒ PDO Configuration

PDO Content (0x1602):

Index	Size	Offs	Name	Type	Default (h...
0x6040:00	2.0	0.0	Controlword	UINT	
0x607A:00	4.0	0.0	Position feedback	DINT	
0x60B8:00	4.0	0.0	Velocity feedback	UINT	
0x60FE:01	2.0	0.0	Position limit	UDINT	

Context Menu:

- 添加新项(W)... Ctrl+Shift+A
- 删除(D) Del
- Edit
- 打印(P)... Ctrl+P
- Move Up
- Move Down

Sync Unit Assignment...

Name	Online	Type	Size	>Addr...	In/Out	User ...	Linked to
Statusword	X 1120	UINT	2.0	95.0	Input	0	nState1, nState2
Position actual ...	X 37991	DINT	4.0	97.0	Input	0	nDataIn1 . In . Inputs ...
Torque actual ...	X 0	INT	2.0	101.0	Input	0	nDataIn3[0] . nDataIn3 ...
FollowingError...	X 0	DINT	4.0	103.0	Input	0	nDataIn1 . In . Inputs ...
Touch Probe S...	X 0	UINT	2.0	107.0	Input	0	nState5, nState6

Activate Configuration and Switch to Run Mode

Build 4024.64 (Loaded) - TwinCAT RT (x86) - TwinCAT Project3 - CX-654406

Download and activate

Download

Activate Configuration

Project: TwinCAT Project3

Target: CX-654406

OK Cancel

Click

The screenshot shows the TwinCAT configuration window. On the left, under 'PDO Assignment (0x1C12)', the checkboxes for 0x1600, 0x1601, 0x1602, and 0x1603 are visible. The 'PDO Content (0x1A00)' table is also shown. A 'TcXaeShell' dialog box is open in the center, displaying a question mark icon and the text 'Restart TwinCAT System in Run Mode'. The '确定' (OK) button is circled in red, and a red arrow points to it with the label 'Click'.

After completing the configuration, you can observe that the device enters the OP state in the "Online" interface.

The screenshot shows the TwinCAT Project3 interface. The 'Online' tab is selected. In the 'State Machine' section, the 'Current State' and 'Requested State' are both set to 'OP', which is circled in red. The 'DLL Status' section shows 'Port A: Carrier / Open', 'Port B: No Carrier / Closed', 'Port C: No Carrier / Closed', and 'Port D: No Carrier / Closed'. The 'File Access over EtherCAT' section has 'Download...' and 'Upload...' buttons. The bottom status bar shows '错误 0', '警告 0', and '13消息 0'.

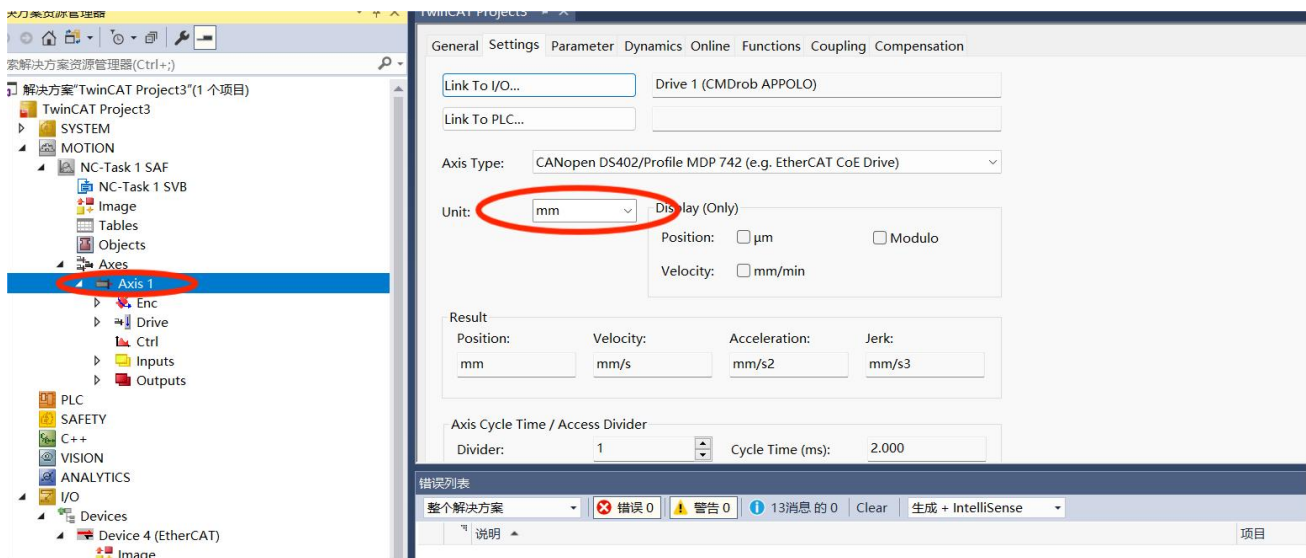
Control Servo Operation

Control the servo via NC:

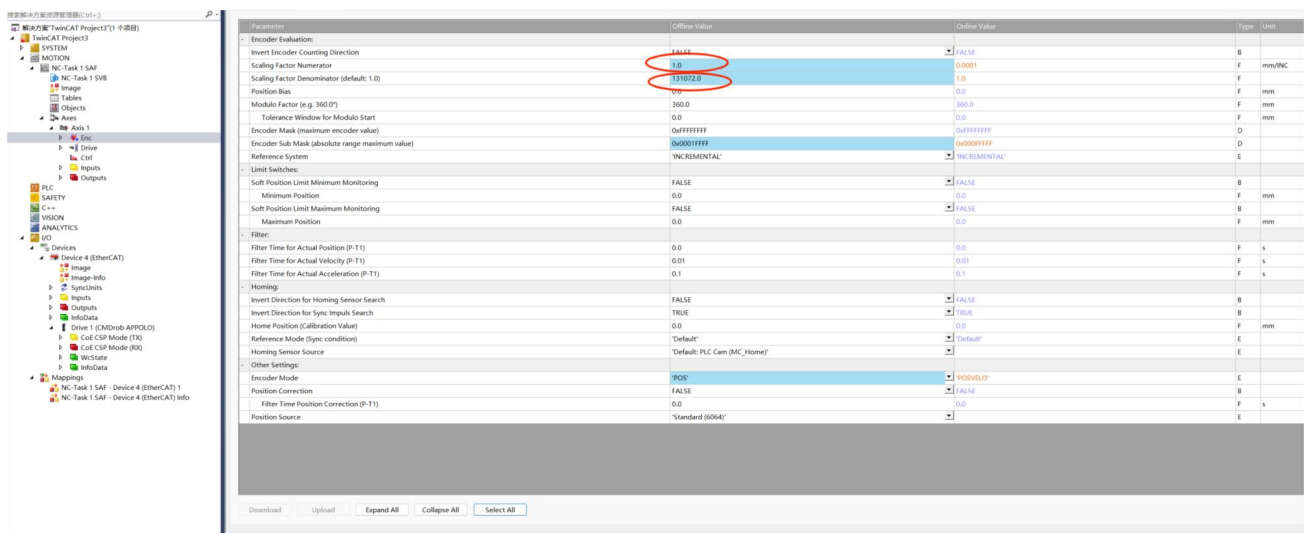
1. The servo operates in Cyclic Synchronous Position Mode.

a. Set Units

For testing, choose the unit as: mm.



b. Set Quantization Factor

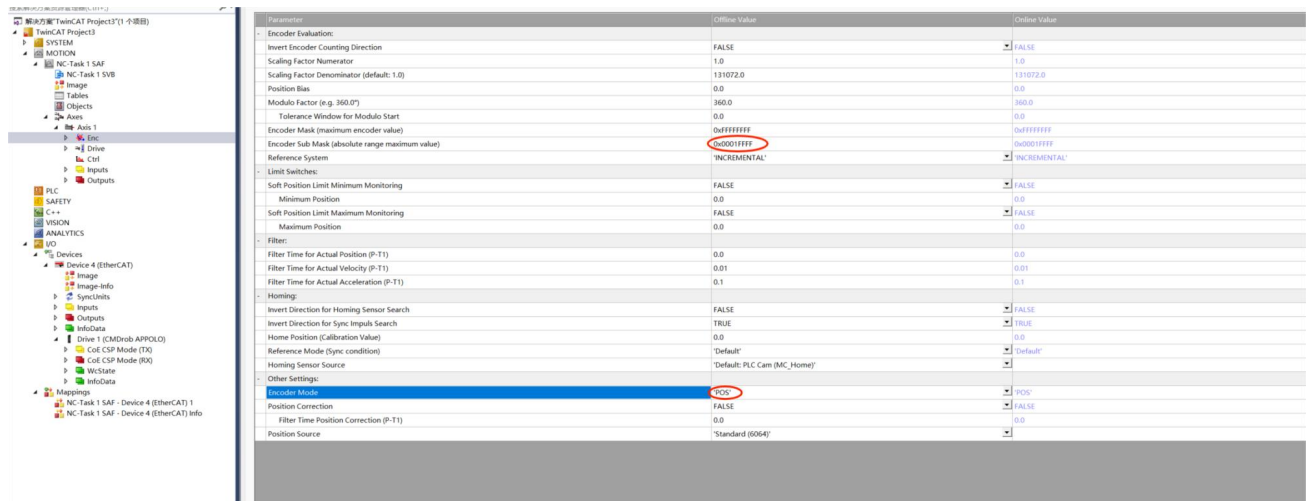


ScalingFactor: The distance corresponding to each position feedback pulse from the encoder.

For example, if the motor rotates 131072 pulses per revolution, and one revolution

corresponds to 1mm, then the Scaling Factor Numerator should be 1 mm/Inc, and the Scaling Factor Denominator (default 1.0) should be 131072.

c. Set Encoder Feedback Mode to Pos



Parameter	Offline Value	Online Value
Encoder Evaluation:		
Invert Encoder Counting Direction	FALSE	FALSE
Scaling Factor Numerator	1.0	1.0
Scaling Factor Denominator (default: 1.0)	131072.0	131072.0
Position Bias	0.0	0.0
Modulo Factor (e.g. 360.0°)	360.0	360.0
Tolerance Window for Modulo Start	0.0	0.0
Encoder Mask (maximum encoder value)	0x0001FFFF	0x0001FFFF
Encoder Sub Mask (absolute range maximum value)	0x0001FFFF	0x0001FFFF
Reference System	'INCREMENTAL'	'INCREMENTAL'
Limit Switches:		
Soft Position Limit Minimum Monitoring	FALSE	FALSE
Minimum Position	0.0	0.0
Soft Position Limit Maximum Monitoring	FALSE	FALSE
Maximum Position	0.0	0.0
Filter:		
Filter Time for Actual Position (P-T1)	0.0	0.0
Filter Time for Actual Velocity (P-T2)	0.01	0.01
Filter Time for Actual Acceleration (P-T3)	0.1	0.1
Homming:		
Invert Direction for Homming Sensor Search	FALSE	FALSE
Invert Direction for Sync Impuls Search	TRUE	TRUE
Home Position (Calibration Value)	0.0	0.0
Reference Mode (Sync condition)	'Default'	'Default'
Homming Sensor Source	'Default: PLC Cam (MC_Homey'	'Default: PLC Cam (MC_Homey'
Other Settings:		
Encoder Mode	Pos	Pos
Position Correction	FALSE	FALSE
Filter Time Position Correction (P-T1)	0.0	0.0
Position Source	'Standard (S064)'	'Standard (S064)'

Encoder Sub Mask (absolute range maximum value): Based on the encoder's single-turn resolution of 131072, set it to 1FFFF.

Other Settings Description:

EncoderMode: Encoder mode, with the following three options:

- Pos: Encoder is used only for position calculation when the position loop is inside the servo driver.
- PosVelo: Encoder is used for both position and velocity calculation when the position loop is inside TwinCAT NC.

d. Set Jog Speed

Parameter	Offline Value	Online Value	Type	Unit
Maximum Dynamics:				
Reference Velocity	100.0	100.0	F	mm/s
Maximum Velocity	100.0	100.0	F	mm/s
Maximum Acceleration	1500.0	1500.0	F	mm/s ²
Maximum Deceleration	1500.0	1500.0	F	mm/s ²
Default Dynamics:				
Default Acceleration	150.0	150.0	F	mm/s ²
Default Deceleration	150.0	150.0	F	mm/s ²
Default Jerk	220.0	220.0	F	mm/s ³
Manual Motion and Homing:				
Homing Velocity (towards plc cam)	30.0	30.0	F	mm/s
Homing Velocity (off plc cam)	30.0	30.0	F	mm/s
Manual Velocity (Fast)	10.0	10.0	F	mm/s
Manual Velocity (Slow)	5.0	5.0	F	mm/s
Jog Increment (Forward)	5.0	5.0	F	mm
Jog Increment (Backward)	5.0	5.0	F	mm
Fast Axis Stop:				
Fast Axis Stop Signal Type (optional)	OFF (default)	OFF (default)	E	
Fast Acceleration (optional)	0.0	0.0	F	mm/s ²
Fast Deceleration (optional)	0.0	0.0	F	mm/s ²
Fast Jerk (optional)	0.0	0.0	F	mm/s ³
Limit Switches:				
Soft Position Limit Minimum Monitoring	FALSE	FALSE	B	
Minimum Position	0.0	0.0	F	mm
Soft Position Limit Maximum Monitoring	FALSE	FALSE	B	
Maximum Position	0.0	0.0	F	mm
Monitoring:				
Position Lag Monitoring	TRUE	TRUE	B	
Maximum Position Lag Value	5.0	5.0	F	mm
Maximum Position Lag Filter Time	0.02	0.02	F	s
Position Range Monitoring	TRUE	TRUE	B	

Set the "Manual Velocity (Fast)" jog speed to 10 mm/s and "Manual Velocity (Slow)" to 5 mm/s.

e. Jog Test

General Settings Parameter Dynamics Online Functions Coupling Compensation

0.2898 Setpoint Position: mm] 3.7991

Lag Distance (min/max): mm Actual Velocity: (mm/s) Setpoint Velocity: (mm/s) 0.0000

Override: [%] Total / Control Output: [%] Error: 0 (0x0)

0.0000 % 0.00 / 0.00 %

Status (log.) Status (phys.) Enabling

☐ Ready ☒ NOT Moving ☐ Coupled Mode ☐ Controller **Set**

☐ Calibrated ☐ Moving Fw ☐ In Target Pos. ☐ Feed Fw

☐ Has Job ☐ Moving Bw ☐ In Pos. Range ☐ Feed Bw

Controller Kv-Factor: [mm/s/mm] 1 Reference Velocity: [mm/s] 2200

Target Position: [mm] 0 Target Velocity: [mm/s] 100

F1 F2 F3 F4 F5 F6 F7 F8 F9

Set Enabling

☐ Controller ☐ Feed Fw ☐ Feed Bw

Override [%]: 0

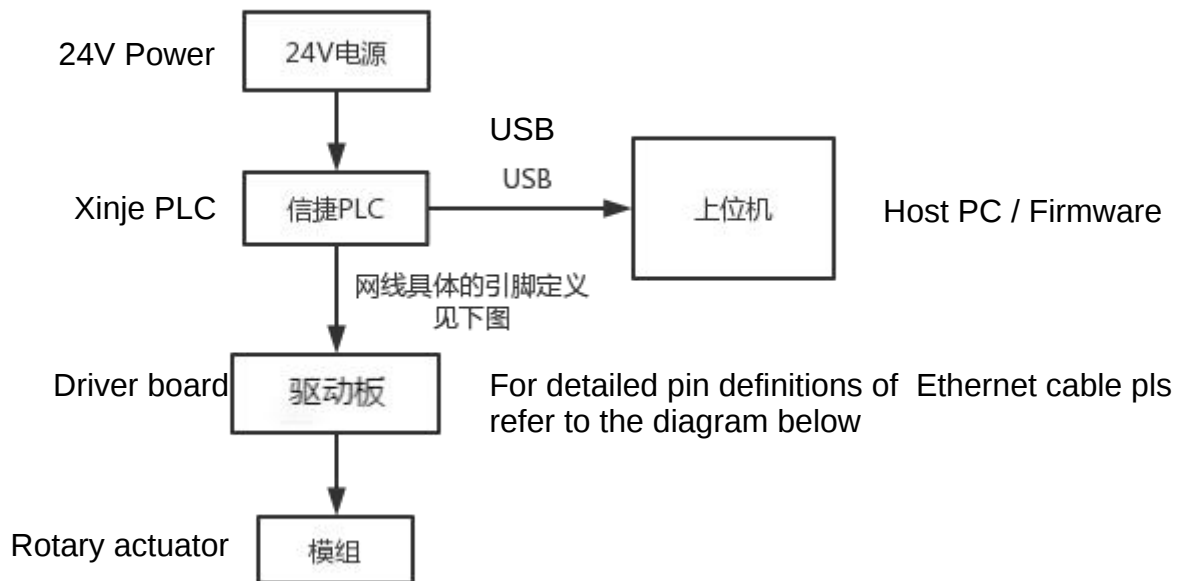
All **OK** **Cancel**

trCAT) 1
trCAT) Info

Click "Set" to open the dialog, then click "All". At this point, the servo driver is enabled. Jogging operation can be performed using F1~F4.

Application Example Using Xinje Controller

Below is a simple usage and configuration example of the robot joint module using Xinje's XL series PLC as the CANopen master. The wiring diagram is shown below:



Wiring Diagram for Configuring the Module with Xinje Controller

Xinje PLC Ethernet Port Pin Definition:



内置IO 32点

RS485

RS232

Ethernet

CAN

内置两路独立的CAN总线, 大幅提高通讯效率

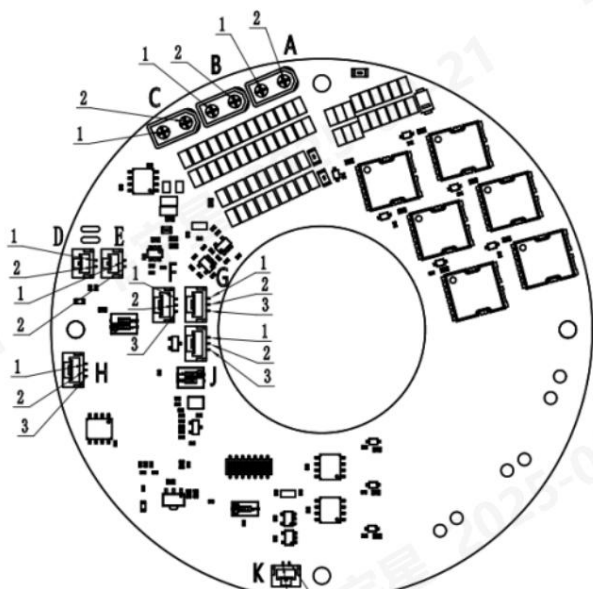
- XL5N系列支持CANopen通讯协议, 同时也支持CAN的自由格式通讯。
- 无需另外扩展CAN通讯模块即可实现PLC本体的CAN通讯, 不但节约了安装空间, 更因为免去了本体与外扩模块的数据通讯时间, 而大幅提升了通讯效率, 保证了系统的响应速度。

RJ45引脚	定义	RJ45引脚	定义
1	CAN1_H	5	CAN2_L
2	CAN1_L	6	GND2
3	GND1	7	
4	CAN2_H	8	

Built-in Dual Independent CAN Buses, Significantly Improving Communication Efficiency

The XL5N series supports the CANopen communication protocol as well as free-format CAN communication. It enables CAN communication directly through the PLC body without requiring an additional CAN communication module. This not only saves installation space, but also eliminates the data transmission time between the PLC body and the expansion module, greatly enhancing communication efficiency and ensuring system response speed.

CANopen Interface Pin Definition of the Module Driver Board (taking the 32 model as an example; for others, see Chapter 8):

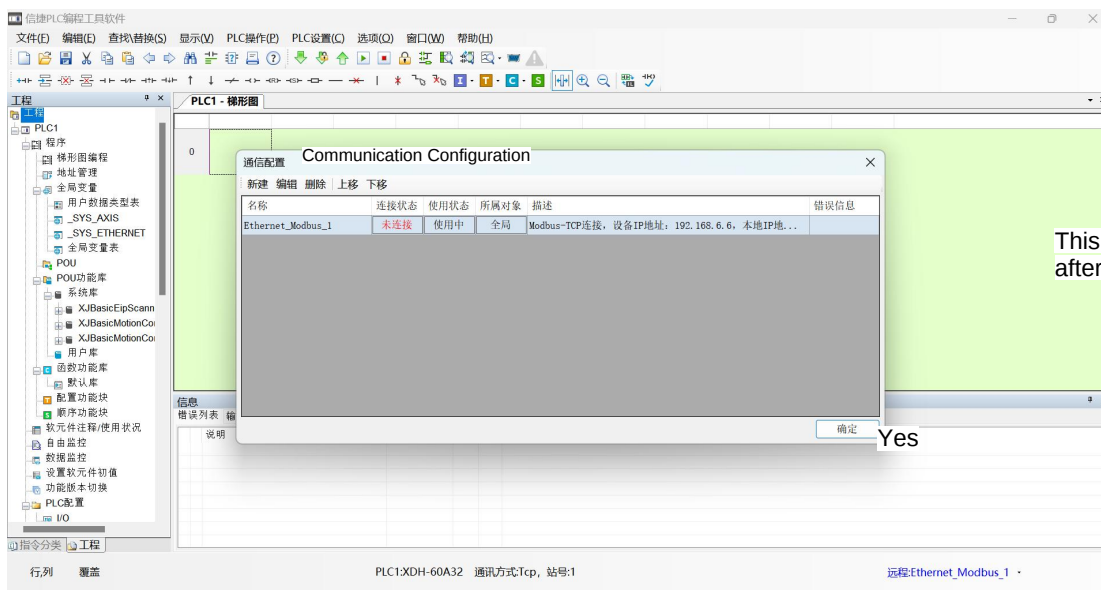
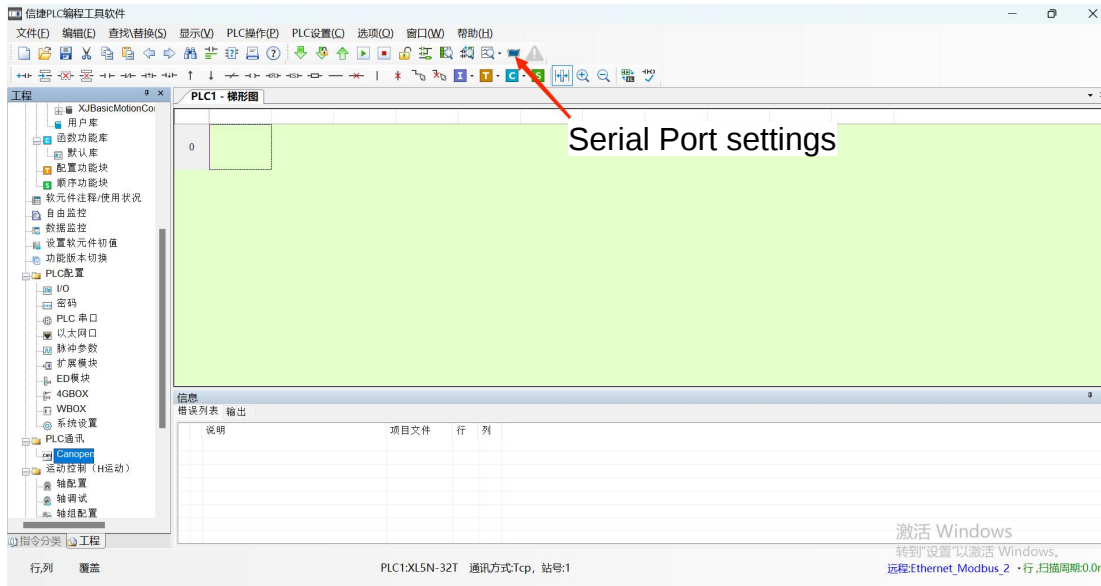


	1	2	3
F/G	1	CANL	CAN总线低
	2	GND	CAN总线地
	3	CANH	CAN总线高

Can bus Low
Can bus Ground
Cnan bus High

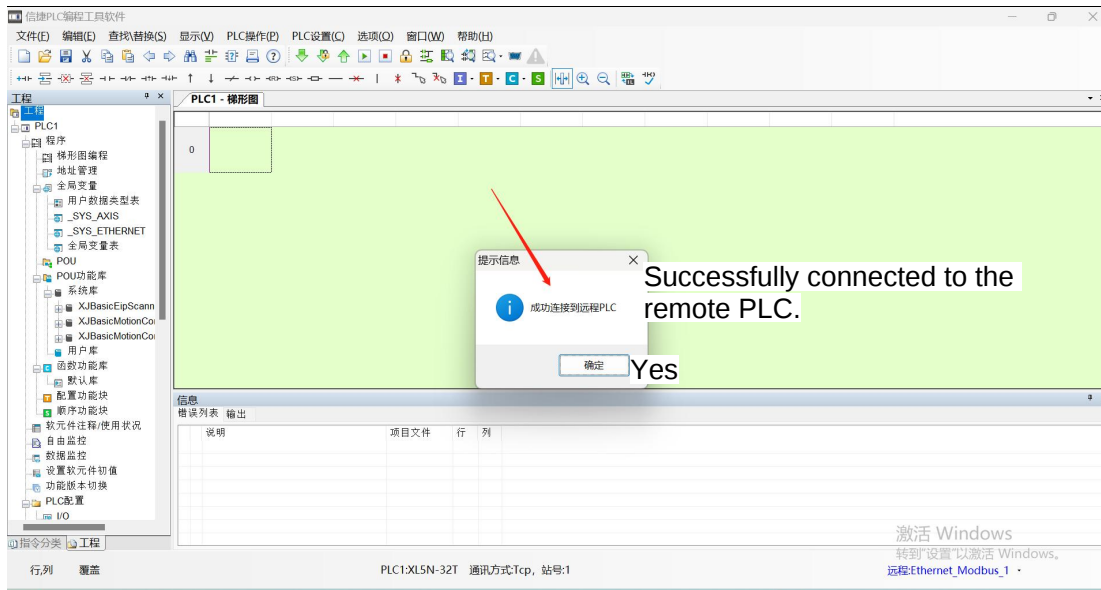
CANopen Configuration:

1. Open the software and click "Serial Port Settings" in the "Menu" as shown below:



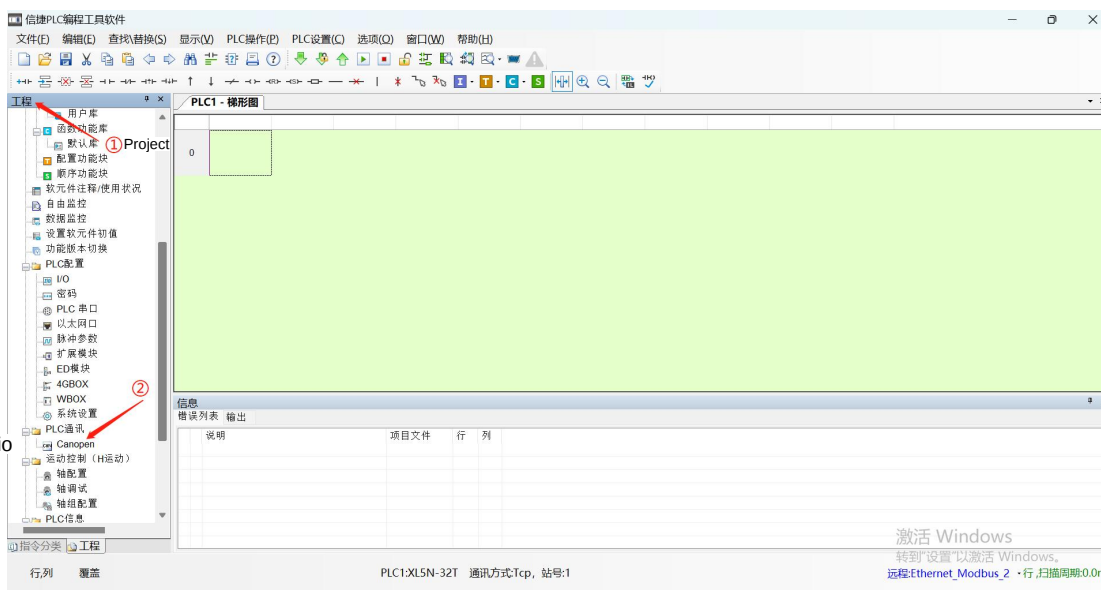
This interface appears after clicking.

2. Create a new communication project and connect to the PLC.

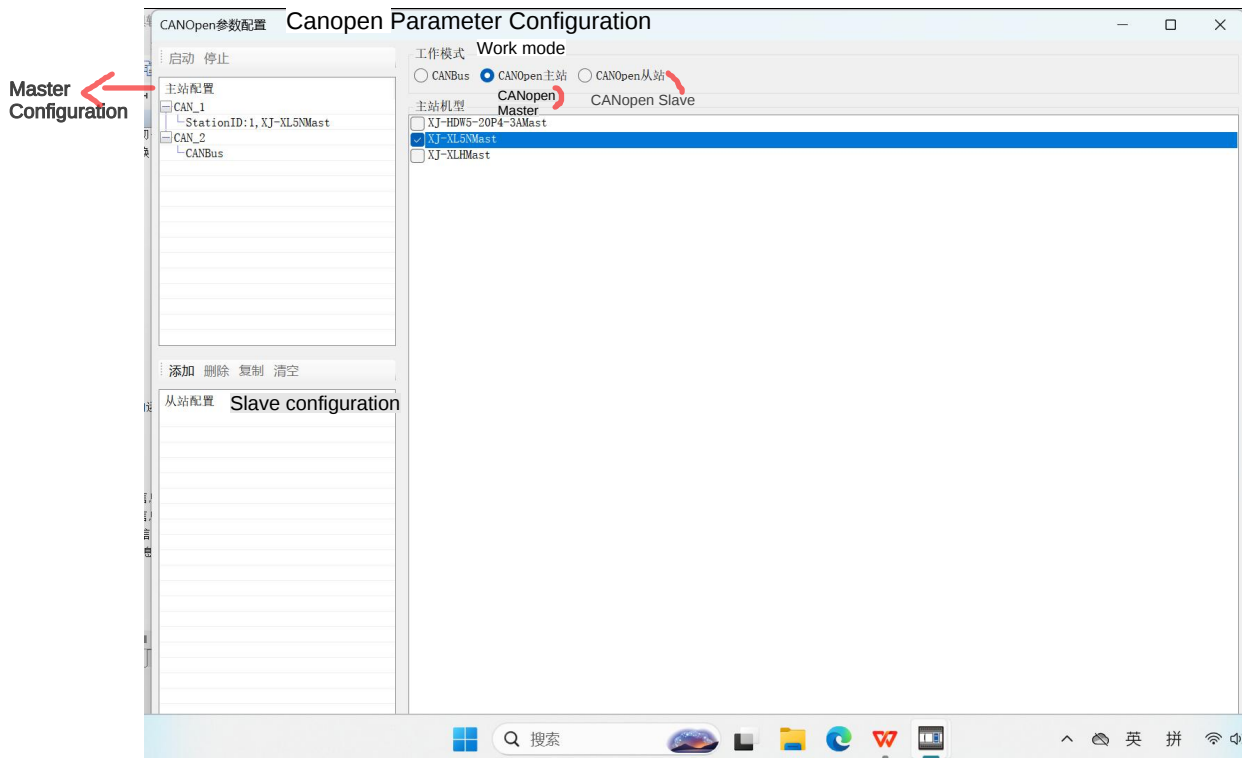


After you click 'Yes' in the previous step, this interface will appear.

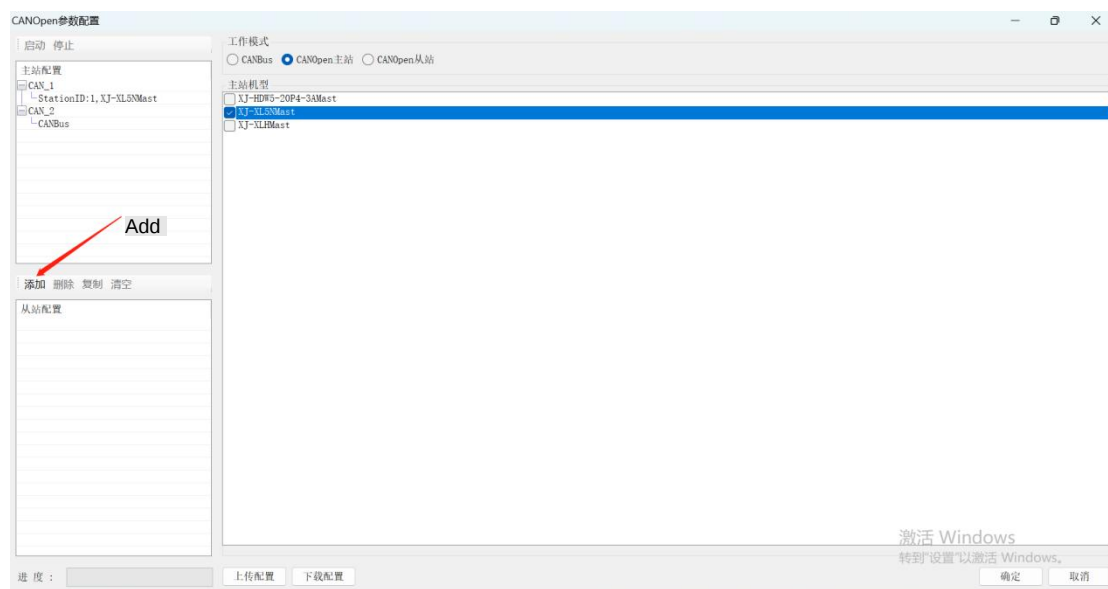
3. Once connected successfully, the software will automatically return to the main page. Locate and click "CANopen" under "PLC Communication" in the "Project" section on the left, and the "CANopen Parameter Configuration" window will appear.

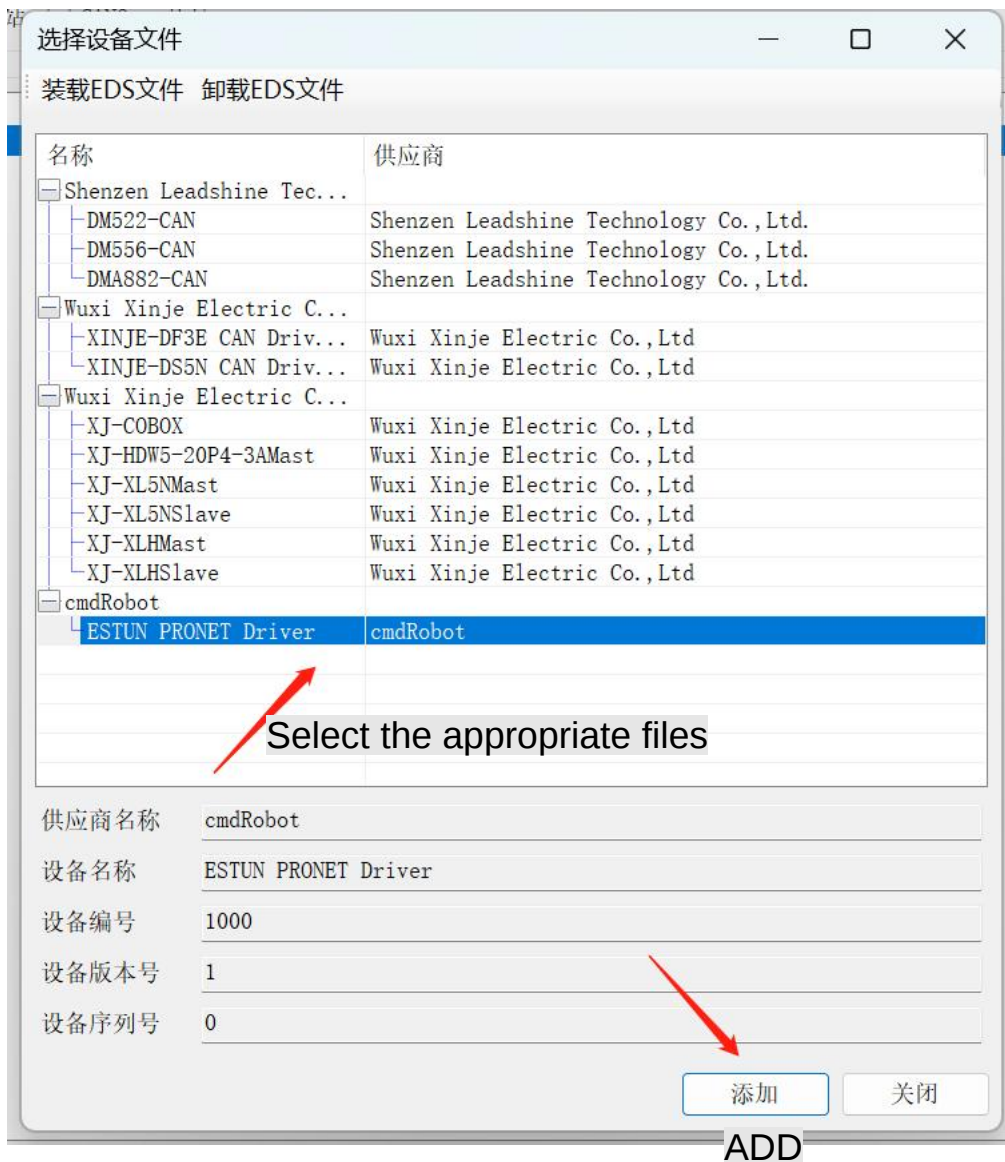
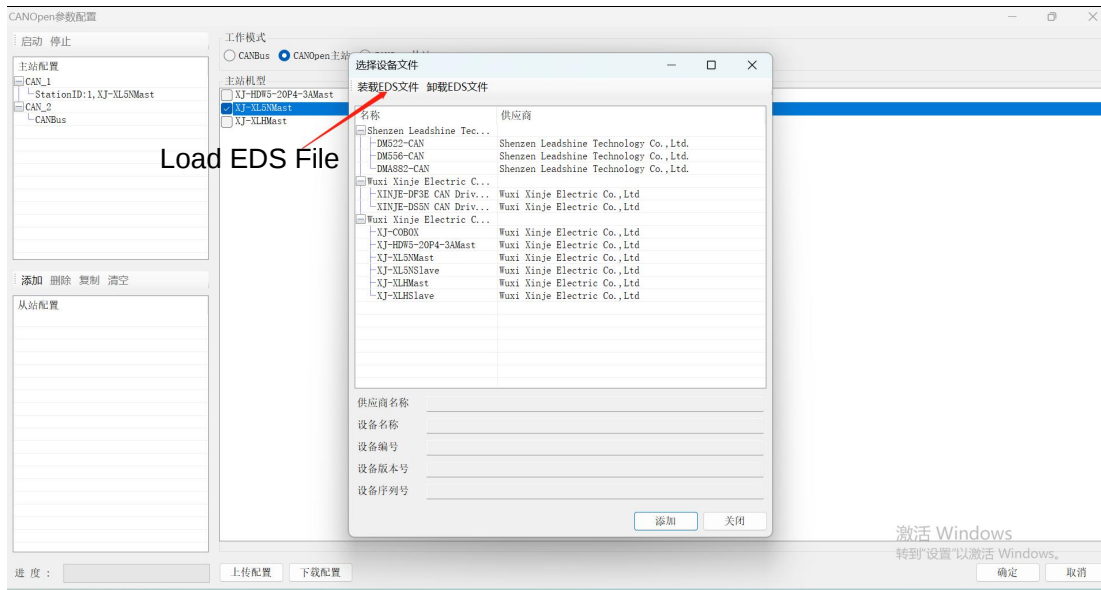


PLC
Communication



4. In the “CANopen Parameter Configuration” window, click “Add” to configure a slave device. The “Select Device File” window will appear. Click “Load EDS File,” select the appropriate EDS file, and then click “Add.”





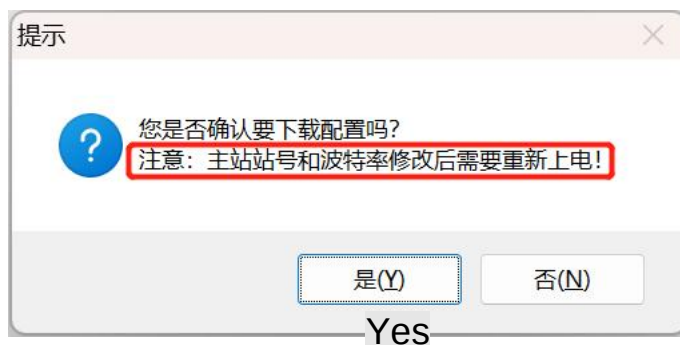
5. Return to the “CANopen Parameter Configuration” window. Click on “StationID:1, XJ-XL5NMast” under the master “CAN_1” to enter the “Basic Parameters” section. Set the baud rate to 500K and click “Download Configuration.”

(Note:

- ① After modifying the master station number and baud rate, the PLC must be powered off and restarted before reconnecting and reconfiguring the communication.
- ② The master's baud rate must match that of the third-party device.)



Click “Yes” when the following confirmation window appears.



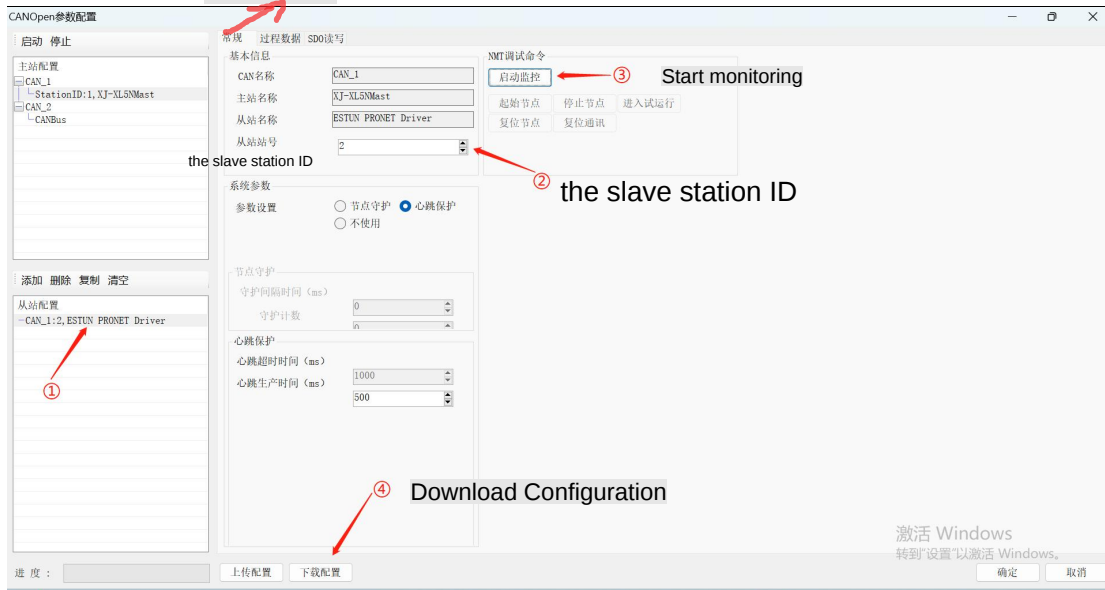
Do you confirm that you want to download the configuration?
Note: After modifying the master station ID and baud rate, a power cycle is required.

After reconnecting, the master's baud rate will be updated to 500K. Then click on “CAN_1:2, XXXX” under “Slave Configuration,” go to the “General” tab to check the slave station ID, click “Start Monitoring,” and then click “Download Configuration.”

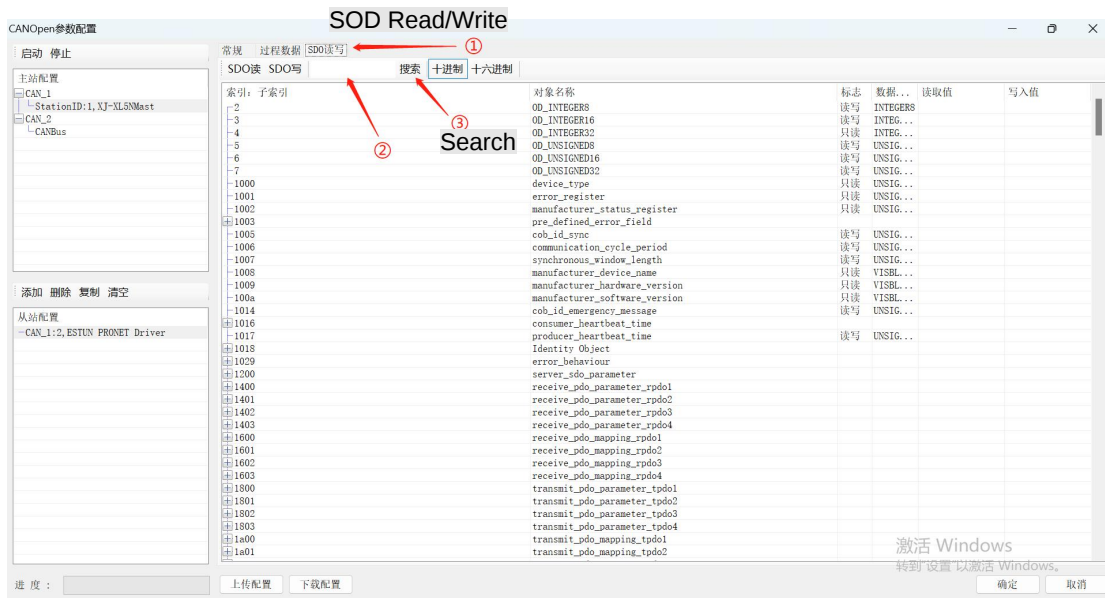
(Note:

- ① The slave station ID must match the communication node of the third-party driver and should start from ID 3.
- ② After changing the communication node of the third-party driver, it must be powered off and restarted.)

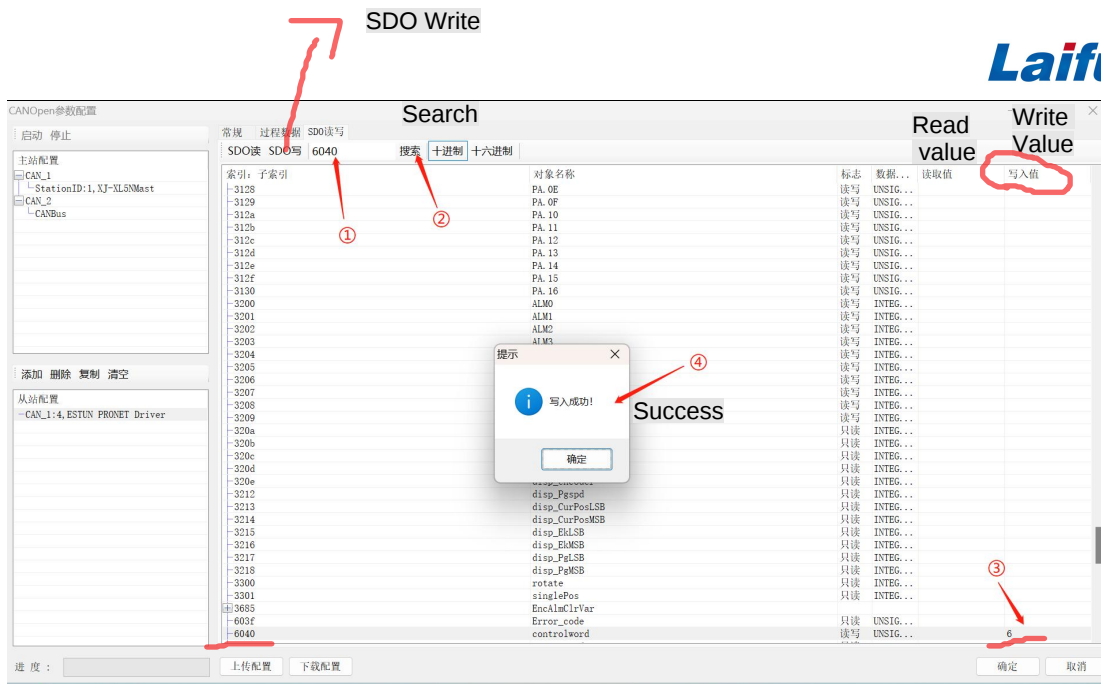
General



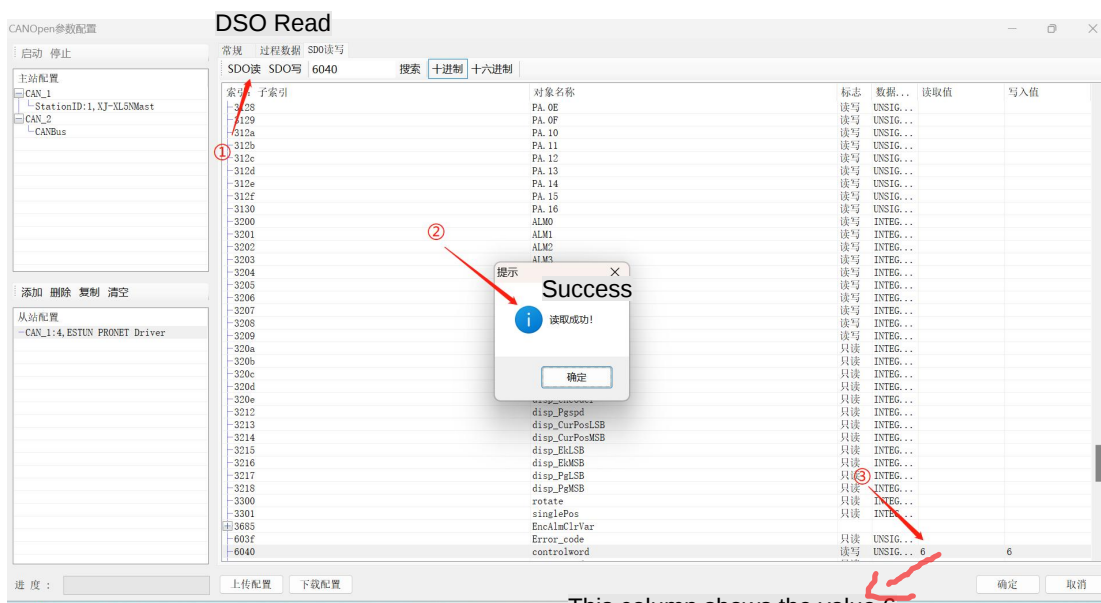
6. Click “SDO Read/Write,” enter the relevant index in the search box, and click “Search.”



7. In the “SDO Read/Write” window, enter “6040,” click “Search,” select “6040,” and then enter “6” in the “Write Value” field. Click “SDO Write,” and a “Success” prompt will appear.



Click “SDO Read,” and a “Success” prompt will confirm that the value “6” has been correctly read back in the “Read Value” column for “6040.”



Repeat the process to write values “7” and “15.” Once completed, the motor connected to the driver will be enabled, indicating that the PLC and the driver have been successfully connected via CANopen.