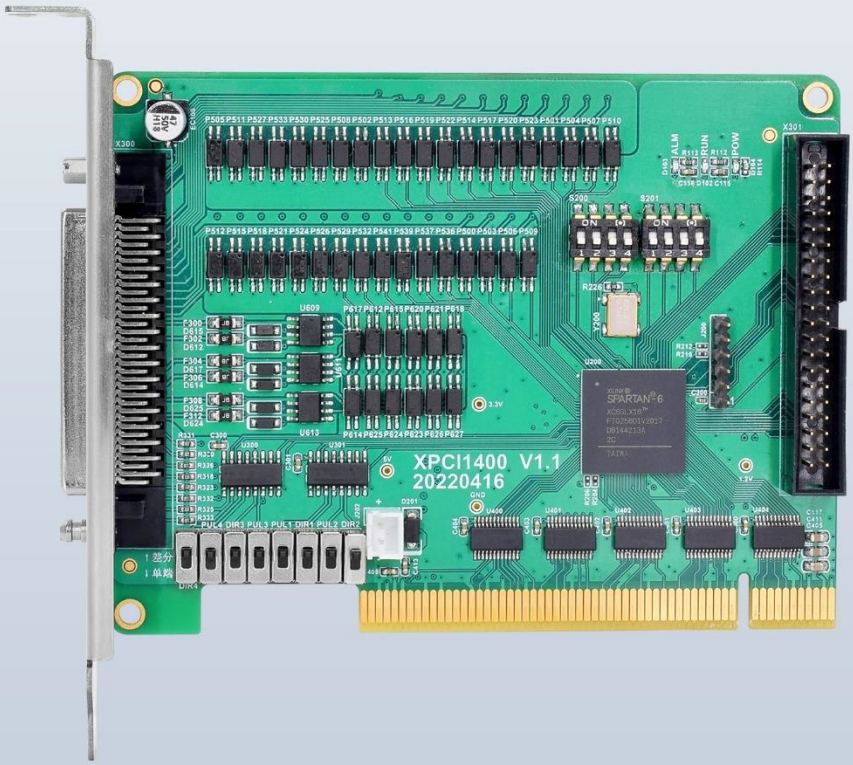
Zmotion®
正运动技术

做最好用的运动控制
DO THE BEST TO USE MOTION CONTROL

PCI Bus Motion Control Card

XPCI1400



Vision Motion Controller | Motion Controller | Motion Control Card | IO Expansion Module | HMI

Foreword

The motion controller provides rich interface, and it has excellent motion control performance, which can meet the expansion requirements of various projects.

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For details about the ZMC controller software and the introduction and routine of each command, please refer to the ZBASIC software manual.

Information contained in this manual is only for reference. Due to improvements in design and functions and other aspects, Zmotion Technology reserves the final interpretation! Subject to change without notice!

Pay attention to safety when debugging the machine!

Please be sure to design an effective safety protection device in the machine, and add an error handling program in the software, otherwise Zmotion has no obligation or responsibility for the loss caused.

In order to ensure the safe, normal and effective use of the product, please be sure to read this product manual carefully before installing and using the product.

Safety Statement

- This chapter describes the safety precautions required for the correct use of this product. Before using this product, please read the instructions for use and correctly understand the relevant information on safety precautions.
- This product should be used in an environment that meets the design specifications, otherwise it may cause equipment damage or personal injury, and malfunctions or component damage caused by failure to comply with relevant regulations are not within the scope of product quality assurance.
- Zmotion will not take any legal responsibility for personal safety accidents and property losses caused by failure to comply with the contents of this manual or illegal operation of products.

Safety Level Definition

According to the level, it can be divided into " Danger " and " Caution ". Failure to operate as required may result in moderate injury, minor injury or equipment damage.

Please keep this guide in a safe place for reading when needed, and be sure to hand this manual to the end user.

Install	
Danger	◆ When the controller is disassembled, all external power supplies used by the system should be disconnected before operation, otherwise it may cause misoperation or damage to the equipment. ◆ It is forbidden to use in the following places: places with dust, oil fume, conductive dust, corrosive gas and flammable gas; places exposed to high temperature, condensation, wind and rain; places with vibration and shock. Electric shock, fire and misuse can cause product damage and deterioration.
Notice	◆ Avoid metal shavings and wire ends falling into the hardware circuit board during installation. ◆ After installation, ensure that there are no foreign objects on the hardware circuit board. ◆ When installing, make it tightly and firmly with the mounting frame.

	◆ Improper installation of the controller may result in misoperation, failure and fire.
Wiring	
 Danger	◆ The specifications and installation methods of the external wiring of the equipment shall comply with the requirements of local power distribution regulations. ◆ When wiring, all external power supplies used by the system should be disconnected before operation. ◆ When powering on and running after the wiring work is completed, the terminals attached to the product must be installed. ◆ Cable terminals should be well insulated to ensure that the insulation distance between cables will not be reduced after the cables are installed on the terminal block.
 Notice	◆ Avoid metal shavings and wire ends falling into the hardware circuit board during installation. ◆ The cable connection should be carried out correctly on the basis of confirming the type of the connected interface. ◆ It should be confirmed that the cables pressed into the terminals are in good contact. ◆ Do not bundle the control wires and communication cables with the main circuit or power supply wires, etc., and the distance between the wires should be more than 100 mm, otherwise noise may cause malfunction. ◆ If the controller is not installed properly, it may cause electric shock or equipment failure or malfunction.

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Chapter I Production Information

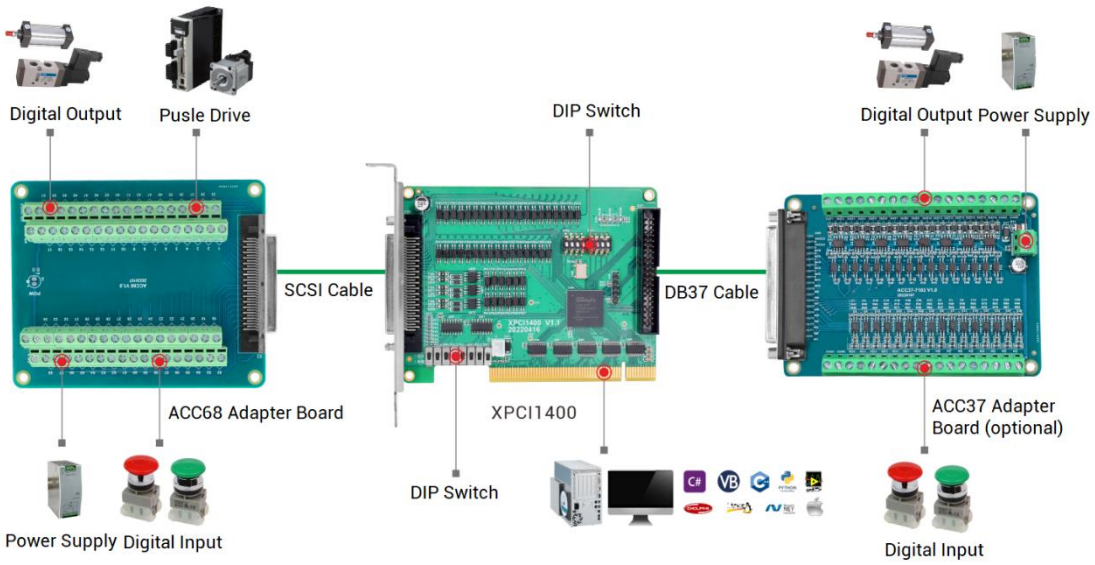
1.1. Product Information

XPCI motion control card is a kind of new type PCI bus control card. It can control multiple step motors or digital servo motors. And there are many functions on it, such as, multi-axis point to point motion, interpolation, trajectory planning, IO control, etc.

1.2. Function Features

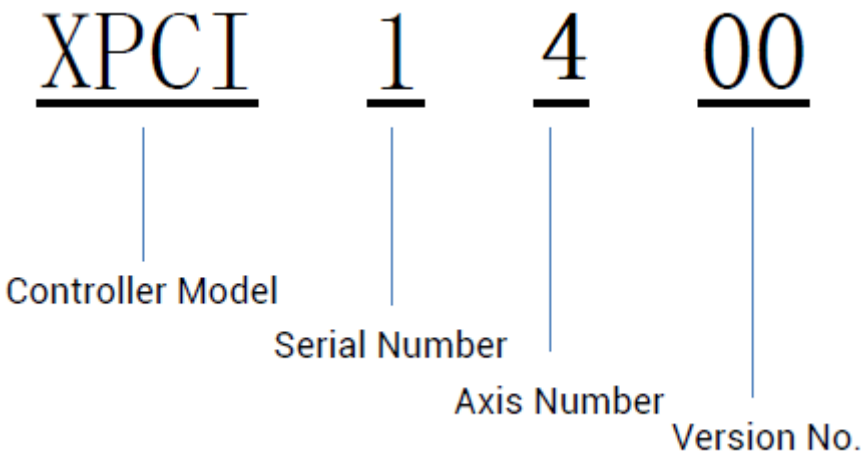
- 4 axes motion control at most.
- Pulse output mode: pulse / direction
- Mechanical control input signals: +/-EL, ORG, ALM, optoelectronic isolation.
- Maximum pulse output frequency of pulse axis is 5MHZ.
- The maximum output current of general digital outputs can reach 300mA, which can directly drive some kinds of solenoid valves.
- Support linear interpolation, arbitrary circular interpolation, helical interpolation
- Support electronic cam, electronic gear, position latch, synchronous follow, virtual axis and other functions.
- Support pulse closed loop, pitch compensation and other functions.
- Support multi-file and multi-task programming in ZBasic.
- A variety of program encryption methods to protect the intellectual property rights of customers.

1.3. System Frame

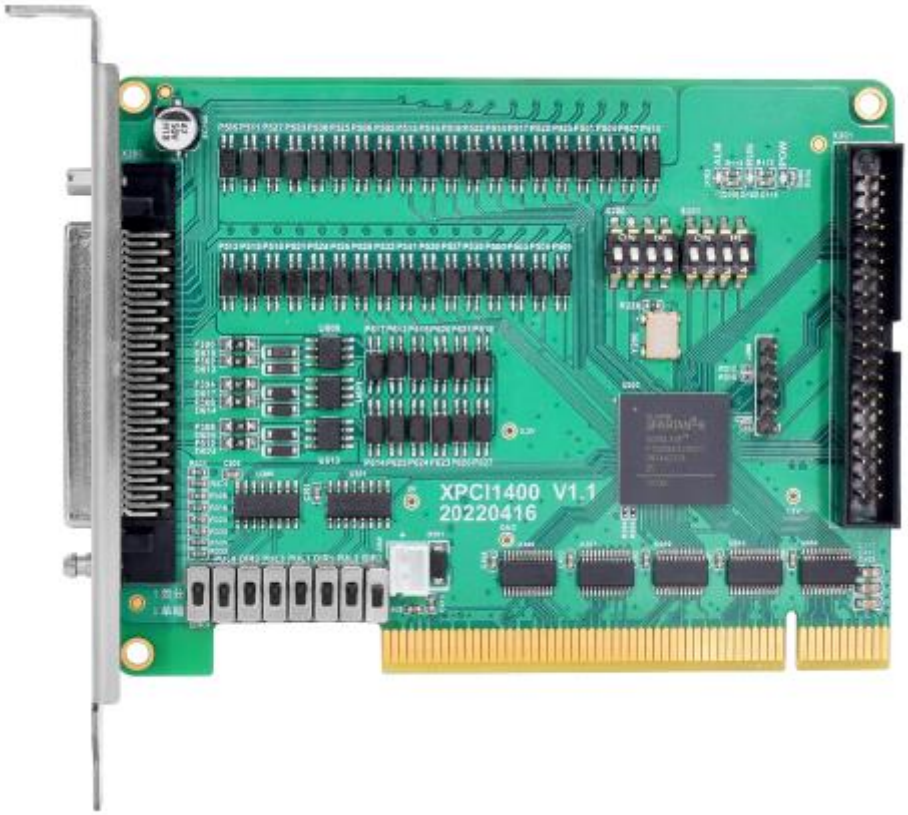


1.4. Model Information

XPCI is the abbreviation of the PCI motion control card model launched by Zmotion. The naming rules are as follows:



1.5. Hardware Installment



Size: 120*91.8mm

The card slot interface is designed according to the PCI V3.0 standard 32-bit card, and it is backward compatible with the standard PCI V2.3.

- PCI doesn't support plug in or pull out when in hot, so please close the computer before inserting and pulling the card.
- Please handle it carefully. Before touching the control card circuit or inserting/pulling the control card, please wear anti-static gloves or touch an effectively grounded metal object to discharge the human body to prevent possible static electricity from damaging the motion control card.

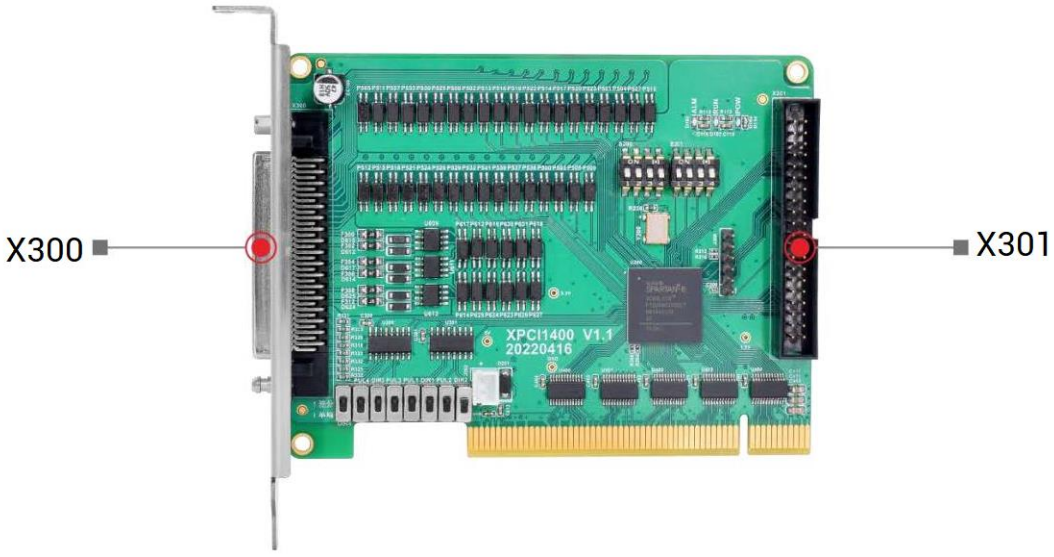
Installation attention	● Non-professionals are strictly prohibited to operate. Specifically, professionals who had been trained related electrical equipment, or who master electrical knowledge. ● Please be sure to read the product instruction manual and safety precautions carefully before installation. ● Before installation, please ensure that the product is powered off. ● Do not disassemble the module, otherwise the machine may be damaged. ● Avoid direct sunlight installation. ● In order to facilitate ventilation and controller replacement, 2-3cm should be left between the upper and lower parts of the controller and the installation environment and surrounding components. ● Considering the convenient operation and maintenance of the controller, please do not install the controller in the following places: a) places where the surrounding ambient temperature exceeds the range of -20°C-60°C b) places where the ambient humidity exceeds the range of 10%-95% (non-condensing) c) places with corrosive gases and flammable gases d) places with many conductive powders such as dust and iron powder, oil mist, salt, and organic solvents

Chapter II Product Specification

2.1. Basic Specification

Item	Description
Model	XPCI1400
Basic Axes	4
Type of Basic Axes	Local pulse axes
Digital IO	There are 52 inputs (20 specified inputs and 32 general inputs) and 28 outputs (with overcurrent protection).
IO Input Frequency	<5kHz
IO Output Frequency	<5kHz
Highest Pulse Frequency	5MHz
Power Supply Input	24V DC input
Dimensions	120*91.8mm

2.2. Interface Definition



→ Interface Description

Mark	Interface	Number	Description
POW	The led that indicates the current state.	1	Power state: it lights when power is conducted.
RUN		1	Run state: it lights when runs normally
ALM		1	Error state: it lights when runs incorrectly
X300	Signal Interface	1	Include motor control signals and IO control signals, which is used with ACC68 adapter board.
X301	Signal Interface	1	Include IO control signals, which is used with ACC37 adapter board.

2.3. Work Environment

Item	Parameters
Work Temperature	-20℃-60℃
Work relative Humidity	10%-95% non-condensing
Storage Temperature	-40℃ ~ 80℃ (not frozen)
Storage Humidity	Below 90%RH (no frost)
Vibration	Below 4.9m/s^2
Shock	Below 19.6m/s^2
Degree of Protection	IP20

Chapter III Wiring, Communication Configuration

3.1. Power Input

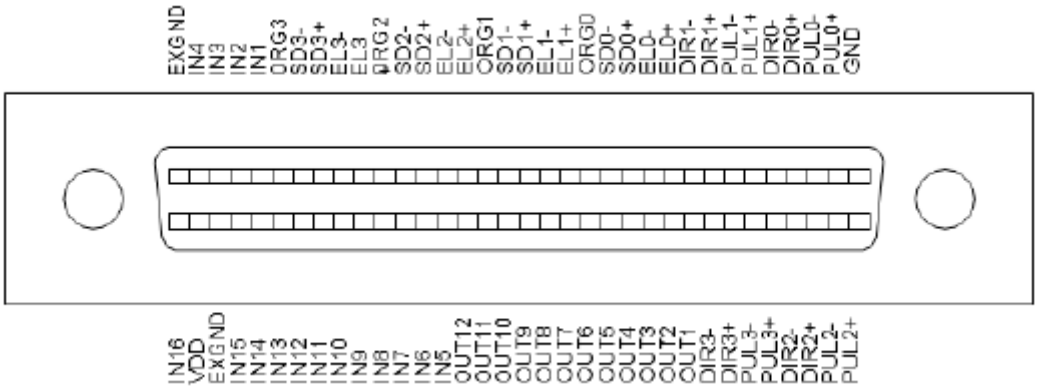
The power input adopts DC24V power supply, which is connected through the terminal 66 (EGND) and terminal 67 (E24V) of the 5.08mm screw terminal on the ACC68 wiring board. For specific interface specifications, please refer to 3.2.2 “Terminal Definition”.

→ Specification:

Item	Description
Voltage	DC24V(-10%~10%)
The current to open	≤0.5A
The current to work	≤0.4A
Anti-reverse connection	Valid
Overcurrent Protection	Valid

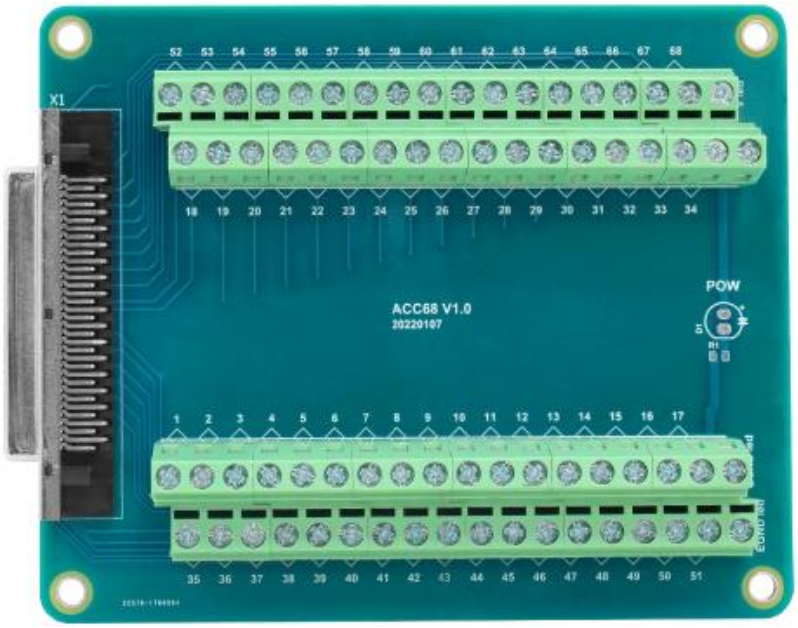
3.2. X300 Signal Interface

X300 is the main interface for motor control and IO signal control of XPCI1400. It is SCSI-II Pin68 socket, and it is necessary to connect ACC68 adapter board. Below shows X300 signal terminal:



3.2.1. ACC68 Adapter

ACC68 is the adapter of X300 signal terminal, use SCSI68 cable to connect.



Size: 120*98mm

3.2.2. Terminal Definition

→ X300 Pin Definition

Pin	Name	Description
1	GND	Internal power ground
2	PUL0+	Pulse signal (+) of axis 0
3	PUL0-	Pulse signal (-) of axis 0
4	DIR0+	Directional signal (+) of axis 0
5	DIR0-	Directional signal (-) of axis 0
6	PUL1+	Pulse signal (+) of axis 1
7	PUL1-	Pulse signal (-) of axis 1
8	DIR1+	Directional signal (+) of axis 1
9	DIR1-	Directional signal (-) of axis 1

10	IN36	Default EL0+, isolation limit signal (+) of axis 0
11	IN37	Default EL0-, isolation limit signal (-) of axis 0
12	IN44	Default SD0+, isolation deceleration signal (+) of axis 0
13	IN45	Default SD0-, isolation deceleration signal (-) of axis 0
14	IN32	Default ORG0, isolation origin signal of axis 0
15	IN38	Default EL1+, isolation limit signal (+) of axis 1
16	IN39	Default EL1-, isolation limit signal (-) of axis 1
17	IN46	Default SD1+, isolation deceleration signal (+) of axis 1
18	IN47	Default SD1-, isolation deceleration signal (-) of axis 1
19	IN33	Default ORG1, isolation origin signal of axis 1
20	IN40	Default EL2+, isolation limit signal (+) of axis 2
21	IN41	Default EL2-, isolation limit signal (-) of axis 2
22	IN48	Default SD2+, isolation deceleration signal (+) of axis 2
23	IN49	Default SD2-, isolation deceleration signal (-) of axis 2
24	IN34	Default ORG2, isolation origin signal of axis 2
25	IN42	Default EL3+, isolation limit signal (+) of axis 3
26	IN43	Default EL3-, isolation limit signal (-) of axis 3
27	IN50	Default SD3+, isolation deceleration signal (+) of axis 3
28	IN51	Default SD3-, isolation deceleration signal (-) of axis 3
29	IN35	Default ORG3, isolation origin signal of axis 3
30	IN0	Isolation general input 0
31	IN1	Isolation general input 1
32	IN2	Isolation general input 2
33	IN3	Isolation general input 3
34	EGND	External power ground, input
35	PUL2+	Pulse signal (+) of axis2
36	PUL2-	Pulse signal (-) of axis 2
37	DIR2+	Directional signal (+) of axis 2
38	DIR2-	Directional signal (-) of axis 2

39	PUL3+	Pulse signal (+) of axis 3
40	PUL3-	Pulse signal (-) of axis 3
41	DIR03+	Directional signal (+) of axis 3
42	DIR03-	Directional signal (-) of axis 3
43	OUT0	Isolation general output 0
44	OUT1	Isolation general output 1
45	OUT2	Isolation general output 2
46	OUT3	Isolation general output 3
47	OUT4	Isolation general output 4
48	OUT5	Isolation general output 5
49	OUT6	Isolation general output 6
50	OUT7	Isolation general output 7
51	OUT8	Isolation general output 8
52	OUT9	Isolation general output 9
53	OUT10	Isolation general output 10
54	OUT11	Isolation general output 11
55	IN4	Isolation general input 4
56	IN5	Isolation general input 5
57	IN6	Isolation general input 6
58	IN7	Isolation general input 7
59	IN8	Isolation general input 8
60	IN9	Isolation general input 9
61	IN10	Isolation general input 10
62	IN11	Isolation general input 11
63	IN12	Isolation general input 12
64	IN13	Isolation general input 13
65	IN14	Isolation general input 14
66	EGND	External power ground, input
67	E24V	External power +24V, input

68	IN15	Isolation general input 15

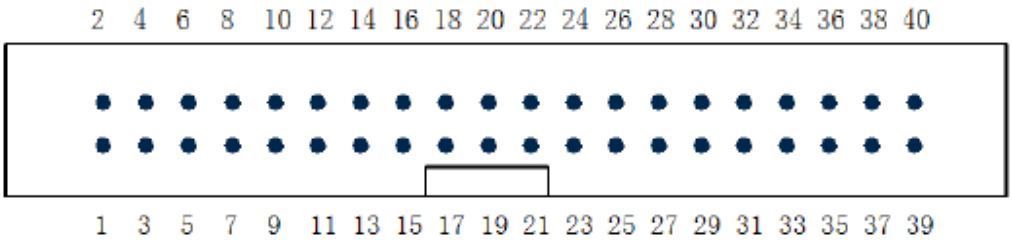
Note:

- Pay attention to the positive and negative poles of the IO power supply of XPCI1400 to avoid burning the IO port.
- The maximum output current of XPCI1400 is 300mA, which can be directly connected to most of loads. Please calculate the current.
- The IO port of XPCI1400 is an isolation IO port, please input the power supply of the IO port from EGND and 24V+.
- If specified IO ports (position limit, deceleration, origin) of XPCI1400 are not used, they can be used as general inputs.

3.3. X301 Signal Interface

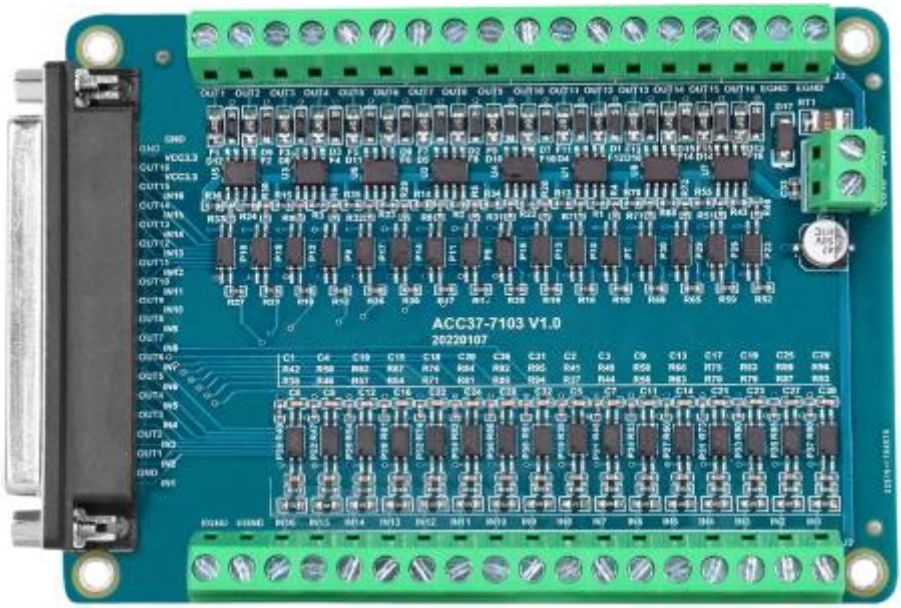
X301 is the IO signal control interface. It uses ACC37-7103 adapter board to connect to external equipment (this terminal is optional), and the adapter board needs DC24V power.

→ Interface Appearance



3.3.1. ACC68 Adapter

ACC37 is the wiring board of X301 signal, use adapter cable and DB37 to connect to X301.



Size: 119.6*86.2mm

3.3.2. Terminal Definition

→ X301 Pin Definition

Pin	Name	I/O	Description
1	IN16	I	Non-isolated general input signal 16
2	IN17	I	Non-isolated general input signal 17
3	IN18	I	Non-isolated general input signal 18
4	IN19	I	Non-isolated general input signal 19
5	IN20	I	Non-isolated general input signal 20
6	IN21	I	Non-isolated general input signal 21
7	IN22	I	Non-isolated general input signal 22
8	IN23	I	Non-isolated general input signal 23
9	IN24	I	Non-isolated general input signal 24
10	IN25	I	Non-isolated general input signal 25
11	IN26	I	Non-isolated general input signal 26
12	IN27	I	Non-isolated general input signal 27
13	IN28	I	Non-isolated general input signal 28

14	IN29	I	Non-isolated general input signal 29
15	IN30	I	Non-isolated general input signal 30
16	IN31	I	Non-isolated general input signal 31
17	3.3V	-	3.3V
18	3.3V	-	3.3V
19	GND	-	GND
20	GND	-	GND
Pin	**Name**	**I/O**	**Description**
21	OUT12	O	Non-isolated general output signal 12
22	OUT13	O	Non-isolated general output signal 13
23	OUT14	O	Non-isolated general output signal 14
24	OUT15	O	Non-isolated general output signal 15
25	OUT16	O	Non-isolated general output signal 16
26	OUT17	O	Non-isolated general output signal 17
27	OUT18	O	Non-isolated general output signal 18
28	OUT19	O	Non-isolated general output signal 19
29	OUT20	O	Non-isolated general output signal 20
30	OUT21	O	Non-isolated general output signal 21
31	OUT22	O	Non-isolated general output signal 22
32	OUT23	O	Non-isolated general output signal 23
33	OUT24	O	Non-isolated general output signal 24
34	OUT25	O	Non-isolated general output signal 25
35	OUT26	O	Non-isolated general output signal 26
36	OUT27	O	Non-isolated general output signal 27
37	GND	O	PC power ground, output
38	-	-	Reserved
39	-	-	Reserved
40	-	-	Reserved

3.4. Pulse Directional Output

The port of the pulse direction axis is connected through the 5.08mm screw terminal on the ACC68 wiring board. For the specific interface, please refer to 3.2.2 Terminal Definition.

3.4.1. Pulse Direction Axis Specification & Wiring

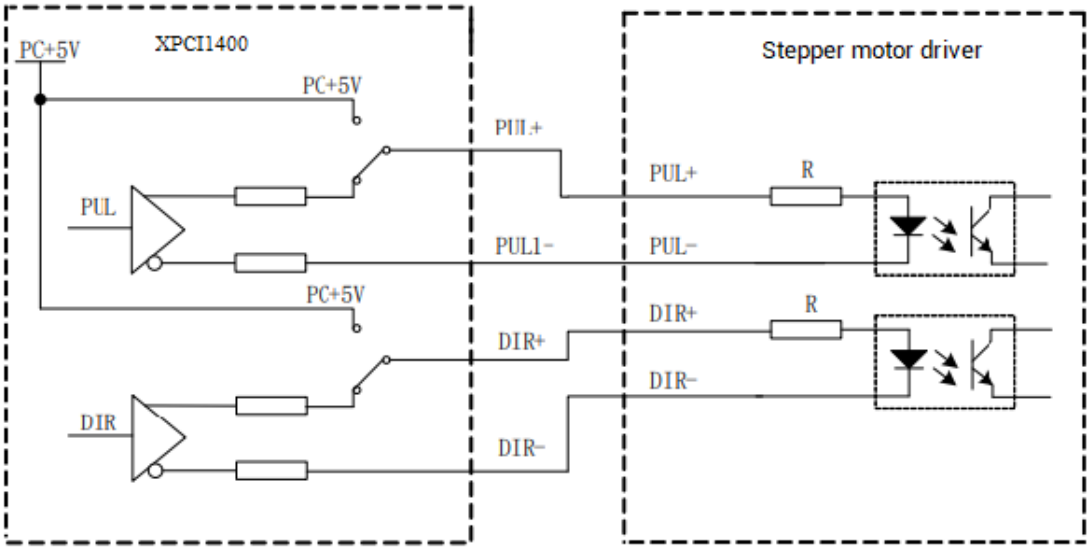
→ Specification

Item	Description
Pulse/direction (PUL/DIR) signal type	Differential output signal
Pulse/direction (PUL/DIR) signal voltage range	0-5V
Pulse/direction (PUL/DIR) signal max frequency	5MHz
Isolation	Non-isolated

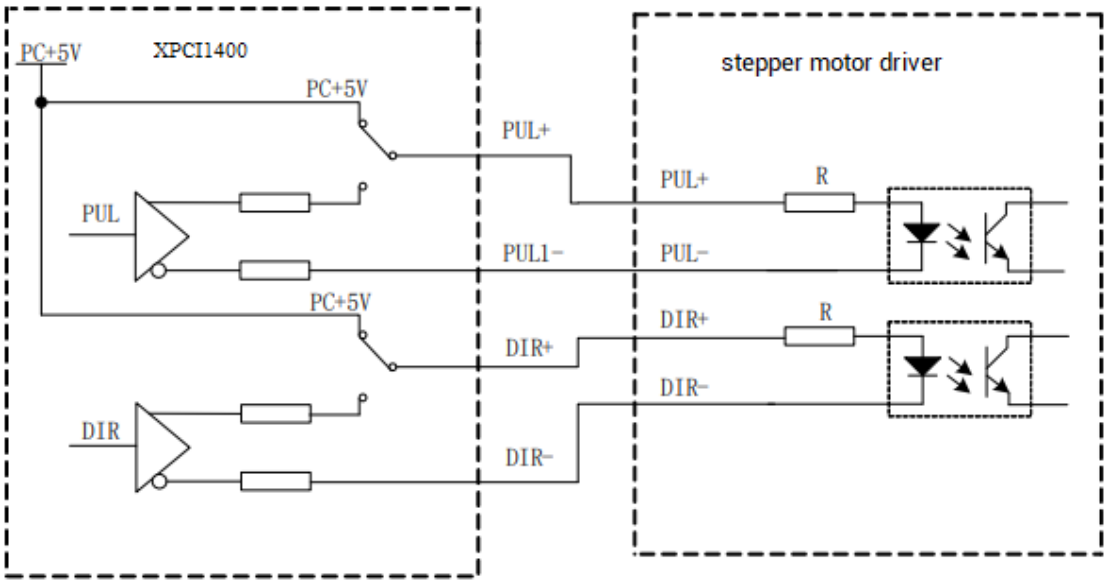
→ Wiring Reference

Connect driver to controller, it needs to correspondingly connect the PUL and DIR terminals one by one. Differential or single-ended wiring can be used. Both methods can be set by adjusting the dial switch on the board. For the specific setting method, refer to 3.8 .1 Differential/single-ended DIP switch.

1. Differential method:



2. Single-ended method:



→ Wiring Note

- Some servo drives are not optically isolated (for example, Panasonic economical servo), and the GND of the internal power supply (terminal 1) needs to be connected with the GND of the drive through ACC68.
- If the high-speed differential pulse port is connected, it is necessary to connect the GND of the internal power supply (terminal 1) to the GND of the driver through ACC64.
- If the drive and the control card use different 24V power supplies, connect the external power supply ground EGND (terminals 34 and 66) to the drive COM through ACC64.

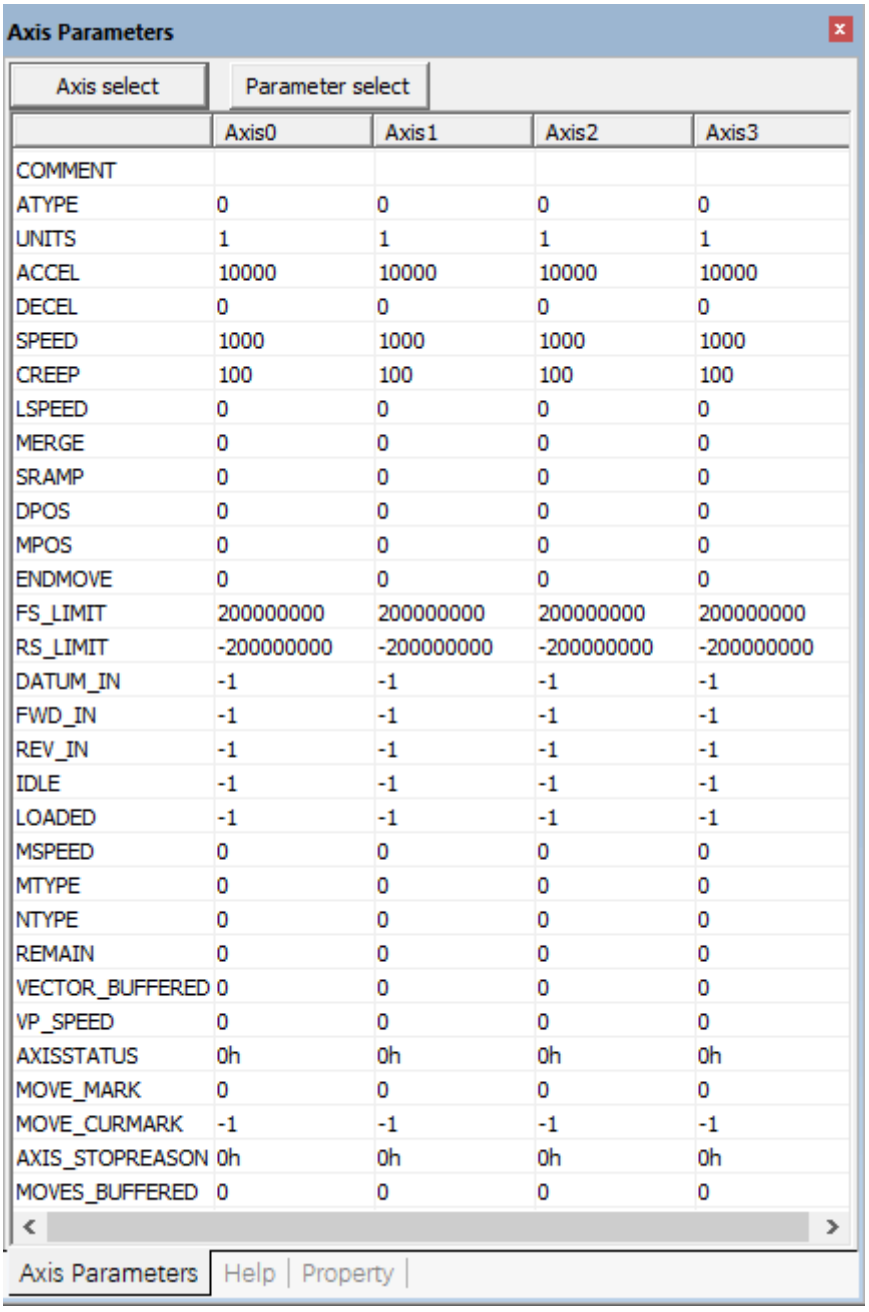
3.4.2. Basic Usage Method

(1) Please follow the above wiring instructions to wiring correctly.

(2) After powered on, please connect to ZDevelop.

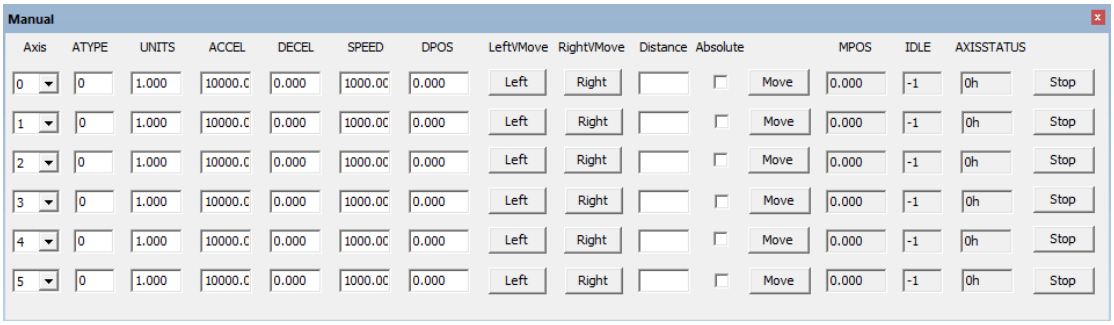
(3) Set axis parameters, such as, ATYPE, UNITS, SPEED, ACCEL, etc.

(4) There are many parameters related to pulse axis, they can be set and checked through relative instructions, please see “axis parameter and axis status" of “ZBasic", or see “ZDevelop/View/Axis parameter".



	Axis0	Axis1	Axis2	Axis3
COMMENT				
ATYPE	0	0	0	0
UNITS	1	1	1	1
ACCEL	10000	10000	10000	10000
DECEL	0	0	0	0
SPEED	1000	1000	1000	1000
CREEP	100	100	100	100
LSPEED	0	0	0	0
MERGE	0	0	0	0
SRAMP	0	0	0	0
DPOS	0	0	0	0
MPOS	0	0	0	0
ENDMOVE	0	0	0	0
FS_LIMIT	200000000	200000000	200000000	200000000
RS_LIMIT	-200000000	-200000000	-200000000	-200000000
DATUM_IN	-1	-1	-1	-1
FWD_IN	-1	-1	-1	-1
REV_IN	-1	-1	-1	-1
IDLE	-1	-1	-1	-1
LOADED	-1	-1	-1	-1
MSPEED	0	0	0	0
MTYPE	0	0	0	0
NTYPE	0	0	0	0
REMAIN	0	0	0	0
VECTOR_BUFFERED	0	0	0	0
VP_SPEED	0	0	0	0
AXISSTATUS	0h	0h	0h	0h
MOVE_MARK	0	0	0	0
MOVE_CURMARK	-1	-1	-1	-1
AXIS_STOPREASON	0h	0h	0h	0h
MOVES_BUFFERED	0	0	0	0

(5) Control corresponding motion through “View – Manual".



3.5. IN: Digital Input

Digital inputs are distributed in X300 and X301 signal interfaces.

3.5.1. Digital Input Specification & Wiring

→ Specification

Item	Low-speed input (specialized input) (general input IN0-IN31)
Input method	NPN Leakage type
Frequency	<5kHz
Voltage level	DC24V
Current	4.8mA
Max leakage current when off	25μA
Voltage to open	<14.5V
Min current	1.8mA
Impedance	4.7Ω
Isolation	optoelectronic isolation
The times in the form are typical based on the resistive load, and may change when the load circuit changes.	

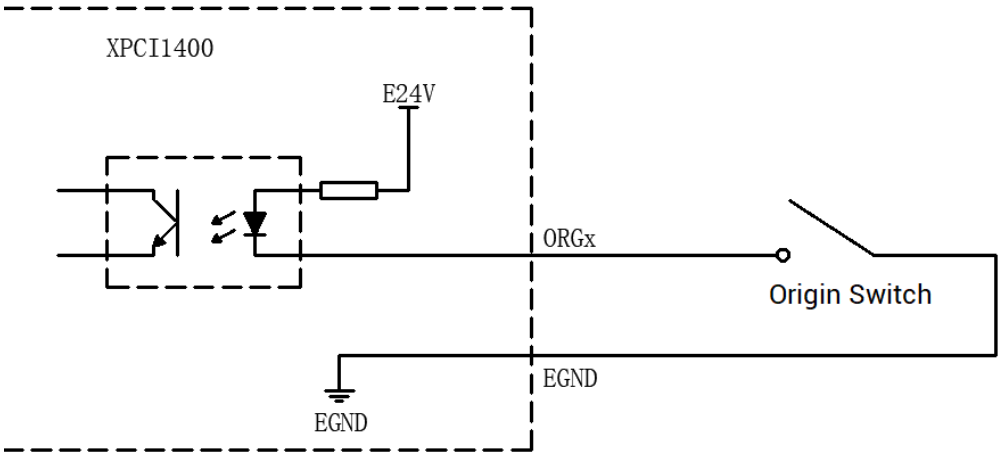
→ Wiring Reference

1. specialized input: origin switch signal

Generally, in motion control system, one position sensor needs to be used to set one position reference point, namely, the origin position. Then, it is convenient to control

position precisely.

XPCI1400 motion control card origin switch signal input circuit:



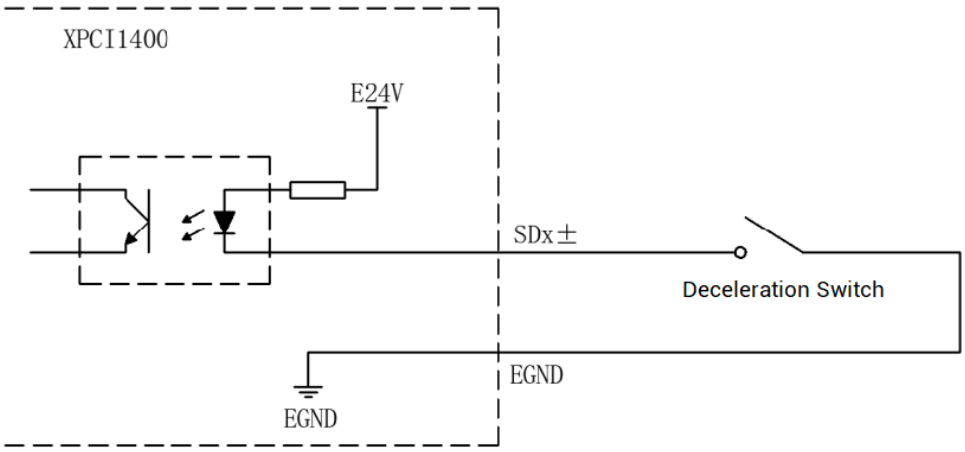
2. specialized input: deceleration switch signal

Generally, in motion control system, there is one position sensor to set a deceleration initial point for precision position control.

During motion, when the motion control card detects the deceleration signal SD, the running speed of the corresponding axis will decelerate to the initial speed. If the deceleration signal SD disappears, the running speed will re-accelerate to the maximum speed.

Each axis of XPCI1400 has two deceleration signal input ports +SD and -SD. +SD is positive deceleration signal, -SD is negative deceleration signal.

The signal input circuit diagram of the deceleration switch is shown in the figure.

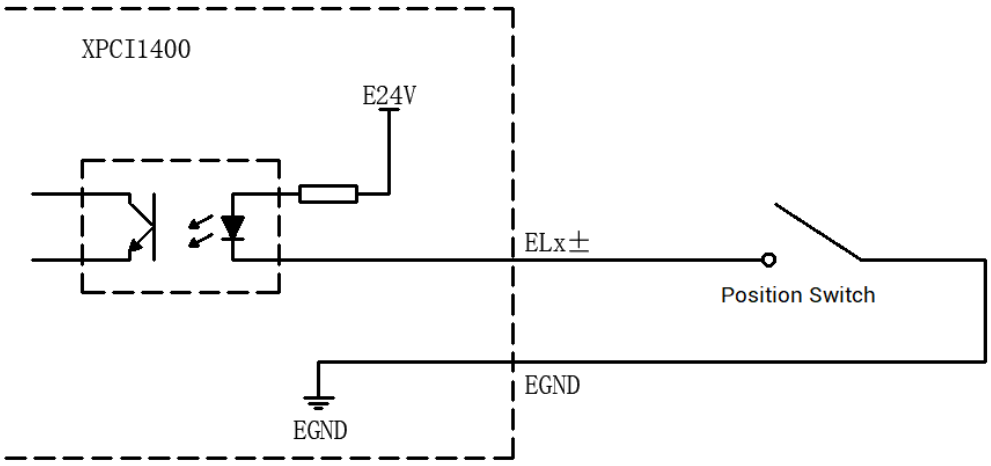


3. specialized input: position limit switch signal

In the motion system, one position sensor is usually used to set a mechanical limit point to determine the boundary position of the motion and protect the mechanical equipment.

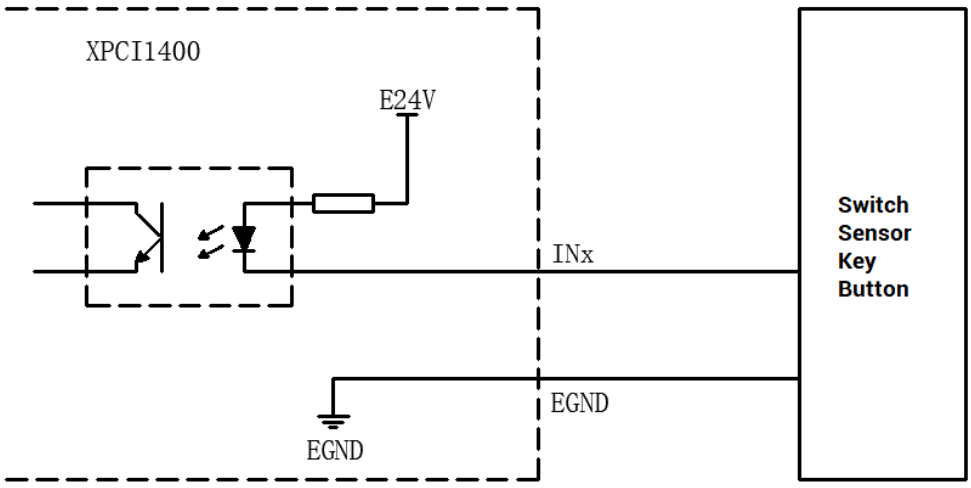
Each axis of XPCI1400 has two position limit signal input ports +EL and -EL. +EL is positive limit signal, -EL is negative limit signal.

The limit switch signal input circuit diagram is shown in the figure.



4. general inputs:

XPCI1400 motion control card provides users with isolated general input signals, which can be used for input signals of switches, sensors or other devices.



→ Wiring Note

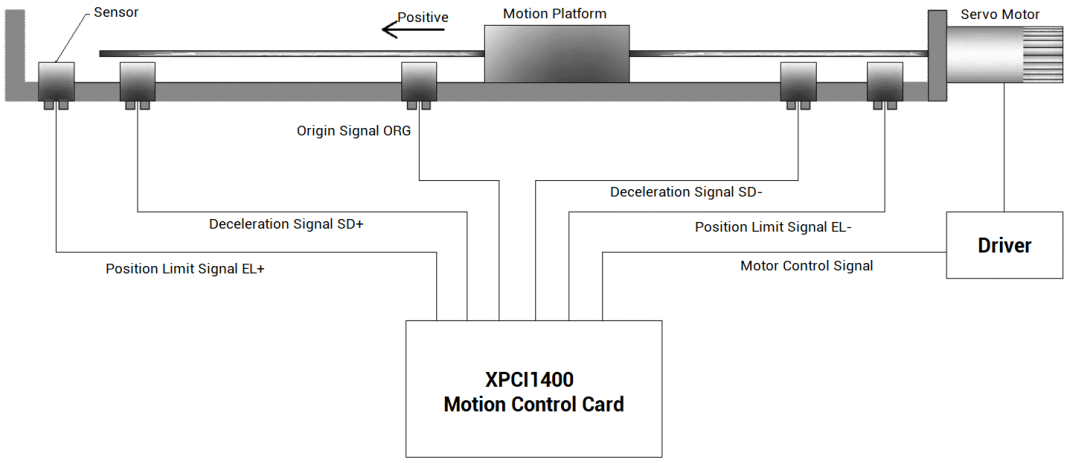
- The valid electric level of EL± signal can be set by software.
- If the limit switch is a normally open switch, it is necessary to set the EL± signal to be valid at low level. When the external mechanical parts touch the limit switch, the

switch is closed, EL± is valid, and the mechanical parts are prohibited from continuing to move in the original direction.

- If the limit switch is a normally closed switch, it is necessary to set the EL± signal to be valid at high level. When the external mechanical parts touch the limit switch, the switch is disconnected, EL± is valid, and the mechanical parts are prohibited from continuing to move in the original direction.

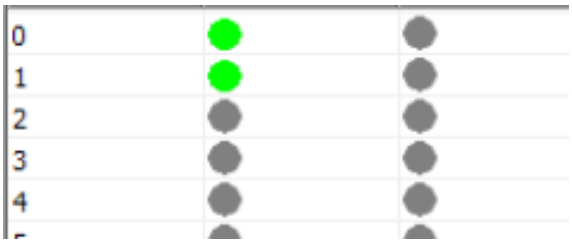
3.5.2. Position Sensor & Signal Distribution

The X300 signal interface defines dedicated IOs, which is used to access signals such as origin, limit, and alarm. The configuration of the sensor can refer to the figure below.



3.5.3. Basic Usage Method

1. Please follow the above wiring instructions to wiring correctly.
2. After powered on, please connect to ZDevelop.
3. State values of corresponding input can be read directly through “IN” command, or they can be checked through “ZDevelop/View/In".



3.7. OUT: Digital Output

Digital outputs are distributed in X300 and X301 signal interfaces.

3.7.1. Digital Output Specification & Wiring

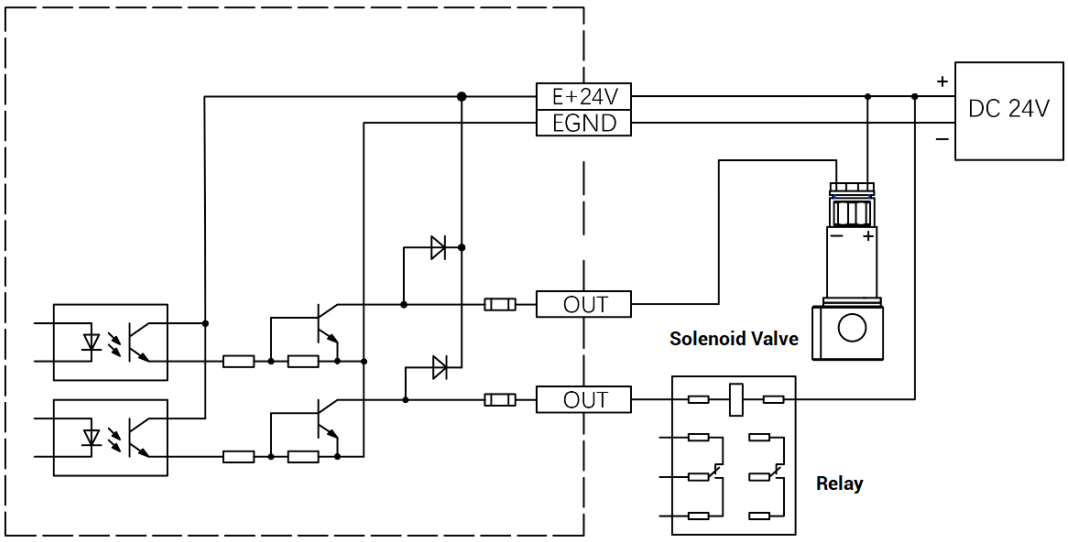
→ Specification

Item	Low-speed output (general input OUT0-OUT27)
Output method	NPN Leakage type, it is 0V when outputs.
Frequency	<8kHz
Voltage level	DC24V
Max Output Current	+300mA
Max leakage current when off	25μA
Respond time to conduct	12μs
Respond time to close	80μs
Overcurrent protection	Support
Isolation	optoelectronic isolation

Note:

- ✧ The times in the form are typical based on the resistive load, and may change when the load circuit changes.
- ✧ Due to the leak-type output, the shutdown of the output will be obviously affected by the external load circuit, and the output frequency should not be set too high in the application. For low-speed output, it is recommended to be lower than 8HKz. If there needs higher speed, please contact us to adjust parameter or custom hardware.

→ Wiring Reference

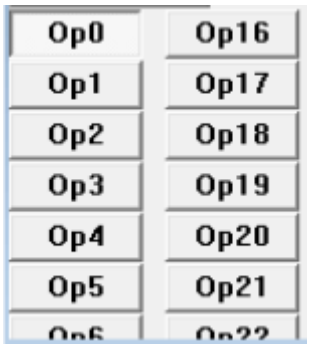


→ Wiring Note

- The wiring principle of low-speed digital input IN (0-27) is shown in the figure above. The external signal source can be an optocoupler, a relay or a solenoid valve etc., all can be connected as long as the requirements on output of electric level can be achieved.
- For the public end, please connect the "EGND" port on the power supply to the negative pole of DC power supply of external input device. If the signal area power supply of the external device and the power supply of the controller are in the same power supply system, this connection also can be omitted.

3.7.2. Basic Usage Method

1. Please follow the above wiring instructions to wiring correctly.
2. After powered on, please use ETHERNET or RS232 to connect to ZDevelop.
3. Open or close output port directly through “OP” command, also, it can be opened or closed through “ZDevelop/View/Op". Please refer to “ZBasic” for details.

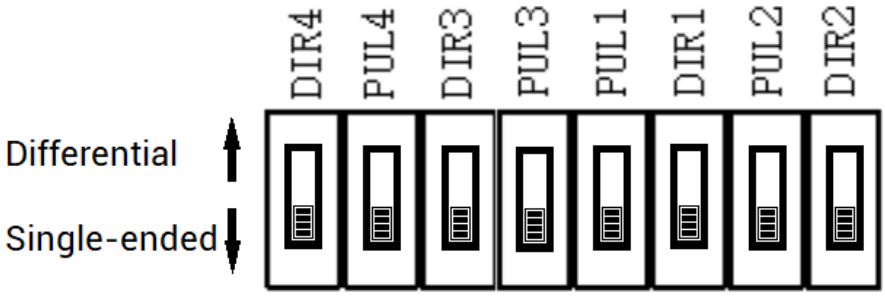


3.8. DIP Switch

This product has several DIP switches.

3.8.1. Differential/Single-ended DIP Switch

→ DIP Switch Appearance



→ Usage Description

It is one switch to select to set the pulse output mode as differential or single-ended output mode. "Differential" position is dialed, which means differential output mode is selected, "Single-ended" position is dialed, which means singled-ended output mode is selected.

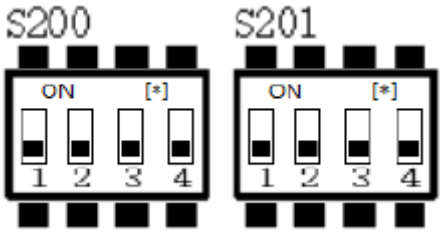
Default is differential output mode.

→ Note

- PUL and DIR of each axis must be dialed consistently, and DIP switch of each axis are independent.

3.8.2. S200, S201 DIP Switch

→ DIP Switch Appearance



→ Usage Description

S200 DIP Switch:

DIP Switch of S200 is the selection switch of initialization electric level when power on of OUT0-OUT27. When select "OFF", output initial electric level is low, the corresponding output port is "0". When select "ON", output initial electric level is high, the corresponding output port is "1".

When DIP switch is not used, all are OFF, so OUT0-OUT27 are with low electric level initially.

The first bit of S200: OUT0-OUT3 initial electric level set the bit, the factory configuration is high level.

The second bit of S200: OUT4-OUT11 initial electric level set the bit, the factory configuration is high level.

The third bit of S200: OUT12-OUT19 initial electric level set the bit, the factory configuration is high level.

The fourth bit of S200: OUT20-OUT27 initial electric level set the bit, the factory configuration is high level.

S201 DIP Switch:

DIP switch S201 is used to set ID of XPCI1400.

When DIP switch is not used, all are OFF, ID is 0.

The first bit of S201: ID is 1.

The second bit of S201: ID is 2.

The third bit of S201: ID is 4.

The fourth bit of S201: ID is 8.

Chapter IV Accessories

When XPCI1400 is used, following accessories are needed. It will be equipped with standard accessories from the factory, and users can also purchase optional accessories according to their needs.

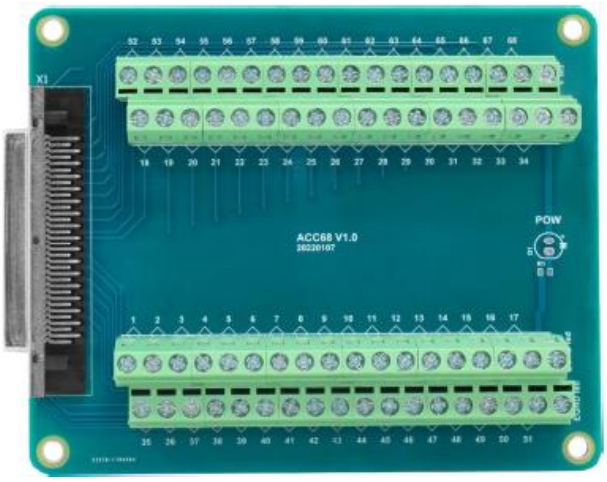
4.1.Standard Accessories

→ Cable

The cable is used to connect ACC68 wiring board and X300 signal interface, and SCSI68-100 (length is 1m) or SCSI68-200 (length is 2m) can be selected. SCSI68-100 is configured by default.

68-pin male head is fully connected to male head, one-to-one correspondence, with shielding.

→ Wiring Board



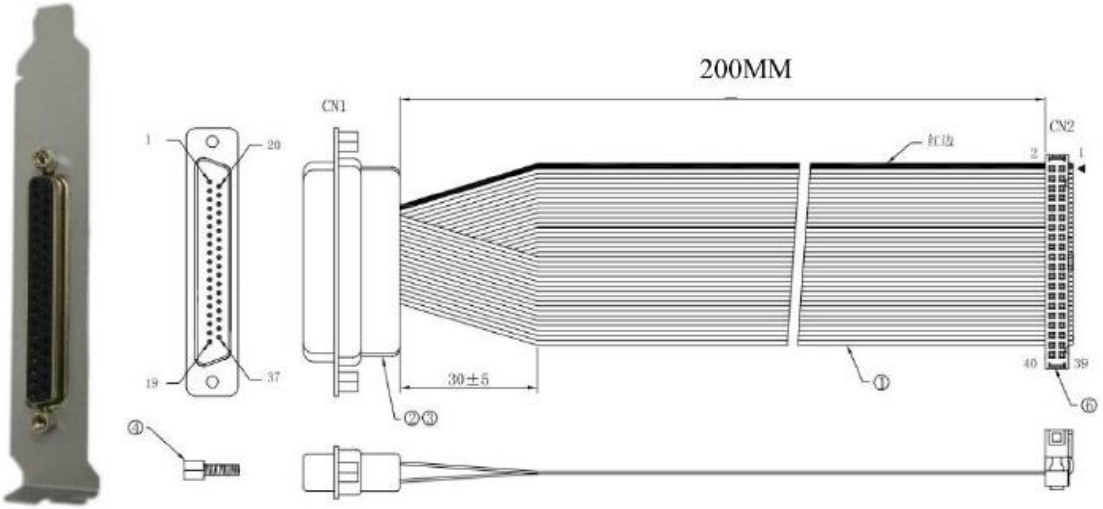
4.2. Optional Accessories

When the user needs to expand more IOs, it can purchase. And 16 inputs and 16 outputs can be expanded.

→ Adapter Cable

The 40P socket of the control card can be converted to DB37 through the ZP72-02 conversion cable, and can be installed on the card slot of the industrial computer for easy wiring.

CH2 is connected with X301.



→ Cable

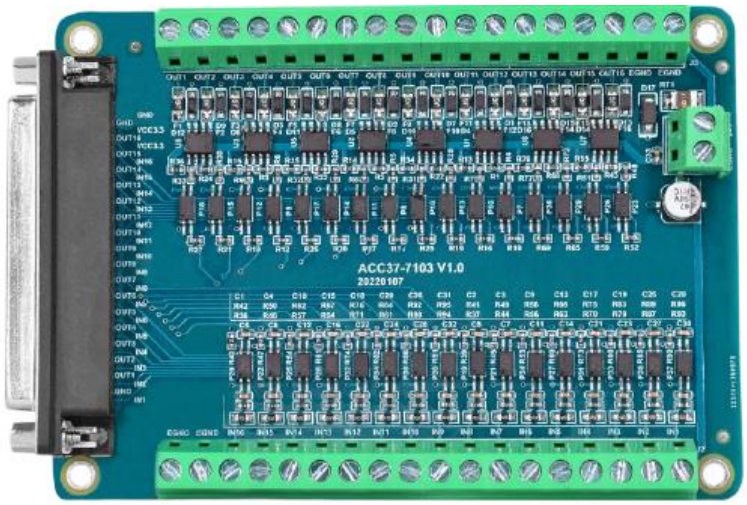
Connect the DB37-150 adapter cable to the interface board, which is convenient for users to install and connect the interface board.

37-pin male-to-male full contact, one-to-one correspondence, shielded.

The cable length is 1.5 meters.

→ Wiring Board

Please refer to 3.3.1 ACC37-7103 wiring board description for specific parameters.



Chapter V Installation

5.1. XPCI1400 Installation

Install steps:

1. Turn off the power to the computer.

2. Open the computer case, select a free PCI card slot, and use a screwdriver to remove the corresponding baffle strip.

3. Insert the motion control card into the slot securely, and tighten the fixing screws on the baffle strip.

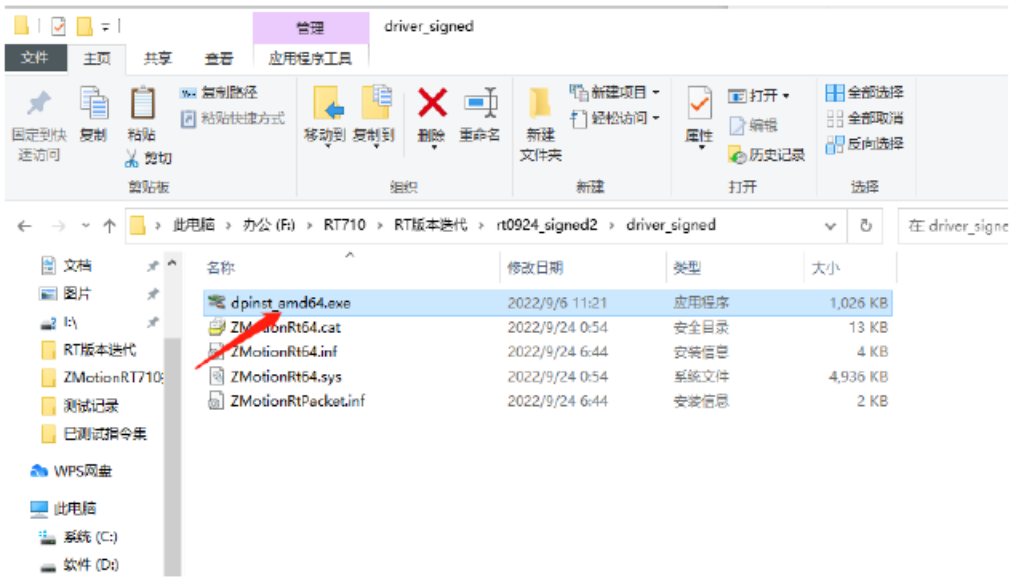
4. Remove a baffle bar adjacent to the slot, and fix the adapter board on the slot of the chassis with screws.

5.2. Drive Program Installation

It is used with the card.

Method 1: install automatically

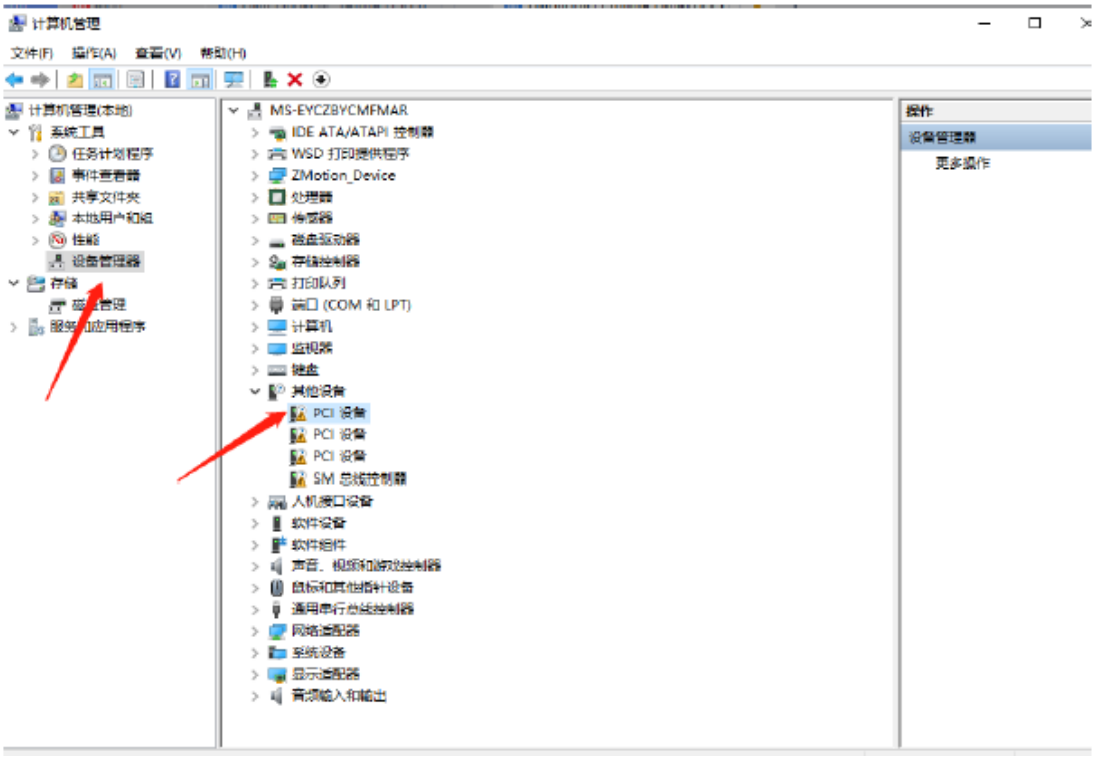
Use the built-in installation wizard software dpinst_amd64.exe in the driver directory to automatically install, and the specific operation is according to the software guide.



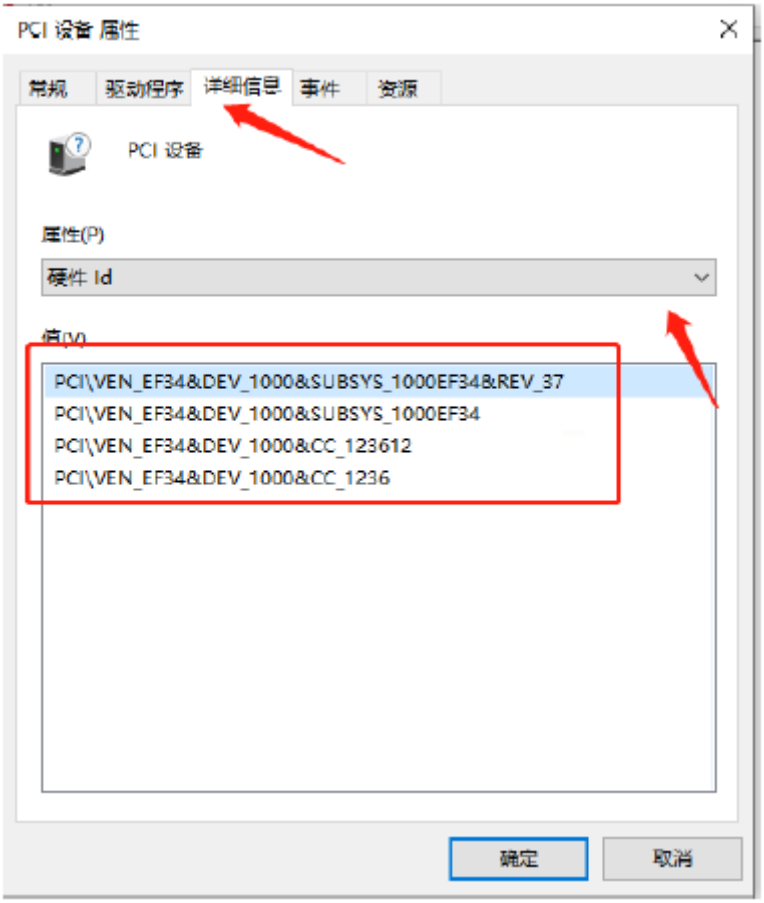
Note: If there is no PCI device, the software cannot be installed successfully, only the ZMotionRT64.sys file can be installed! !

Method 2: install manually

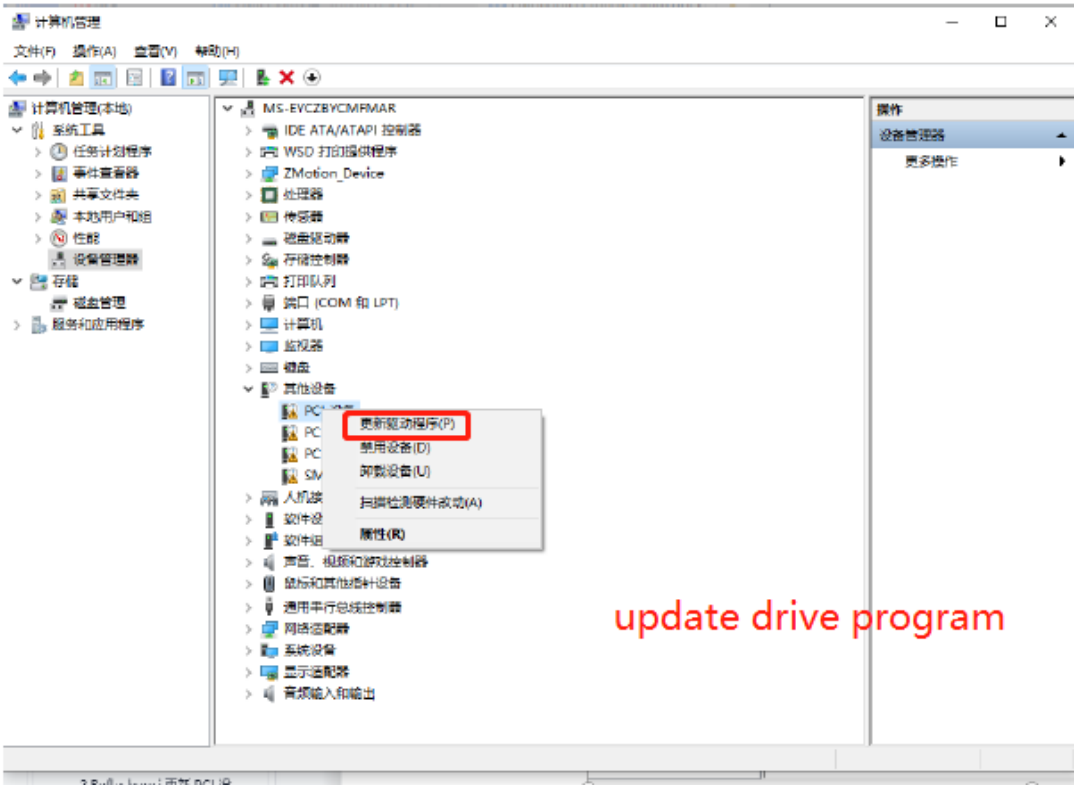
1. Open the Device Manager menu and select the PCI device in Other Devices.



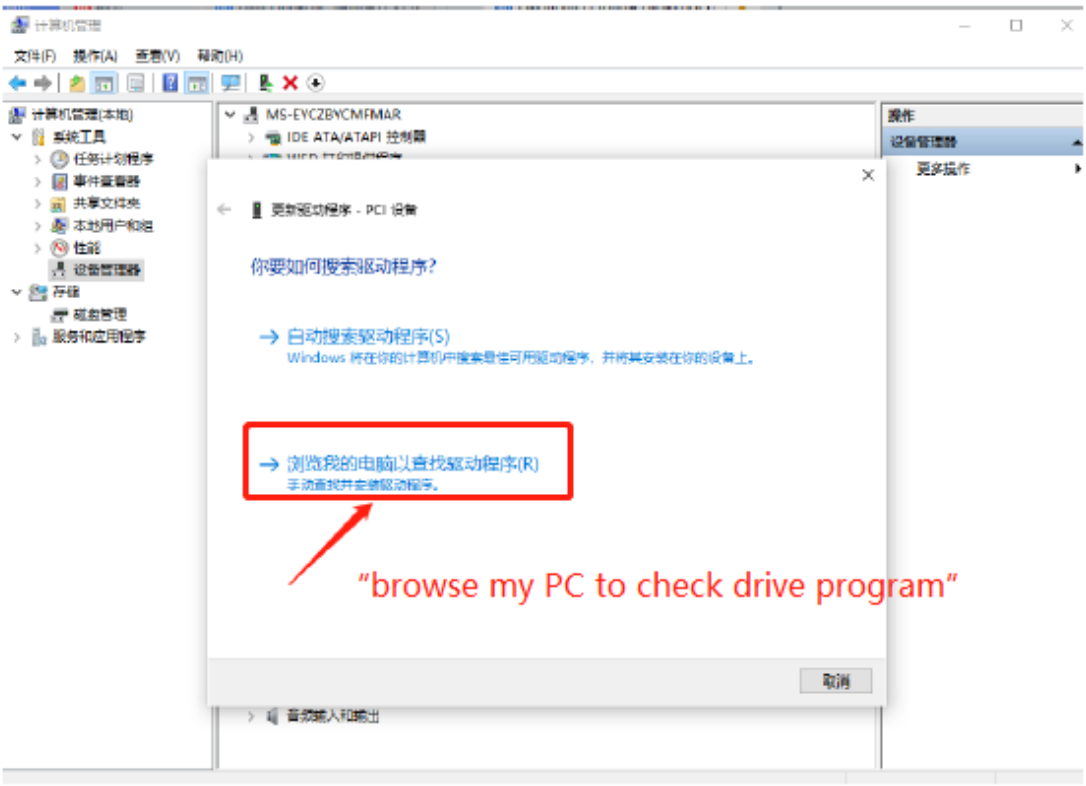
2. If there are multiple PCI devices, right-click "Properties" to view detailed information, select "Hardware ID" for properties, and confirm that it is a PCI device starting with PCI\VEN_EF34&DEV_1000&.



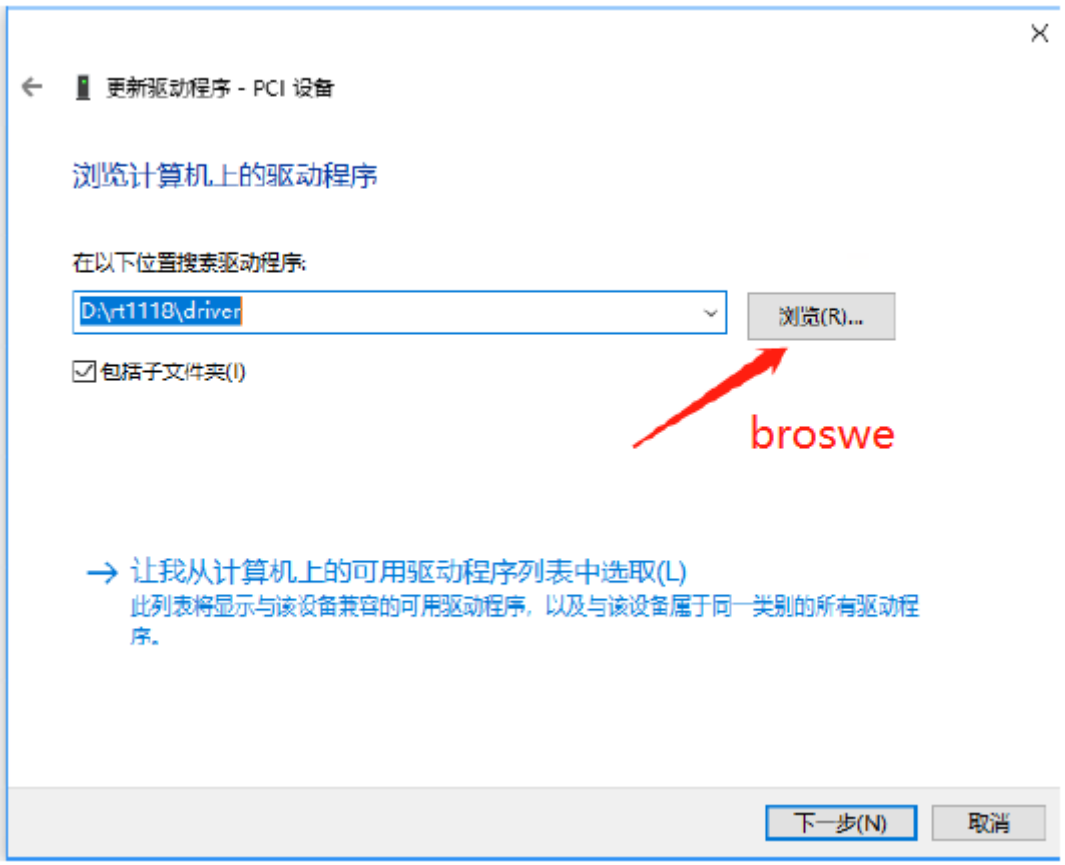
3. Find PCI Device, right-click to select “update drive program".



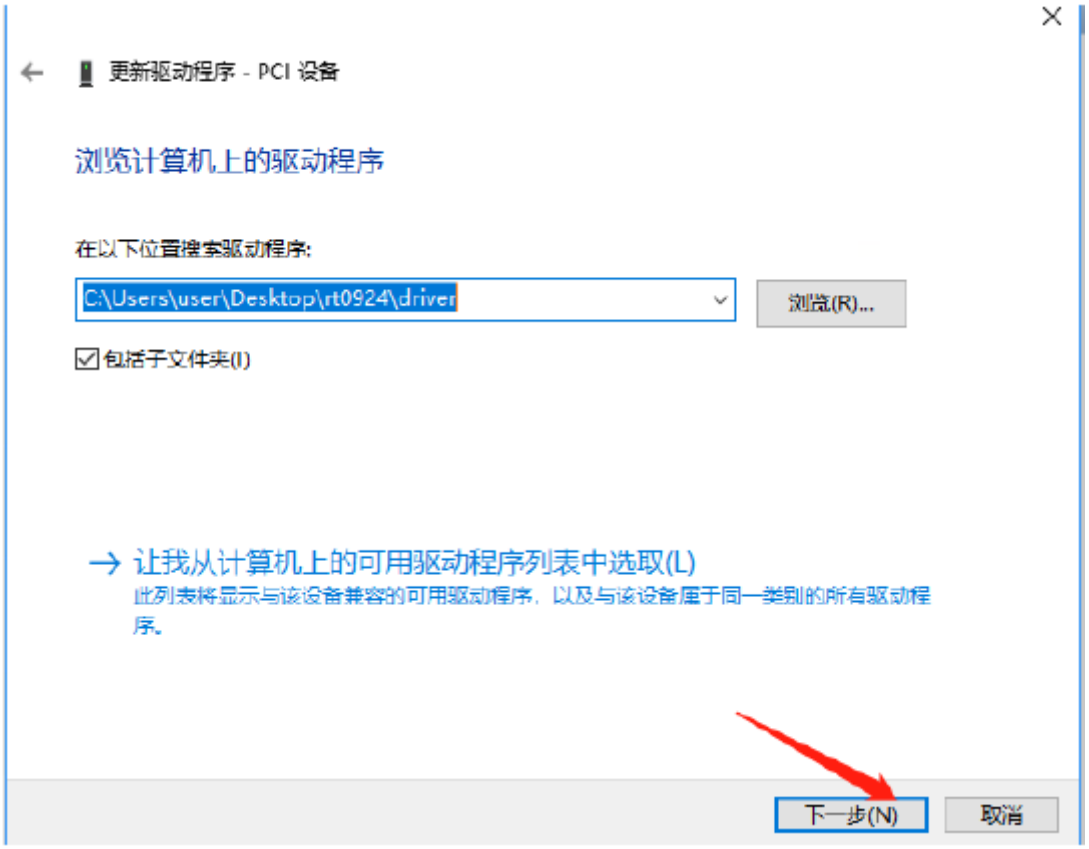
4. Select “browse my PC to check drive program".



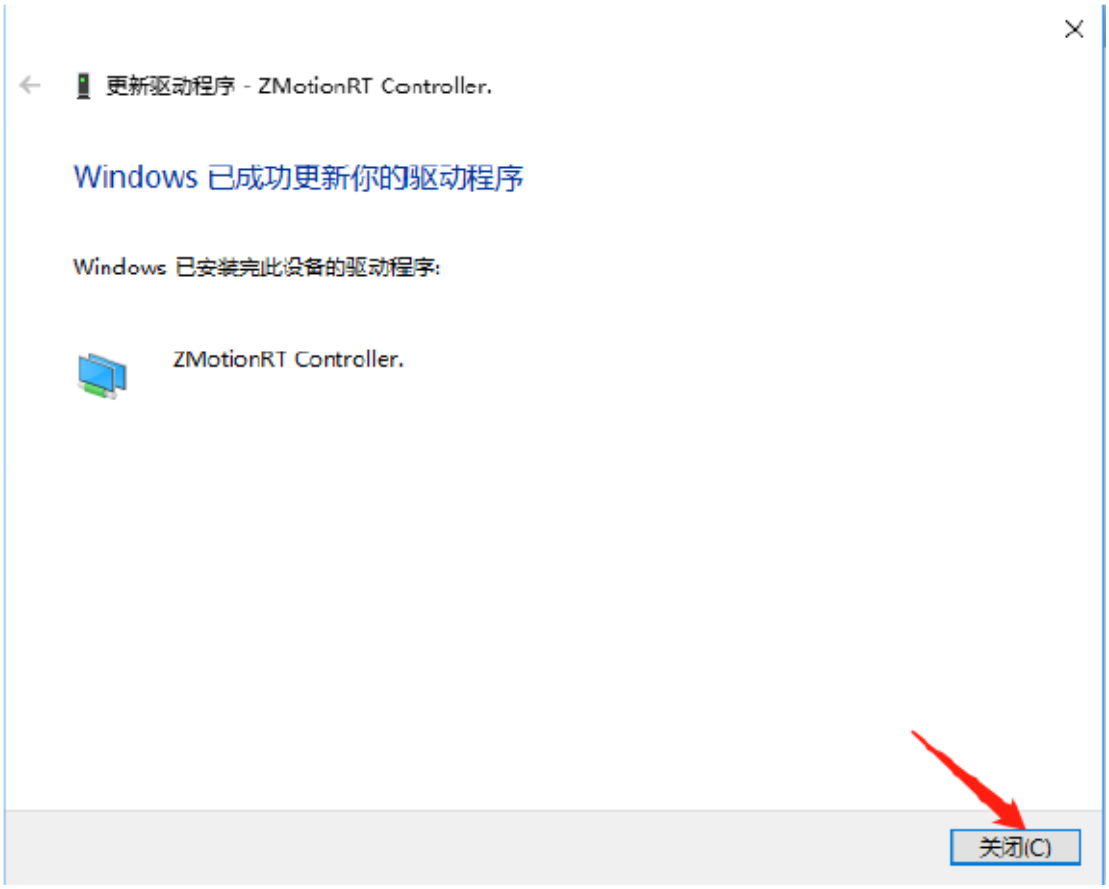
5. Click “browse", and select driver folder.



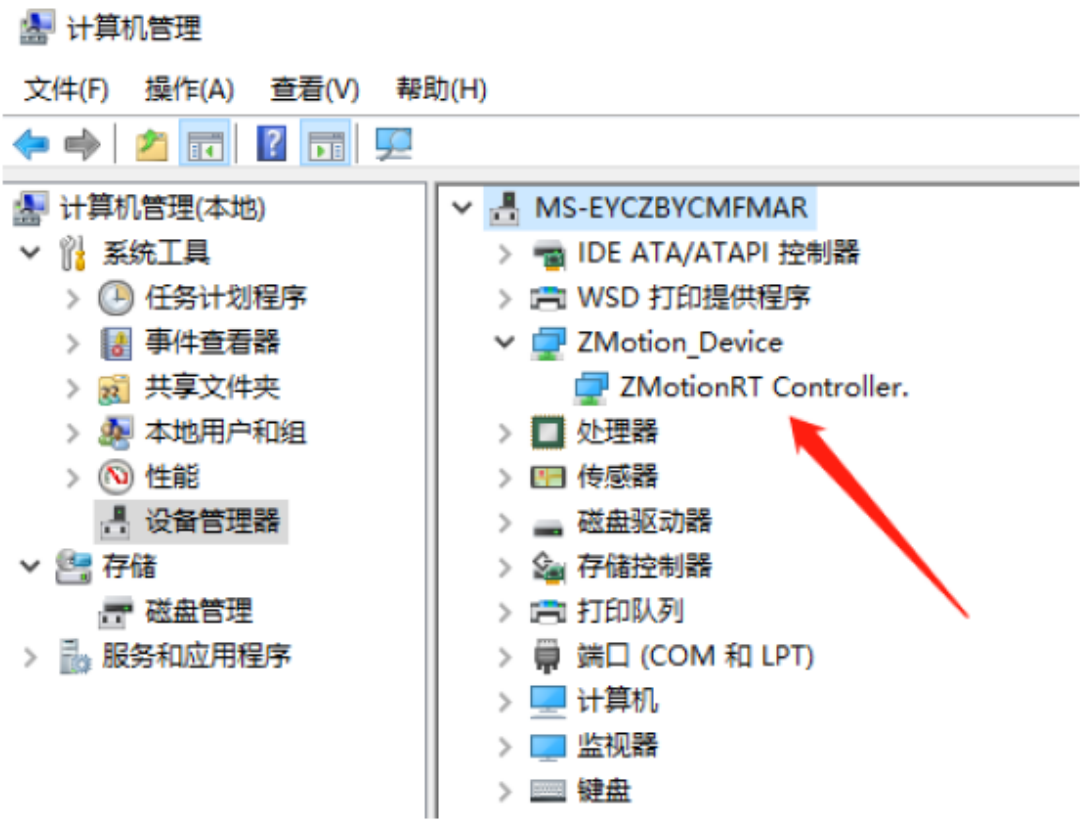
6. Click “next step”.



7. Wait until installed, click close.



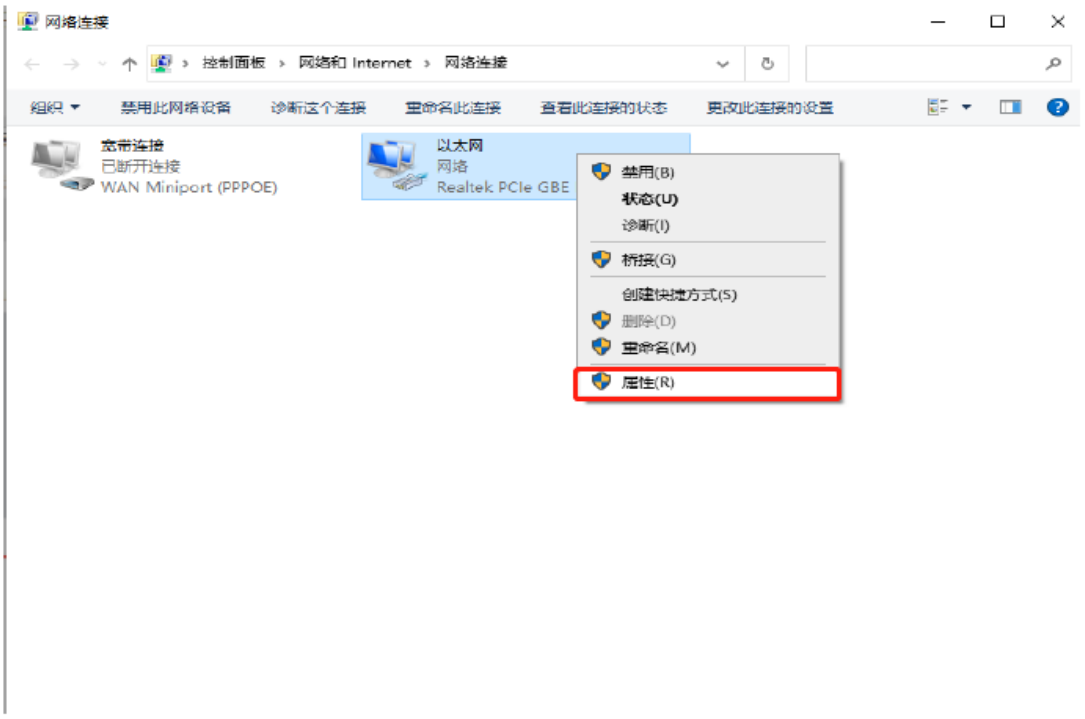
8. If there is ZMotionRTController in the device manager, the installation is successful.

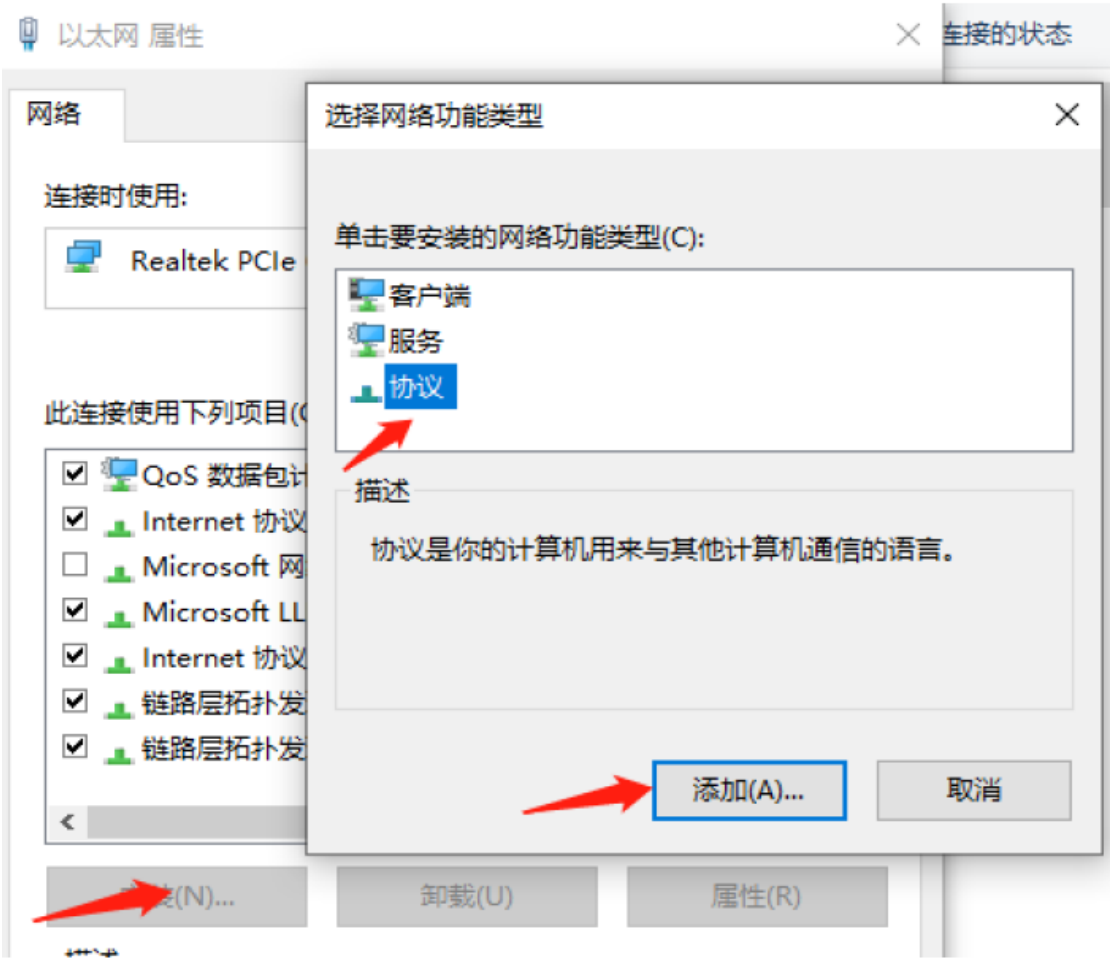


5.3. Ordinary Network Card Install EtherCAT Bus Protocol

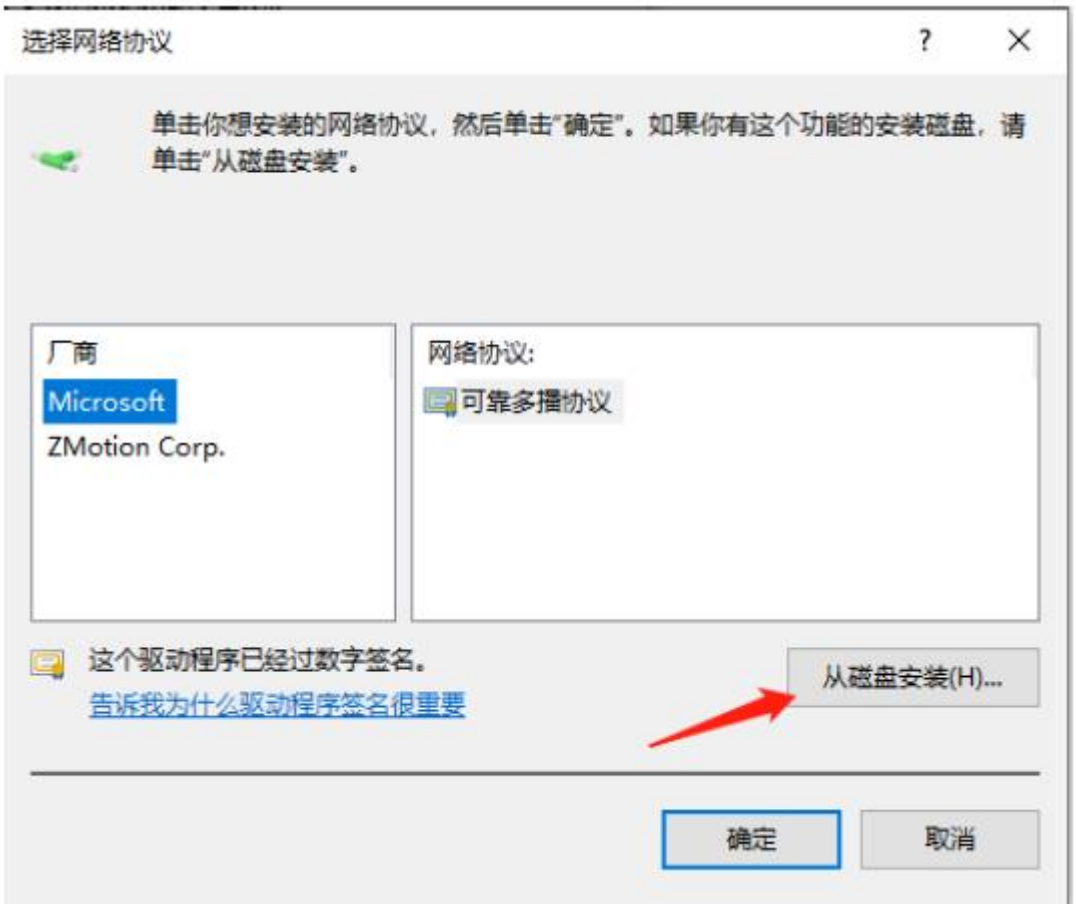
MotionRT710 supports the ETHERCAT network port of XPCIE, and also supports the common network port of the computer as ETHERCAT.

1. On the Windows network connection interface, select the network port that needs to be used as the bus, right-click Properties->Installation->Protocol->Add.

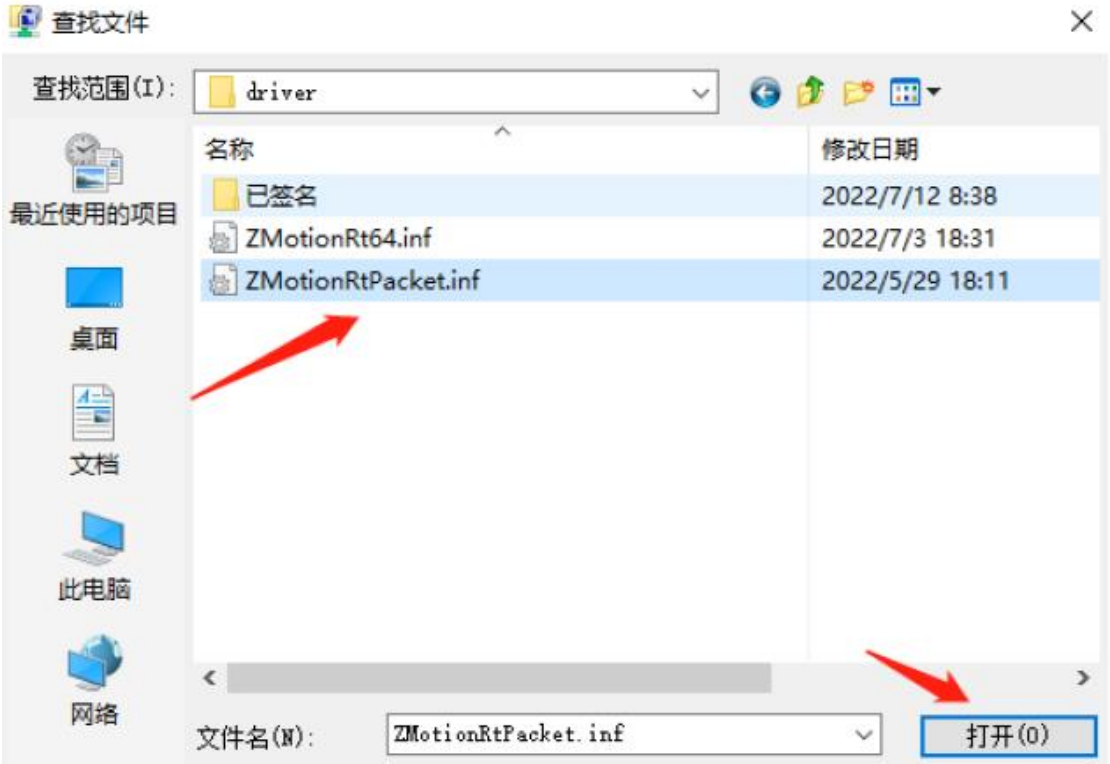




2. Select “installation from disk".



3. Brower drive position, select “ZMotionRtPacket.inf".



4. Click “ok".

Note: The installation wizard software cannot install this agreement! !

If there is ZMotionRT64PacketProtocolDriver in the properties, it means the installation is successful, and you can add the corresponding network port bus protocol if you check it. The network port that does not connect to the device can be unchecked here.

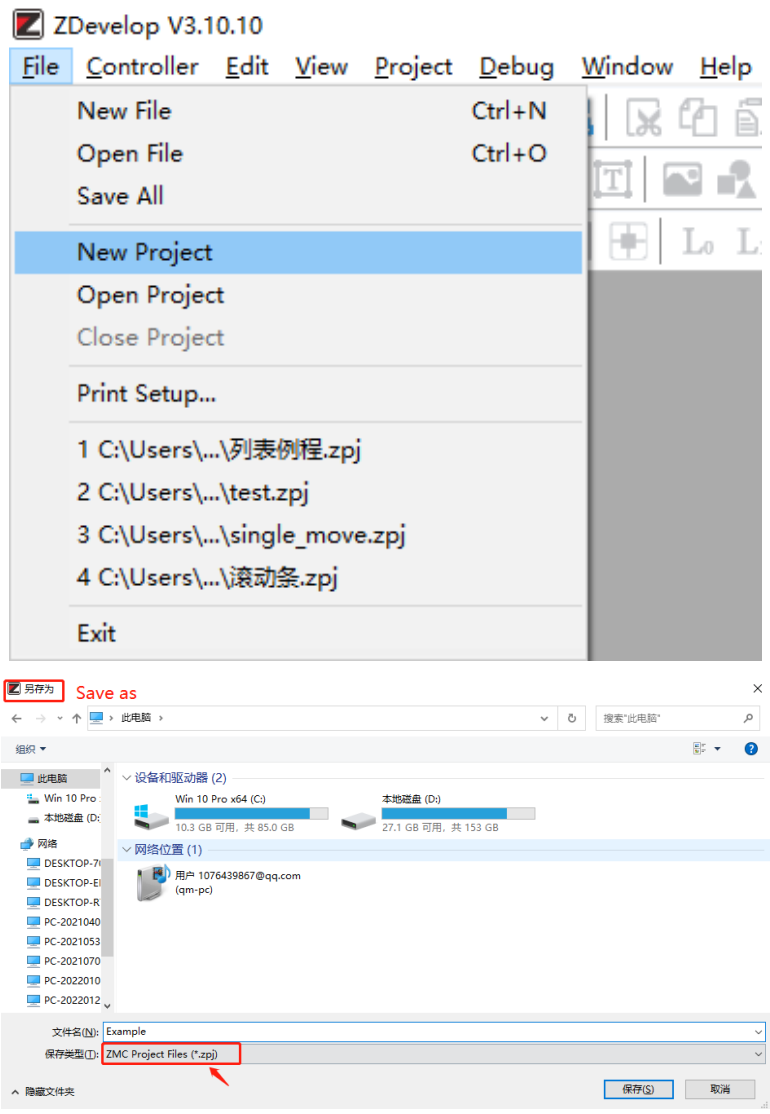
本地连接 属性
网络
共享
连接时使用:
Realtek PCIe GbE Family Controller
配置(C)...
此连接使用下列项目(O):
Internet 协议版本 4 (TCP/IPv4)
Microsoft 网络适配器多路传送器协议
Microsoft LLDP 协议驱动程序
Internet 协议版本 6 (TCP/IPv6)
ZMotionRT64 Packet Protocol Driver
安装(N)...
卸载(U)
属性(R)
描述
允许其他计算机使用 Microsoft 网络访问你计算机上的资源。
确定
取消

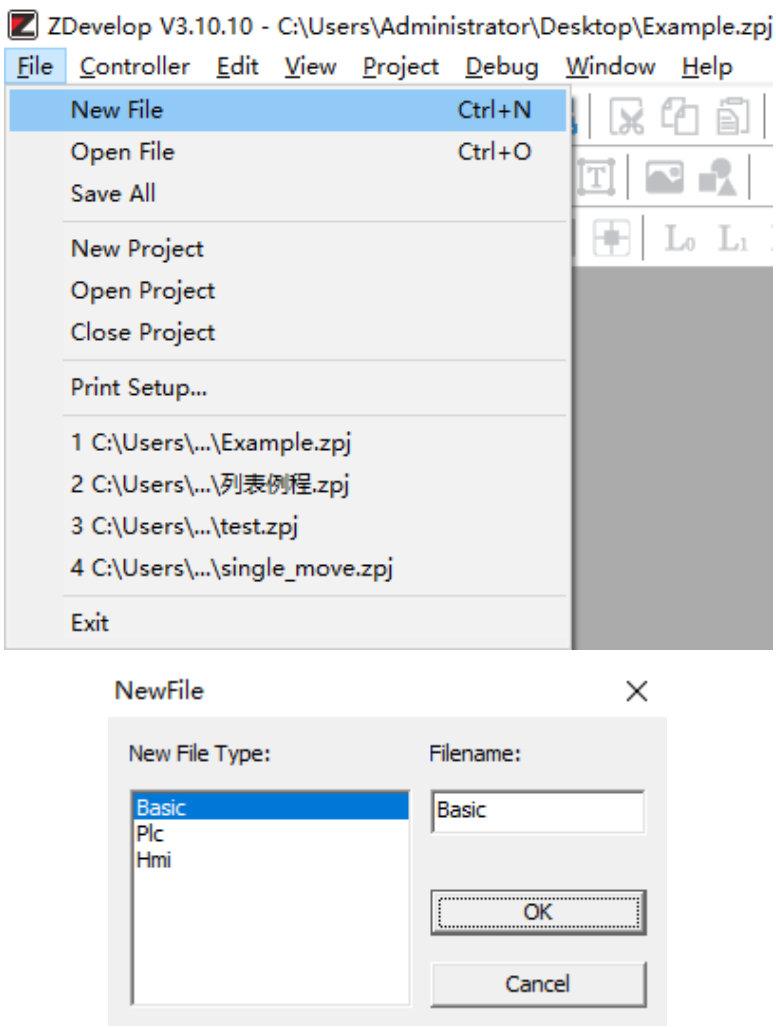
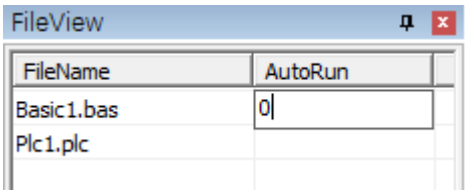
Chapter VI Program & Applications

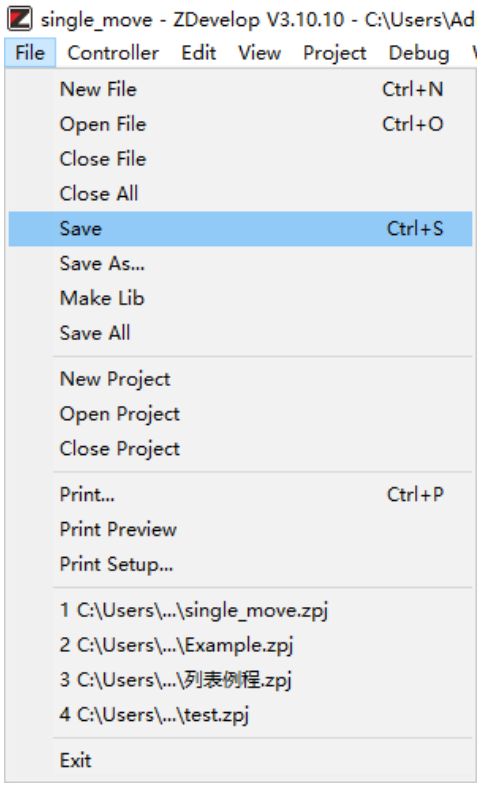
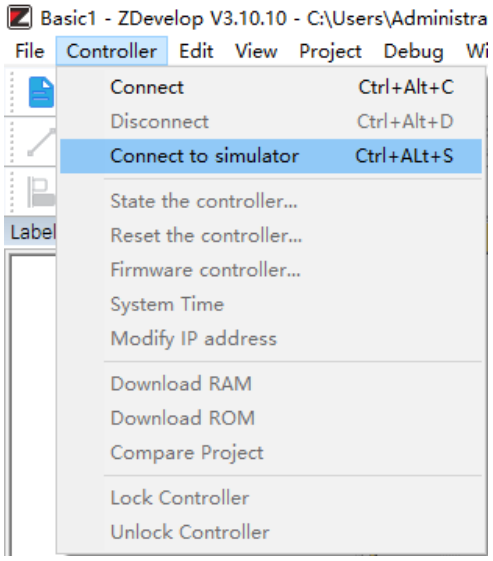
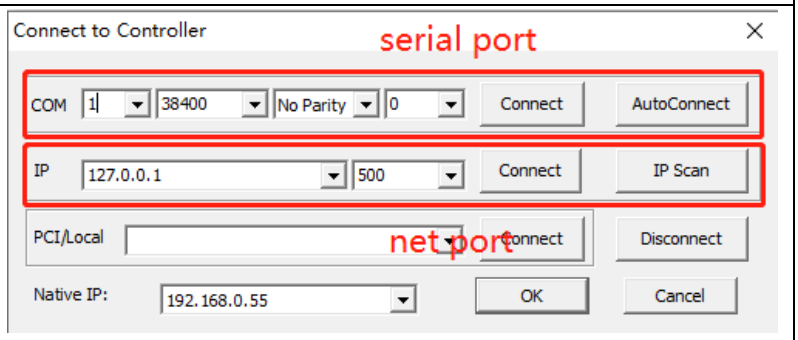
6.1. ZDevelop Software Usage

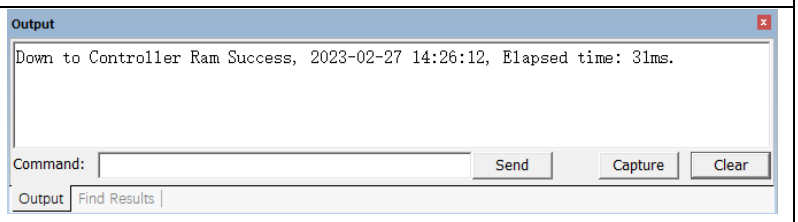
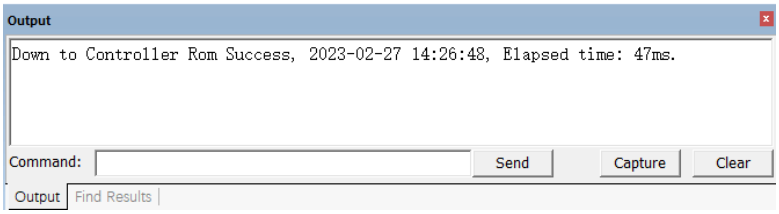
ZDevelop is a PC-side program development, debugging and diagnostic software for the ZMoiton series motion controllers of Zmotion Technology. Through it, users can easily edit and configure the controller program, quickly develop applications, diagnose system operating parameters in real time, and watch the motion controller. The running program is debugged in real time and supports Chinese and English bilingual environments.

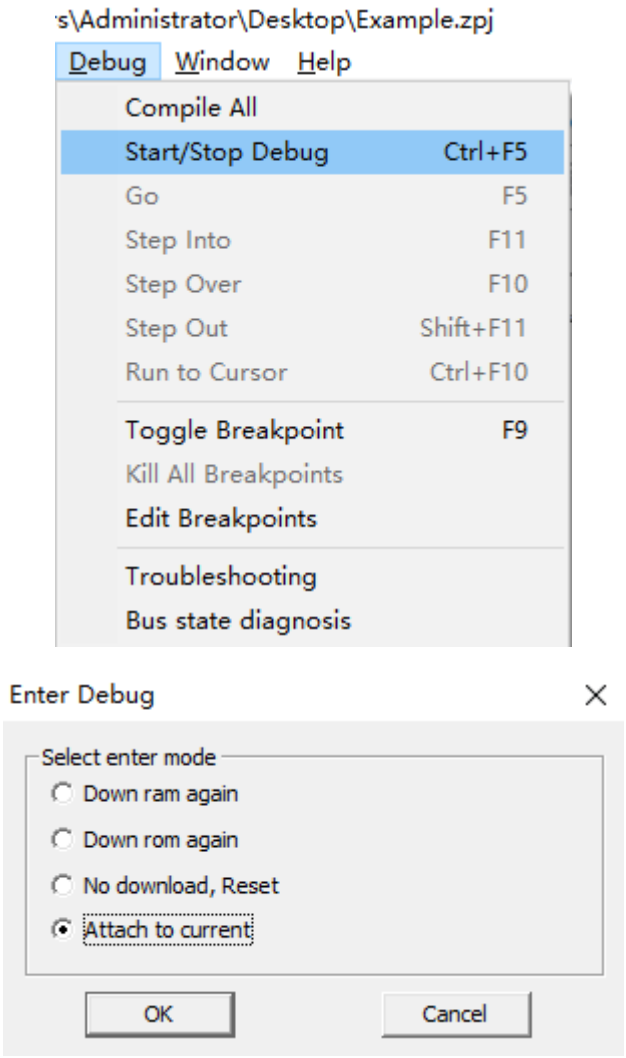
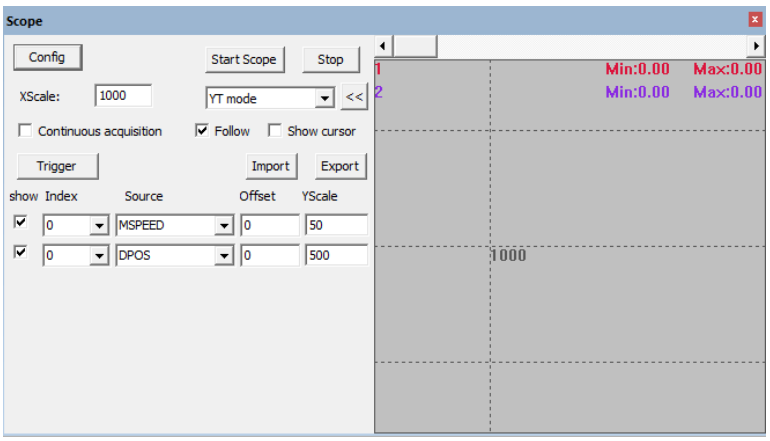
ZBasic, ZPLC and ZHMI can run multi-tasks, and ZBasic can run multi-tasks, and can be mixed with ZPLC and ZHMI.

Step	Operations	Display Interface
1	Open ZDevelop, click "File" – "New Project", Save as window will pop up, then enter file name, save the project file with suffix "zpj.".	

2	Click “File” – “New File”, select file type to build, here select Basic, click “OK”.	
3	Double click “AutoRun”, enter task number 0.	

4	Edit the program in program editing window, click "save", new built basic file will be saved under "zpj." project automatically. "Save all" means all files under this project will be saved.	
5	Click "controller – connect", if no controller, select connect to simulator.	
	Then, "connect to controller" window will pop up, you can select serial port or net port to connect, select matched serial port	

	parameters or net port IP address, then click “connect”.	
6	Click “Ram/Rom” – “download RAM / download ROM”, if it is successful, there is print indication, at the same time, program is downloaded into controller and runs automatically. RAM: it will not save when power off. ROM: it will save data when power off, and when the program is connected to controller again, running according to task number.	 

7	Click “Debug” – “Start/Stop Debug” to call “Task” and “Watch” window, because it was downloaded before, here select “Attach the current”.	
8	Click “View” – “Scope” to open oscilloscope.	

Note:

- When opening an project, choose to open the zpj file of the project. If only the Bas file is opened, the program cannot be downloaded to the controller.
- When the project is not created, only the Bas file cannot be downloaded to the controller.
- The number 0 in automatic operation represents the task number, and the program

runs with task 0, and the task number has no priority.

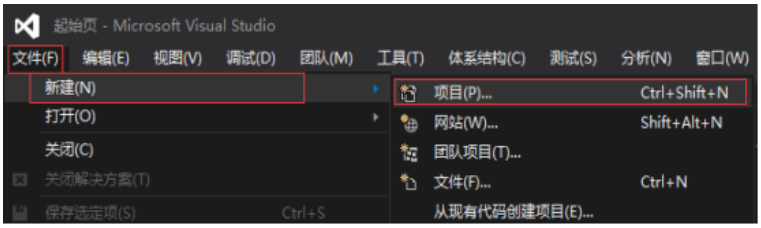
- If no task number is set for the files in the entire project, when downloading to the controller, the system prompts the following message WARN: no program set autorun

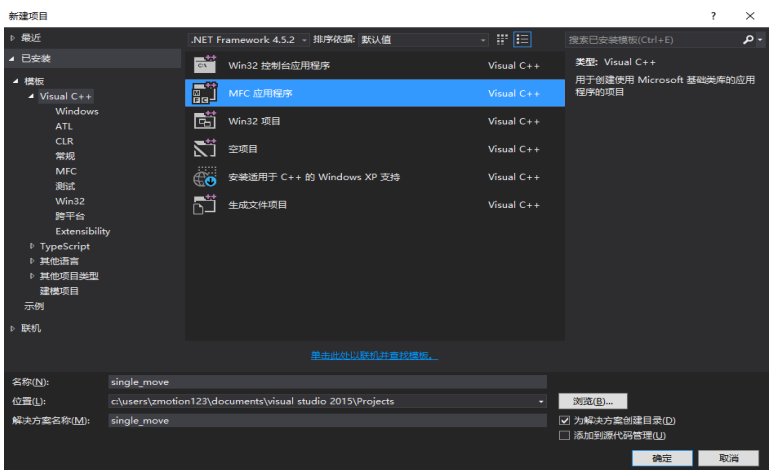
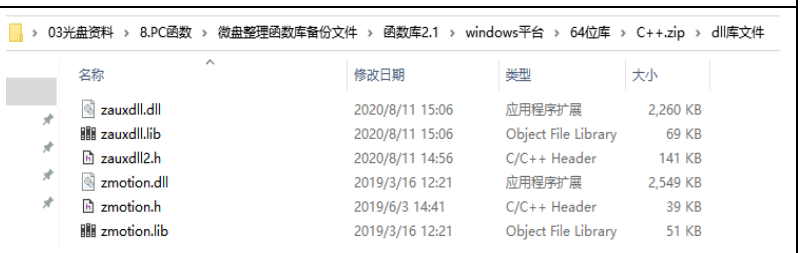
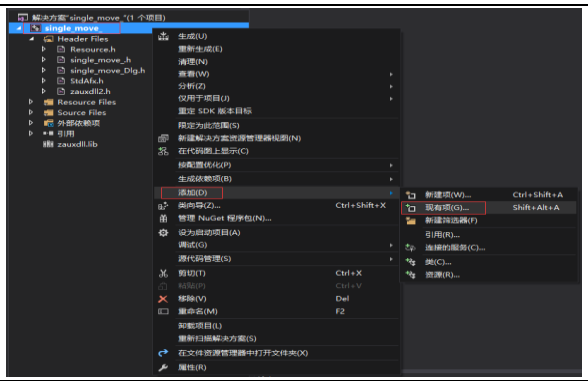
6.2. PC Upper-Computer Program Application

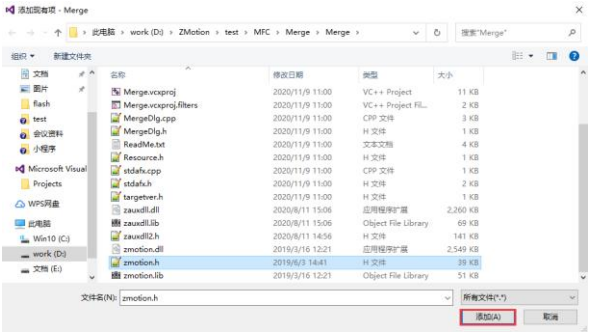
The controller supports development under various operating systems such as windows, linux, Mac, Android, and wince, and provides dll libraries in various environments such as vc, c#, vb.net, and labview, as shown in the figure below. PC software programming refers to "ZMotion PC Function Library Programming Manual".

The program developed using the PC software cannot be downloaded to the controller, and it is connected to the controller through the dll dynamic library. The dll library needs to be added to the header file and declared during development.

The c++ project development process in VS is as follows:

Step	Operations	Display Interface
1	Open VS, click “File” – “New” – “Project”.	

2	Select development language as “Visual C++” and the select program type as “MFC application type”.		
3	Select “Based on basic box”, click “next” or “finish”		
4	Find C++ function library provided by manufacturer. Routine is below (64-bit library)		
5	Copy all DLL related library files under the above path to the newly created project.		
6	Add a static library and related header files to the project. Static library: zauxdll.lib,	1) Right-click the header file first, and then select: "Add" → "Existing	

<table>
<tr><td rowspan="2"></td><td rowspan="2">zmotion.lib
Related header files:
zauxdll2.h,
zmotion.h</td><td>Item".</td><td></td></tr>
<tr><td>2) Add static libraries and related header files in sequence in the pop-up window.</td><td>  </td></tr>
<tr><td>7</td><td>Declare the relevant header files and define the controller connection handle, so far the project is newly created.</td><td colspan="2">

```cpp
// single_move_Dlg.cpp : implementation file
//

#include "stdafx.h"
#include "single_move_.h"
#include "single_move_Dlg.h"
#include "zauxdll2.h"

#ifdef _DEBUG
#define new DEBUG_NEW
#undef THIS_FILE
static char THIS_FILE[] = __FILE__;
#endif

/////////////////////////////////////////////////////////////////////////////
// CSingle_move_Dlg dialog

ZMC_HANDLE      g_handle = NULL;            //控制器链接句柄
```

</td></tr>
</table>

Chapter VII Run and Maintain

The correct operation and maintenance of the device can not only guarantee and extend the life cycle of the equipment itself, but also take technical management measures according to the pre-specified plan or the corresponding technical conditions to prevent equipment performance degradation or reduce the probability of equipment failure.

7.1. Regular Inspection and Maintenance

The working environment has an impact on the device. Therefore, it is usually inspected regularly based on the inspection cycle of 6 months to 1 year. The inspection cycle of the device can be appropriately adjusted according to the surrounding environment to make it work within the specified standard environment.

Check item	Check content	Inspection standards
power supply	Check whether the voltage is rated	DC 24 V (-10%~10%)
surroundings	Whether the ambient temperature is within the specified range (when installed in the cabinet, the temperature inside the cabinet is the ambient temperature)	-20 °C -60 °C
	Whether the ambient humidity is within the specified range (when installed in the cabinet, the humidity in the cabinet is the ambient humidity)	10 %-9 5 % non-condensing
	Is there direct sunlight	No
	With or without droplets of water, oil, chemicals, etc.	No
	Whether there is dust, salt, iron filings, dirt	No
	Whether there is corrosive gas	No
	Whether there are flammable and explosive gases or articles	No

	Whether the device is subjected to vibration or shock	Should be within the range of vibration resistance and impact resistance
	Is the heat dissipation good	Keep good ventilation and heat dissipation
Installation and Wiring Status	Whether the basic unit and the expansion unit are installed firmly	The mounting screws should be tightened without loosening
	Whether the connecting cables of the basic unit and the expansion unit are fully inserted	The connection cable cannot be loosened
	Are the screws of the external wiring loose	Screws should be tightened without loosening
	Whether the cable is damaged, aged, cracked	The cable must not have any abnormal appearance

7.2. Common Problems

Problems	Suggestions
Motor does not rotate.	3. Check whether the ATYPE of the controller is correct. 4. Check whether hardware position limit, software position limit, alarm signal work, and whether axis states are normal. 5. Check whether motor is enabled successfully. 6. Confirm whether pulse amount UNITS and speed values are suitable. If there is the encoder feedback, check whether MPOS changes. 7. Check whether pulse mode and pulse mode of drive are matched. 8. Check whether alarm is produced on motion controller station or drive station. 9. Check whether the wiring is correct. 10. Confirm whether controller sends pulses normally.
The position limit signal is	1. Check whether the limit sensor is working normally,

invalid.	and whether the "input" view can watch the signal change of the limit sensor. 2. Check whether the mapping of the limit switch is correct. 3. Check whether the limit sensor is connected to the common terminal of the controller.
No signal comes to the input.	1. Check whether the limit sensor is working normally, and whether the "input" view can watch the signal change of the limit sensor. 2. Check whether the mapping of the limit switch is correct. 3. Check whether the limit sensor is connected to the common terminal of the controller.
The output does not work.	1. Check whether IO power is needed. 2. Check whether the output number matches the ID of the IO board.
POWER led is ON, RUN led is OFF.	1. Check whether the power of the power supply is sufficient. At this time, it is best to supply power to the controller alone, and restart the controller after adjustment. 2. Check whether the ALM light flickers regularly (hardware problem).
RUN led is ON, ALM led is ON.	1. Program running error, please check ZDevelop error code, and check application program.
Fail to connect controller to PC through serial port.	1. Check whether the serial port parameters are modified by the running program, you can check all the current serial port configurations through ?*SETCOM. 2. Check whether the serial port parameters of the PC match the controller. 3. Open the device manager and check whether the serial driver of the PC is normal.
CAN expansion module cannot be connected.	1. Check the CAN wiring and power supply circuit, whether the 120 ohm resistor is installed at both ends.

	2. Check the master-slave configuration, communication speed configuration, etc. 3. Check the DIP switch to see if there are multiple expansion modules with the same ID. 4. Use twisted-pair cables, ground the shielding layer, and use dual power supplies for severe interference (the main power supply of the expansion module and the IO power supply are separately powered)
Fail to connect controller to PC through net port.	1. Check IP address of PC, it needs to be at the same segment with controller IP address. 2. Check controller IP address, it can be checked and captured after connection through serial port. 3. When net port led is off, please check wiring. 4. Check whether controller power led POWER and running indicator led RUN are ON normally. 5. Check whether the cable is good quality, change one better cable to try again. 6. Check whether controller IP conflicts with other devices. 7. Check whether controller net port channel ETH are all occupied by other devices, disconnect to other devices, then try again. 8. When there are multiple net cards, don't use other net cards, or change one computer to connect again. 9. Check PC firewall setting. 10. Use “Packet Internet Groper” tool (Ping), check whether controller can be Ping, if it can't, please check physical interface or net cable. 11. Check IP address and MAC address through arp-a.