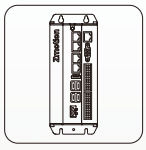
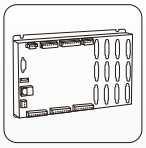
Zmotion®
正运动技术

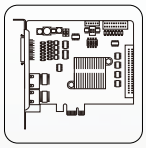
Better Motion Control, Smarter Life

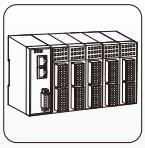
2025-2026

Zmotion Technology Product Catalogue


Vision Motion Controller


Motion Controller


PCIe Motion Control Card


Remote IO Module


Teach Pendant

V3


Zmotion®
正运动技术
做最好用的运动控制

Company Profile

Zmotion Technology is a national high-tech enterprise, which focuses on motion control technology R&D (general motion control software & hardware products). In Zmotion, there integrates lots of experienced talents from famous companies or institutions, such as Huawei, Huazhong University of Science and Technology etc. At the same time, Zmotion insists self-innovating and collaborating with comprehensive universities to research basic knowledge of motion control. In this way, Zmotion has already become one of the fastest growing industrial motion control companies in China, also it is the rare company that has completely managed core technologies of motion control and platform technology of real time industrial control software.

Now, Zmotion develops many motion control products, mainly including 2-24 axes **embedded pulse motion controller**, 2-128 axes **embedded EtherCAT motion controller**, 2-24 axes network pulse motion control card, 2-128 axes **PCI EtherCAT motion control card, PCIE / XPCIE EtherCAT motion control card**, and 2-240 axes **vision motion controller**. In addition, Zmotion provides **HMI** and all kinds of **expansion modules**.

Zmotion motion control real-time kernel "MotionRT" has developed from MotionRT1 to MotionRT7 in recent 10 years. Before, it only supports real-time motion and real-time RTBasic. Now, it can achieve real-time motion, **RTBasic, RTPLC, RTHMI, EtherCAT, vision, robot control, G code, etc.,** and it is compatible with Windows and Linux and tries to realize cross-platform. Moreover, MotionRT7 is the first self-developed Windows motion control real-time soft kernel in China.

Zmotion vision motion controller superimposes some machine visual functions based on motion functions, such as, vision positioning, vision measurement, contour matching and QR code/bar code detection. It extremely reduces barriers of machine vision application. And hardware is highly-integrated into a small volume. For software, easy to develop in one-stop-shop.

The advantage **"Easy to Use"** mentioned above is for all Zmotion motion control products, except development by all kinds of operation systems and language function libraries, there is one "All In One" industrial application development software "RTSys" made in China, and Zmotion keeps promoting it. Through RTSys, you can achieve one-stop-shop development on Hmi, Basic / PLC hybrid motion, and machine vision, and it can do real-time simulation, online tracking Debug, etc., in this way, shorten development period, reduce development risk.

All Zmotion software and hardware products strictly obey Huawei "IPD-CMM" development process, which means they are stable and reliable at the telecom level, also with wonderful software and hardware compatibility and expansibility. From quality control, Zmotion products strictly implement the ISO9001 quality management system in market needs, product definition, design development, material supplement, production and processing, customer service, etc. Then it can be known high-quality can be ensured. In addition, CE certifications are made.

Zmotion always aims to do better motion control. Nowadays, our products are widely used in 3C electronics, laser processing, printing, packaging, robot, entertainment, medical devices etc. Zmotion always puts quality at the first place, regards requirements as the first priority, takes "creating value" as the base, and considers "improving performance" as the pursuit. **All the time, what we do is to supply smart manufacturing with more valuable motion control products, solutions, and services.**

Corporate Culture

Mission

Let Chinese Motion Control Lead the World

Wish

Better Motion Control, Smarter Life

Business Philosophy

Strive

As a Struggler

Keep Growing

Focus on Target

Adapt to Path

Create Tools

Service

Take Service as Soul

Less Service: Easy to Use

Better Service: Efficient Response

Reliable Service: Good Performance

Study

Take Study as Routine

Study in Needs

Study in Competition

Study in Cooperation

Help

Take Help as Arm

Help Colleagues

Help Partners

Help You,

Achieve Us

Enterprise Qualification

116+ Trademark Certification

75+ CE Certifications

48+ Soft Certifications

26+ Patents

Development History

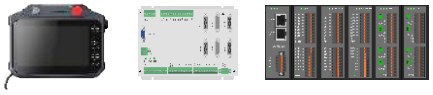
2022

- **Windows Real-Time Motion Control Soft Kernel**
  MotionRT7
- **Open Laser Scan Motion Controller**
  ZMC408SCAN-V22
- **Automatic Fast-Configuration Software**
  RTFuse
- **PC-based Motion Control Card**
  XPCI / XPCIE
- **Vision Motion Controller**
  VPLC710

- **Zmotion New Office in Chengdu**
- **Zmotion New Office in Wuhan**

2021

- **Embedded Vision Motion Controller**
  VPLC532E
- **ZHD500X HMI**
- **ZMIO310 Expansion Module**



- **Zmotion New Address**
- **Zmotion New Office in Xi'an**
- **Zmotion New Office in Dongguan**

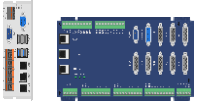
2019

- **60-Axis EtherCAT & RTEX Motion Controller**
  ZMC460N
- **20-Axis EtherCAT & RTEX Scan Motion Controller**
  ZMC420SCAN
- **4-Axis Network Motion Control Card**
  ECI2418B
- **ZMIO300 Bus IO Expansion Module**

- **"Zmotion" Brand Upgraded**
- **Zmotion Obtained "ISO" Certifcation**
- **Zmotion New Office in Xiamen**
- **Zmotion New Office in Qingdao**

2020

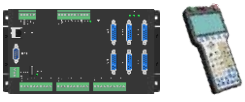
- **Embedded Vision Motion Controller**
  VPLC516E
- **12-Axis EtherCAT Vertical Motion Controller**
  XPLC312E
- **8-Axis EtherCAT Network Motion Control Card**
  ECI2828-V2



- **New Product Series: VPLC Machine Vision Motion Controller**

2014

- **4-12 Axis Pulse Motion Controller**
  ZMC2XX Controller
  ZHD300/ZHD300X Handheld HMI



2013

- **2-6 Axis Pulse Motion Controller / Card**
  ZMC0XX Controller
  ZMC1XX Controller
  ZCAN Bus Expansion Module
  ECI1000 Card

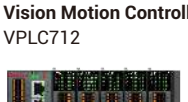
- **Zmotion Technology was Established**

2023

- **IDE**
  RTSys
- **National Produced Wide Temperature Controller**
  HXX Controller
- **PCIe EtherCAT Mnotion Control Card**
  PCIE464

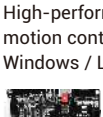
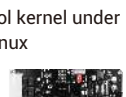

2024

- **Motion Controller**
  ZMC432M
- **PCIe EtherCAT Card**
  PCIE464M
- **Vision Motion Controller**
  VPLC712



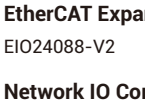
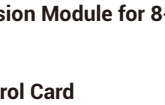
2025

- **MotionRT750**
  High-performance real-time motion control kernel under Windows / Linux

2018

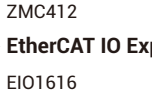
- **6-Axis Dual-Bus Motion Controller (EtherCAT & RTEX)**
  ZMC306N
- **6/8 Axis EtherCAT Motion Control Type PLC**
  XPLC006E-V2/XPLC864E-V2
- **EtherCAT Expansion Module for 8-Axis**
  EIO24088-V2
- **Network IO Control Card**
  ECI0032/ECI0064

- **Zmotion Technology Branch Established in Pune, India**

2017

- **6/32 Axis EtherCAT Motion Controller**
  ZMC406-V2/ZMC432-V2
- **32-Axis RTEX Motion Controller**
  ZMC432N
- **64-Axis EtherCAT & RTEX PCI Motion Control Card**
  PCI464
- **12-Axis High-Performance Pulse Motion Controller**
  ZMC412
- **EtherCAT IO Expansion Module**
  EIO1616
- **ZHD400/ZHD400X HMI**




- **Be Awarded as "National High-Tech Enterprise"**
- **Zmotion New Office in Suzhou**
- **Zmotion New Office in Foshan**

2015

- **3-16 Axis Pulse Motion Controller**
  ZMC3XX Controller
- **3-8 Axis Network Motion Control Card**
  ECI2000 Card
  ECI3000 Card


2016

- **The First 64-Axis EtherCAT Motion Controller in China**
  ZMC464 EtherCAT.
- **The First Motion Control PLC in China**
  (√ hybrid programming among RTBasic, RTPLC, RTHMI)
  XPLC864-V2


- **Zmotion New Address**

MotionRT Development History

China's First R & D

Windows Motion Control Real-Time Soft Kernel

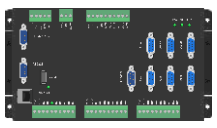
Cross-Platform

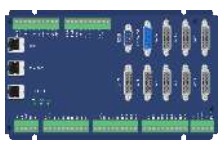
Motion Control Real-Time Soft Kernel

Windows Linux Modbus EtherCAT GiGE VISION

MotionRT1

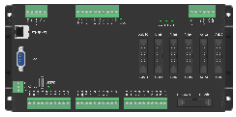
Real-Time BASIC (RTBasic)
Real-Time Motion (RTMotion)





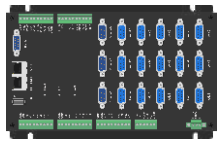
MotionRT2

Real-Time PLC (RTPlc)
Real-Time BASIC (RTBasic)
Real-Time Motion (RTMotion)



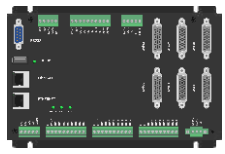
MotionRT3

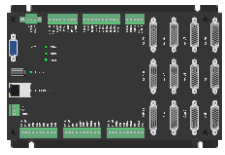
Real-Time HMI (RTHmi)
Real-Time PLC (RTPlc)
Real-Time BASIC (RTBasic)
Real-Time Motion (RTMotion)

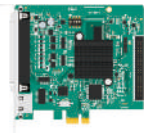


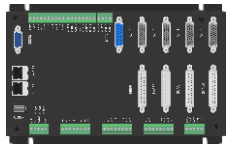
MotionRT4

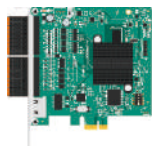
Real-Time Bus (EtherCAT/RTEX/XY2)
Real-Time HMI (RTHmi)
Real-Time PLC (RTPlc)
Real-Time BASIC (RTBasic)
Real-Time Motion (RTMotion)
G Code (RTCNC)
Laser Galvanometer (SCAN)
Robot Control (Robot)





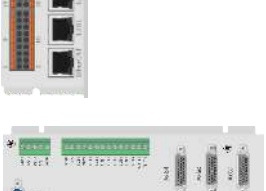






Real-Time Linux (ARM)
Rapid Local Port "LOCAL"
Machine Vision (RTVision)
Real-Time Bus (EtherCAT/RTEX/XY2)
Real-Time HMI (RTHmi)
Real-Time PLC (RTPlc)
Real-Time BASIC (RTBasic)
Real-Time Motion (RTMotion)
G Code (RTCNC)
Laser Galvanometer (SCAN)
Robot Control (Robot)

MotionRT5

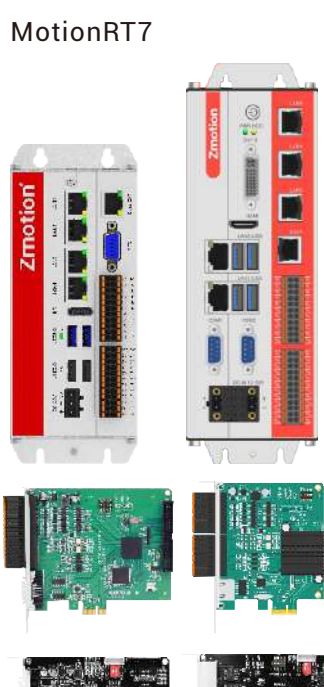


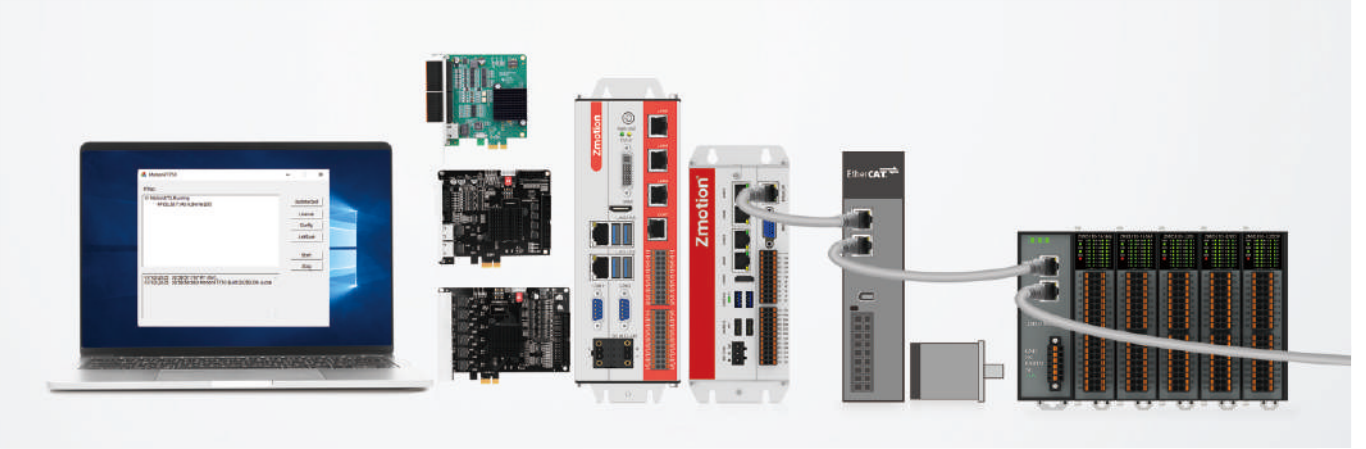
Real-Time Linux (x86)
Rapid Local Port "LOCAL"
Machine Vision (RTVision)
Real-Time Bus (EtherCAT/RTEX/XY2)
Real-Time HMI (RTHmi)
Real-Time PLC (RTPlc)
Real-Time BASIC (RTBasic)
Real-Time Motion (RTMotion)
G Code (RTCNC)
Laser Galvanometer (SCAN)
Robot Control (Robot)

MotionRT6

Real-Time Windows (x86)
Rapid Local Port "LOCAL"
Machine Vision (RTVision)
Real-Time Bus (EtherCAT/RTEX/XY2
Real-Time HMI (RTHmi)
Real-Time PLC (RTPlc)
Real-Time BASIC (RTBasic)
Real-Time Motion (RTMotion)
G Code (RTCNC)
Laser Galvanometer (SCAN)
Robot Control (Robot)

MotionRT7

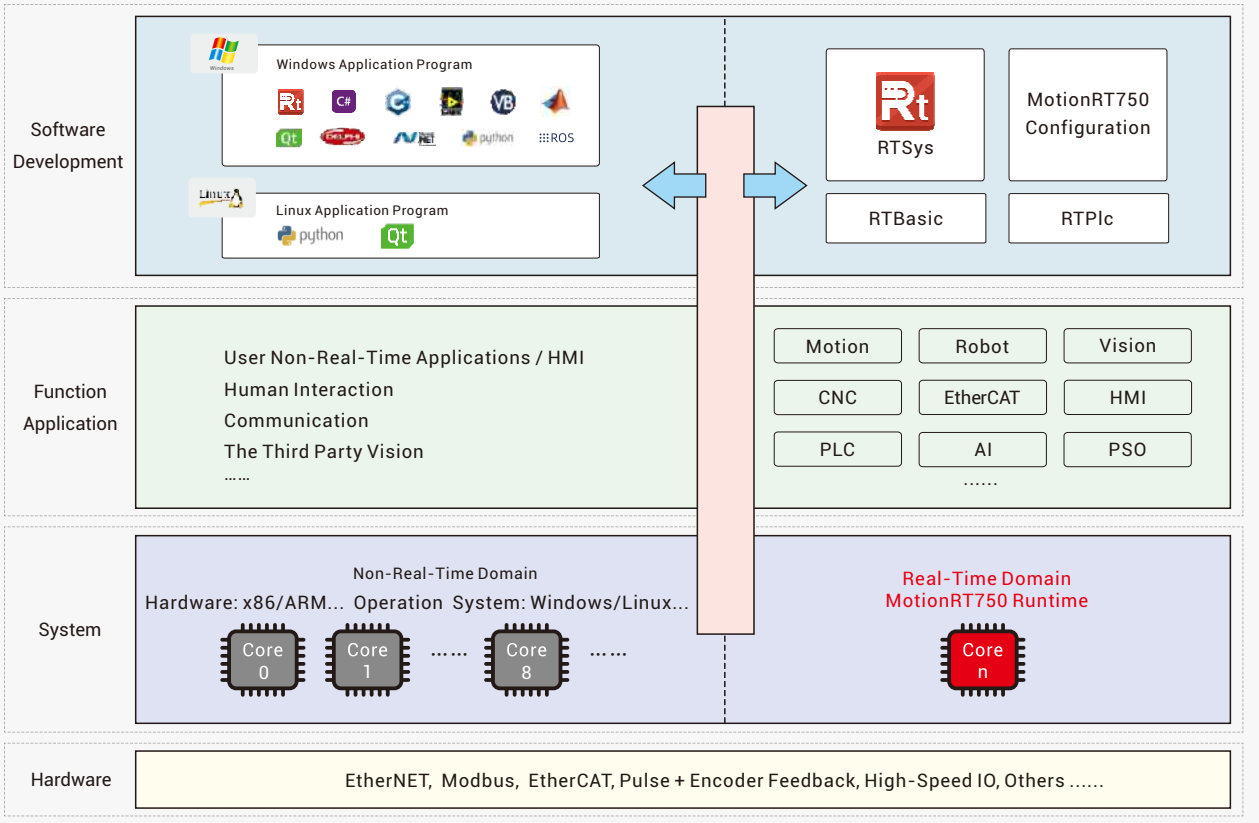




MotionRT750 Windows / Linux

Motion Control Real-Time Kernel: cross-platform & self R & D "x86 / ARM Windows / Linux real-time kernel (independent CPU)".

x86/ARM IPC



01 An independent software: suit for all kinds of Linux / Windows PC.

02 Compatible with other MotionRT, one-time develop, then rapidly switch to embedded, Linux, etc.

03 Uniform function library & rapid local port "LOCAL": the motion function calling can reach at "us" level, which is faster 10 times than normal PCI cards.

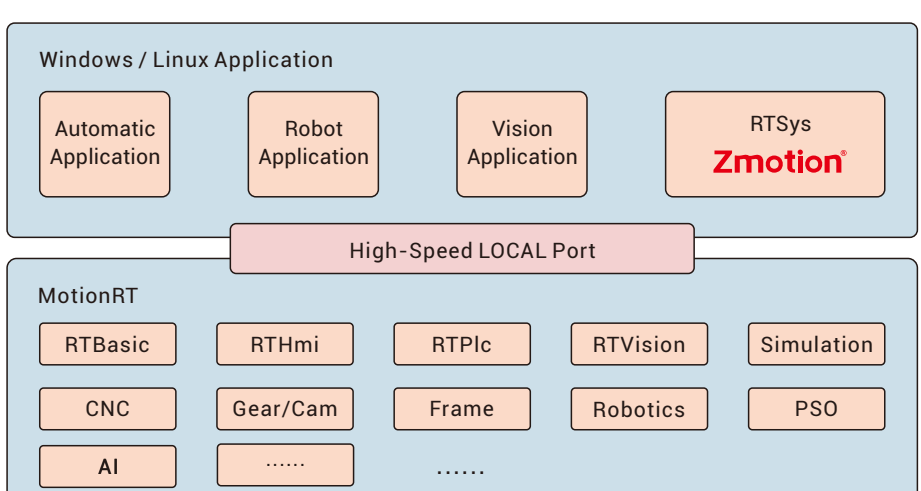
04 Integrate Machine Vision: quick to build all kinds of real-time applications.

05 Self R & D "x86 Motion Control Real-Time Kernel": max period of 50us, redundancy mode is 125us with 32 axes, for multi-channel EtherCAT synchronous period is 500us with 254 axes.

Software Structure

Motion control program, vision algorithm and MotionRT7 motion control engine share memory and interact data at a high-speed, then the interaction efficiency of motion control and machine vision can be promoted greatly.

User customized functions merge with Gmc, Gear/Cam, Frame, Robotics, CNC and other algorithms to create one specialized control system for users.



Motion Control Functions

Motion Axes: EtherCAT, up to 240 axes

IOs: up to 4096 INs & 4096 OUTs by EtherCAT

Analogs: up to 512 ADs & 512 DAs by EtherCAT

Functional Features:

a. point-point , interpolation of linear, circular, helical, continuous processing.

b. electronic cam/gear, synchronous follow, position latch, virtual-axis superposition.

c. acceleration & deceleration of S curve, SS curve: softer trajectory motion.

d. 1D/2D/3D high-speed PSO, vision fly-shooting, high-speed dispensing, laser.

e. users can customize motion control algorithm, robot algorithm, etc.

Machine Vision Functions support the third party vision


Vision Positioning

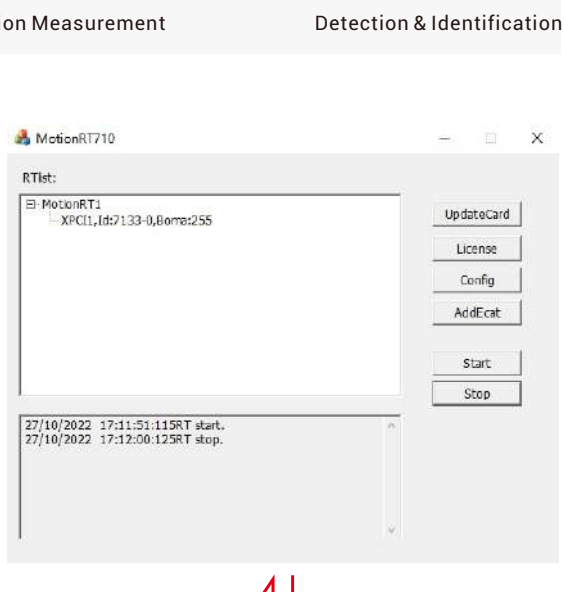

Blob Analysis

Vision Measurement

Detection & Identification

MotionRT750:

- Green (no need to install): quick start
- Be with "Drive Operation Permission Authorization" (no authorization, also valid)
- Configure EtherCAT, functions, and parameters.
- Uniform & complete SDK library
- ON, Connect, Simulate, etc.

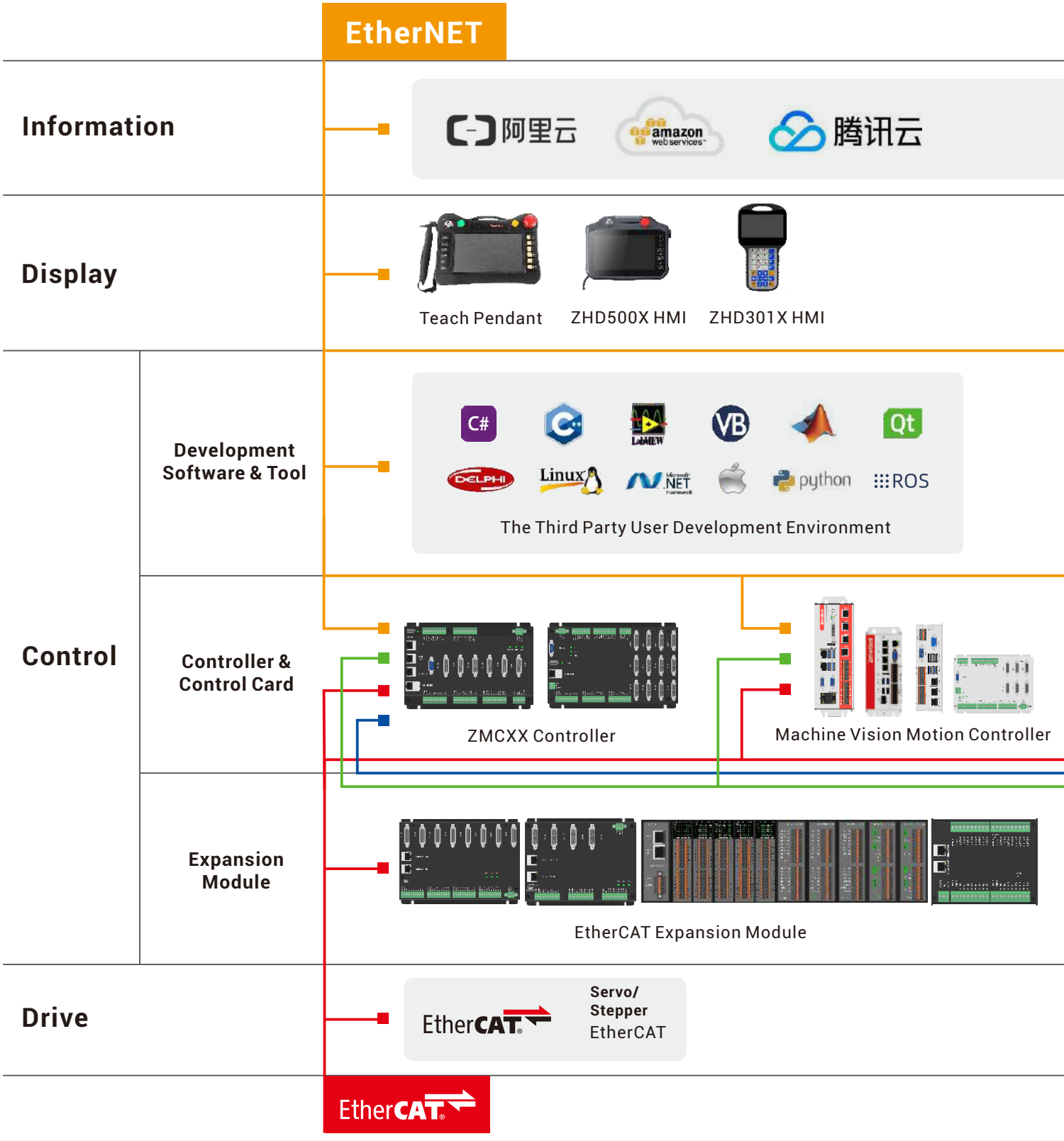


Software

Ax64 - MO8 - HW - ZV - R6 - F - YYYY
1 2 3 4 5 6 7

1. 64-Axis (6-254)
2. Motion Control
3. PSO
4. Vision Control
5. R1: normal robotic arm
   R6: robotic arm of 6-joint / special structure
6. F: control cycle of 125us / 250us
7. YYYY: customized function
   NC xx Function / G Code
   CNCxxx Function / CNCxxx Function

System Diagram



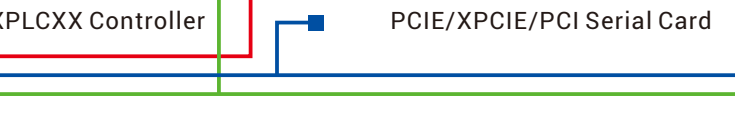
Zmotion®

RTSys/ ZmotionCad / ZRobotView/
ZarDown/Zflash/ZmotionTwins/MotionRT7
Zmotion Development Environment & Tools

XPLCXX Controller

PCIE/XPCIE/PCI Serial Card

ECI Series Card



ZCAN Expansion Module

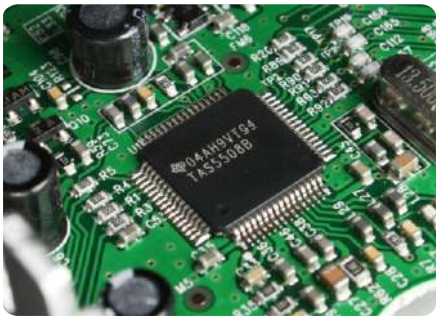
RTEX Realtime Express

Servo/
Stepper
RTEX

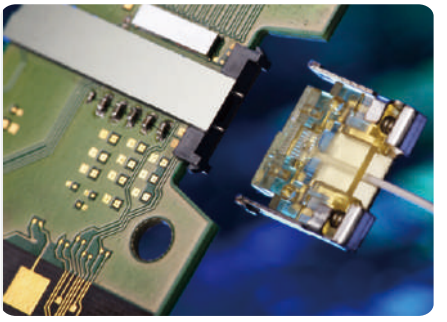
CAN

RTEX Realtime Express

Applications & Solutions



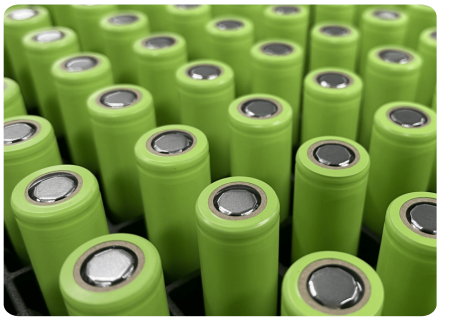
3C Electronics



Semi-Conductor

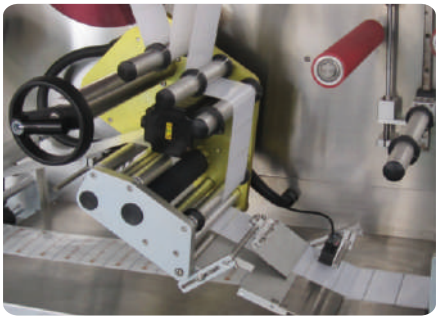
Laser Processing

Photovoltaic



New Energy

Automotive Equipment Manufacturing



Printing & Packaging

Textile & Garment Equipment

CNC Processing

Medical Equipment

Industrial Robot

Logistics

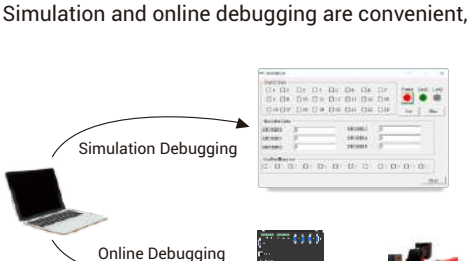
Product Contents

Product Property

Functional Property 1

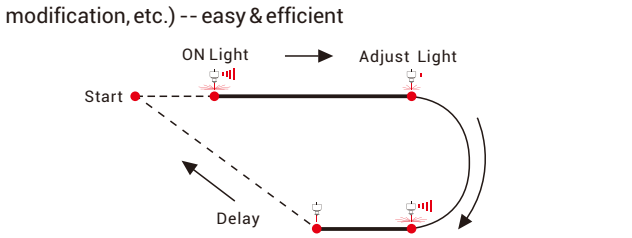
Do Better Motion Control

Simulation and online debugging are convenient, like VC.



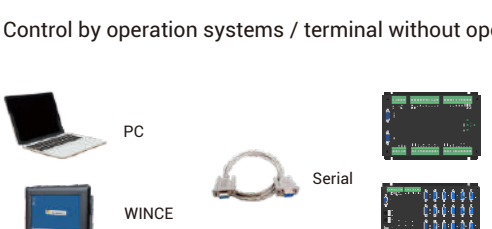
Synchronous Motion

Support synchronous motions (IO, PWM, DAC, system variables modification, etc.) -- easy & efficient



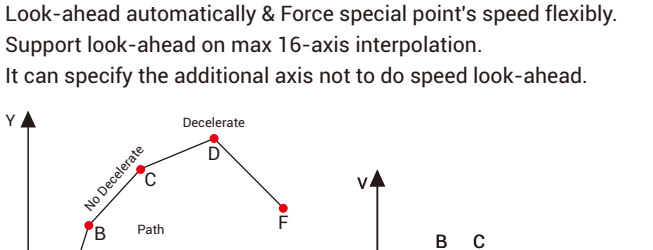
Online Control

Control by operation systems / terminal without operation system.



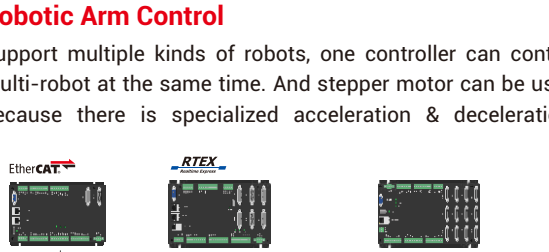
Adaptive Look-ahead

Look-ahead automatically & Force special point's speed flexibly.
Support look-ahead on max 16-axis interpolation.
It can specify the additional axis not to do speed look-ahead.



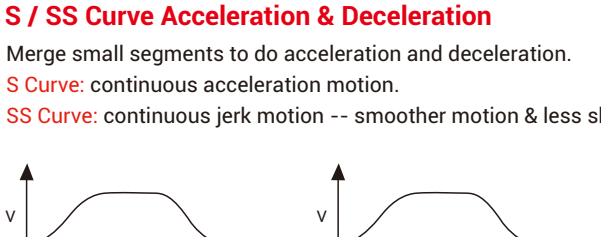
Robotic Arm Control

Support multiple kinds of robots, one controller can control multi-robot at the same time. And stepper motor can be used because there is specialized acceleration & deceleration.



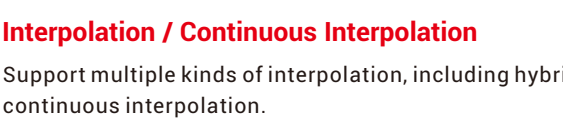
S / SS Curve Acceleration & Deceleration

Merge small segments to do acceleration and deceleration.
S Curve: continuous acceleration motion.
SS Curve: continuous jerk motion -- smoother motion & less shock



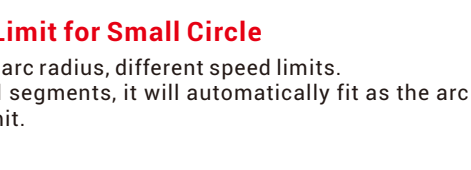
Interpolation / Continuous Interpolation

Support multiple kinds of interpolation, including hybrid continuous interpolation.



Speed Limit for Small Circle

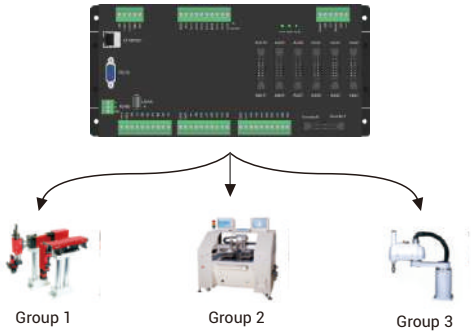
Different arc radius, different speed limits.
For small segments, it will automatically fit as the arc to do speed limit.



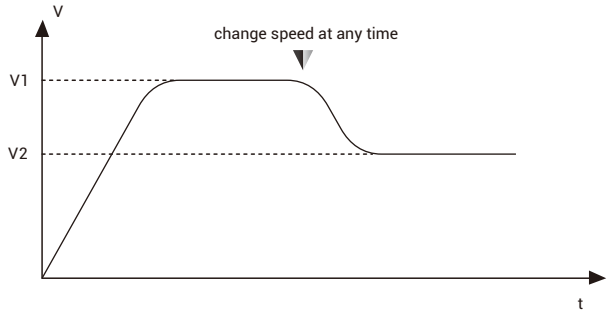
Functional Property 2

Multi-Machine Control

Each group's axes control one device independently.

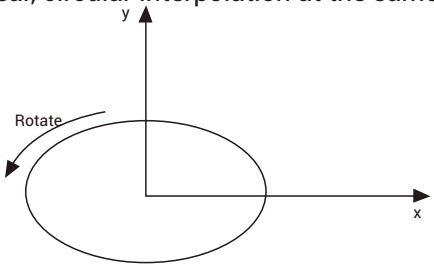


Dynamic Speed

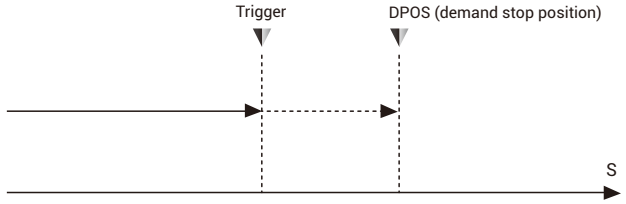


Turntable Control

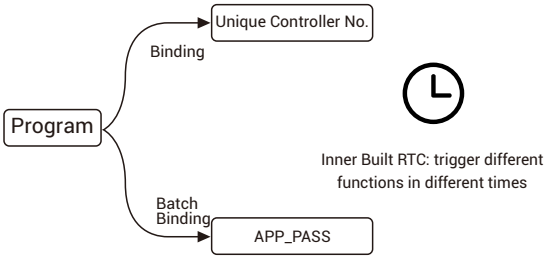
While the turntable is rotating, it can automatically do linear, circular interpolation at the same time.



Modify DPOS Dynamically

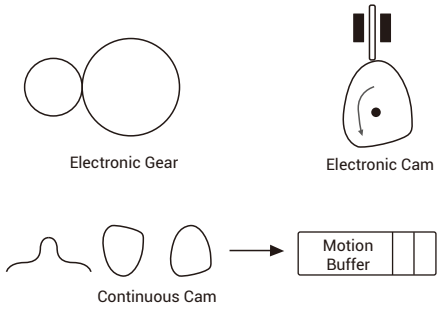


Safety



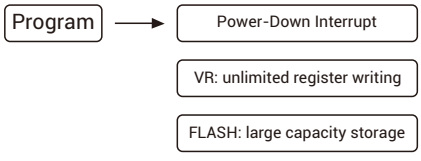
Electronic Cam

Support changeable continuous cam.



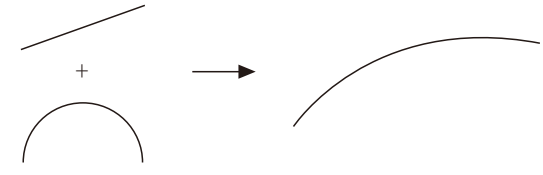
Power Failure Detection / Storage

Trigger power-off interrupt function in the instant of power-off.



Virtual Axis / Motion Superposition

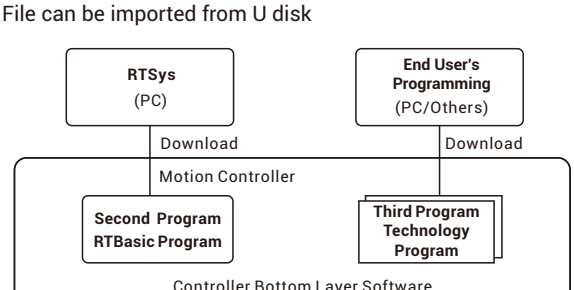
It can be combined as all kinds of complex motions.



Functional Property 3

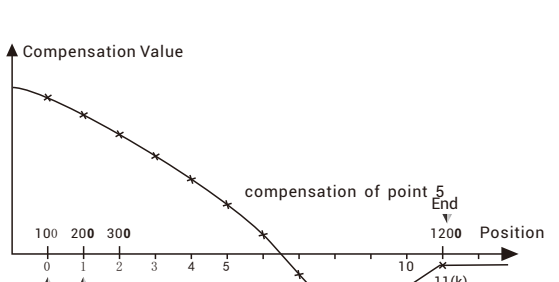
Three-Time Programming

RTBasic (ZBasic): second programming, also supports three-time program file, its behavior is defined by Basic program.
√ oversize three-time file & Basic grammar & G Code grammar & 3 File can be imported from U disk



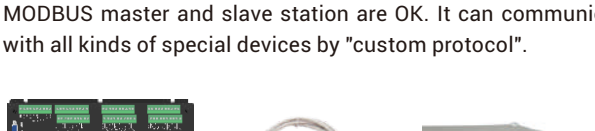
Backlash/Pitch Compensation

Compensation is achieved by simple parameters configuration.



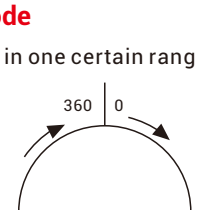
Customized Communication

MODBUS master and slave station are OK. It can communicate with all kinds of special devices by "custom protocol".



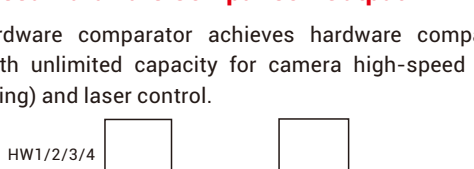
Position Cycle Mode

Set axis coordinates in one certain range.



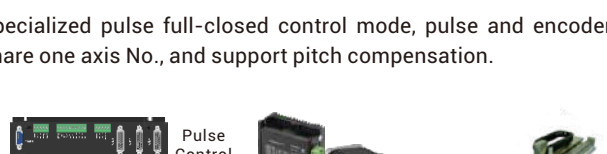
High-Speed Hardware Comparison Output

FPGA hardware comparator achieves hardware comparison output with unlimited capacity for camera high-speed photo (fly-shooting) and laser control.



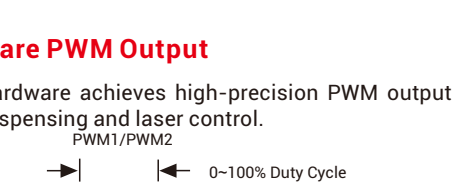
Pulse Full-Closed of Stepper Control (CL-Version)

Specialized pulse full-closed control mode, pulse and encoder share one axis No., and support pitch compensation.



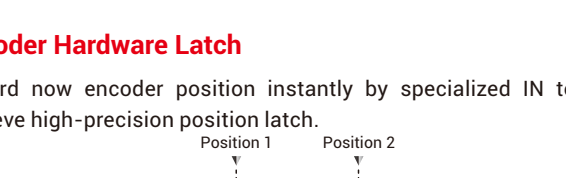
Hardware PWM Output

FPGA hardware achieves high-precision PWM output for high-speed dispensing and laser control.



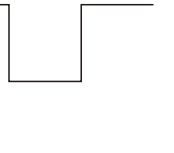
Encoder Hardware Latch

Record now encoder position instantly by specialized IN to achieve high-precision position latch.



Teach Pendant

Program freely.
Support the third party's touch screen for teaching.


ZHD500XB

Others

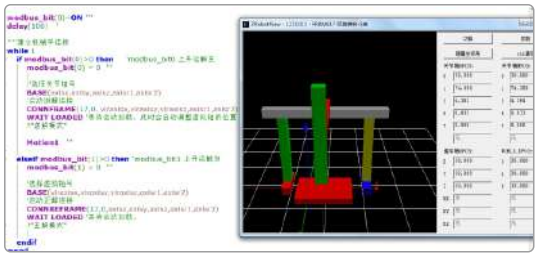
- Support IO expansion by EtherCAT & ZCAN
- Support EtherCAT
- Support RTEX

EtherCAT®

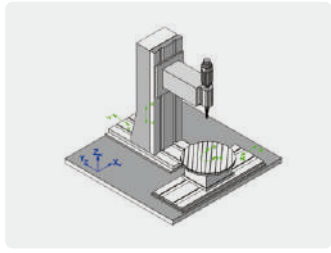
RTEX Realtime Express

Functional Property 4

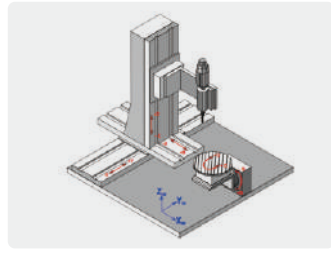
Robot Application on Axis 4 / Axis 5 RTCP



Dual-Turntable



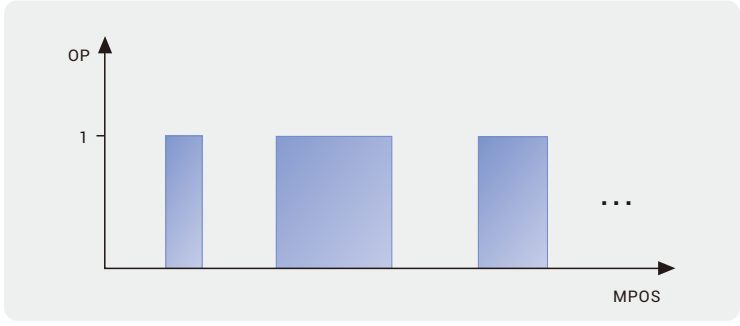
Single-Turntable



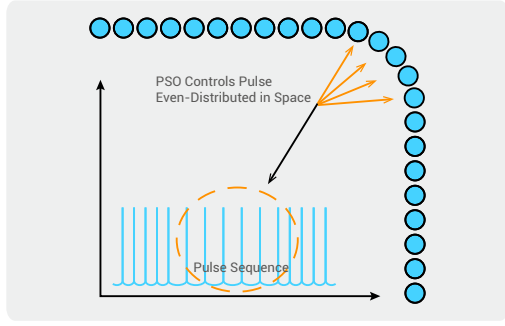
Dual-Turntable

Typical Applications: welding/dispensing/spraying/laser/woodworking, etc.

Position Synchronous Output (PSO) Application



HW_PSWITCH Application

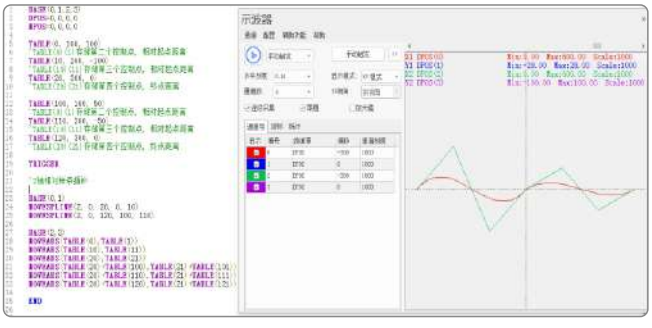


PSO Laser Output & Motion Control

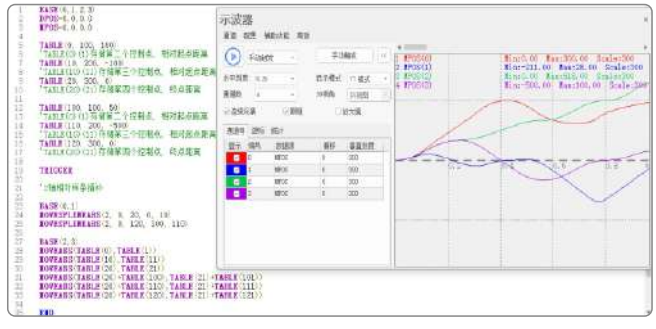
Any Initial Position: take real feedback of servo / grating as standard base.
Any Synchronous Width: minimal of one pulse width
Any synchronous Volume: write & clear synchronous output's buffer at any time.

Typical Applications:
high-precision dispensing/laser/shooting(take photo by industrial camera), etc.

Spline Curve Interpolation



MOVESPLINE

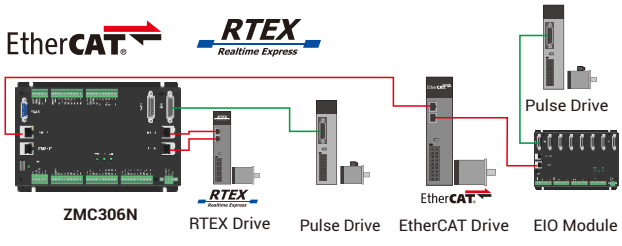


MOVESPLINEABS

Spline Interpolation High-Precision High-Efficiency More Convenient

Typical Applications: High-Speed & High-Precision – metal process/wood process/high precision dispensing/laser

Hybrid Interpolation (Pulse,EtherCAT,RTEX)



High-Performance EtherCAT/RTEX

EtherCAT®

ZMC464 16-Axis (max 100μs) 64-Axis (max 500μs)
PCI464 16-Axis (max 100μs) 64-Axis (max 500μs)

RTEX Realtime Express

ZMC432N 32-Axis (max 500μs)
PCI464 32-Axis (max 500μs)

Functional Property 5

Support All Kinds of Operation Systems & Programming Languages

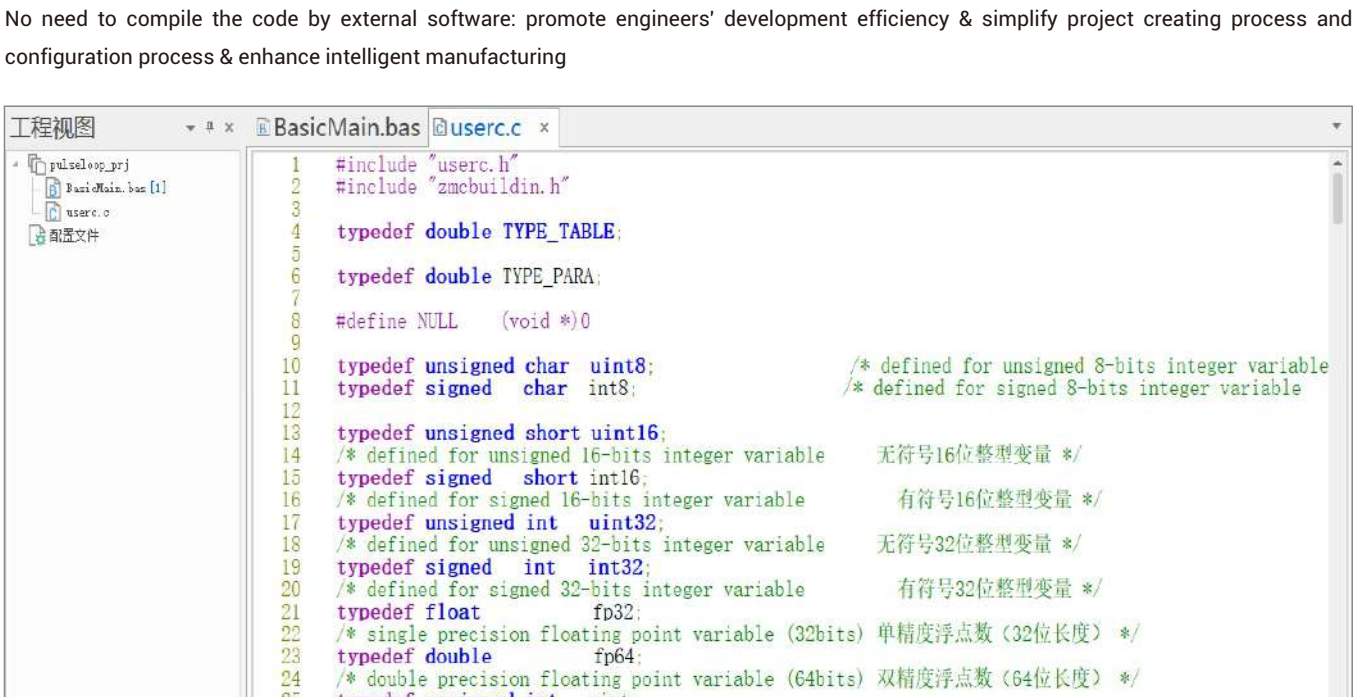
Support C Language Compiling & Real-Time Executing

Some controllers can use inner C language to compile and run the program in RTSys IDE development environment.

(1) promote program operation and calculation execution efficiency -- for high-speed applications

(2) user can use own robotic arm algorithm model -- user system becomes more flexible and easier

No need to compile the code by external software: promote engineers' development efficiency & simplify project creating process and configuration process & enhance intelligent manufacturing

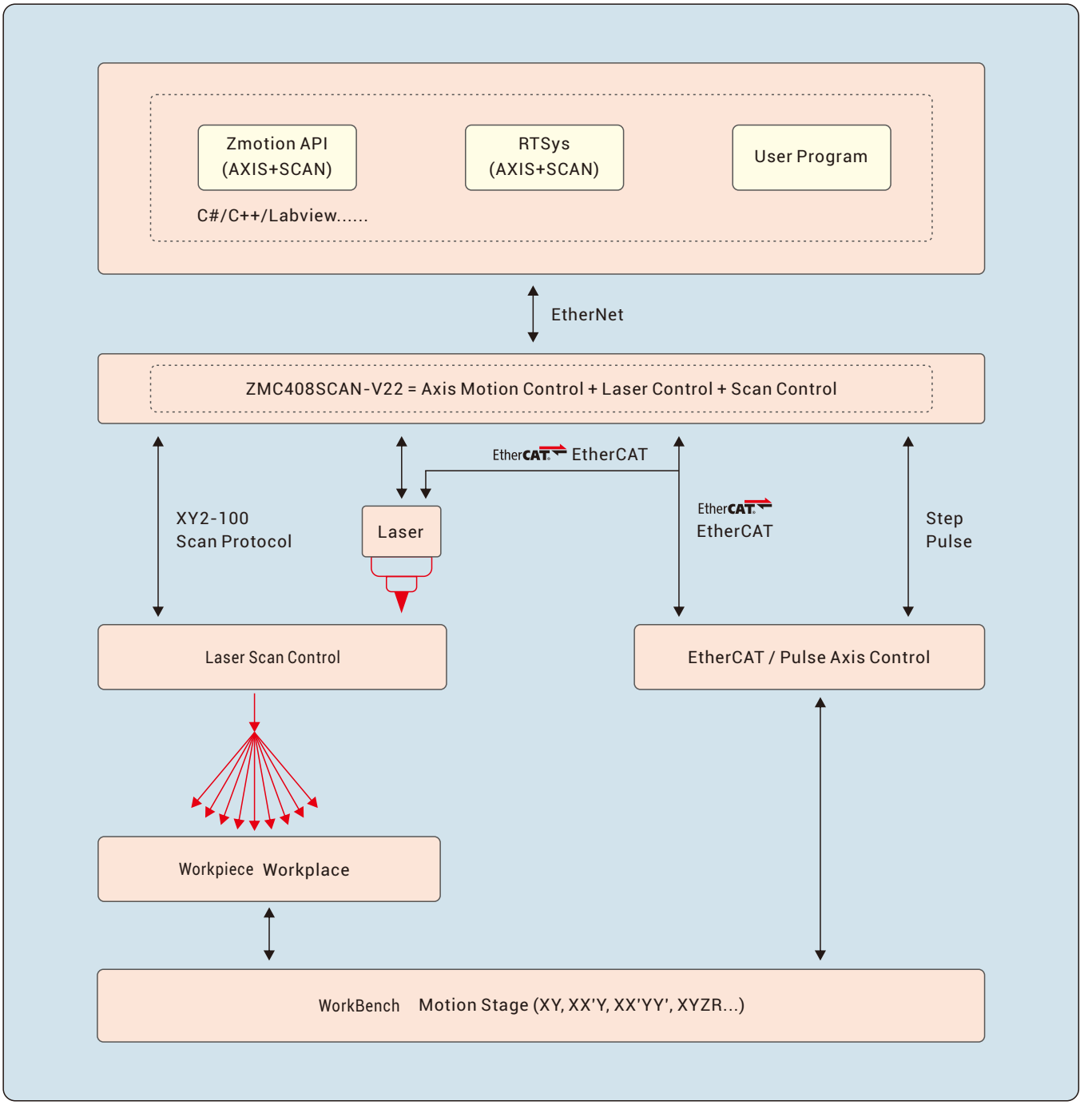


Functional Property 6

Laser Scan in Large Format

Advantages

- one controller integrates with laser control + scan control + axis control -- save hardware cost.
- use XY2-100 scan protocol, 2D / 3D laser scan are OK, and support axis control and scan linkage interpolation.
- open development ways: (C# / C++/LabVIEW.....), industry software an be created rapidly.
- support "open laser correction" -- higher laser precision
- control axis, scan, laser power synchronously -- higher efficiency
- axis and laser scan do synchronous motion -- solve the problem "splicing error in traditional large format"

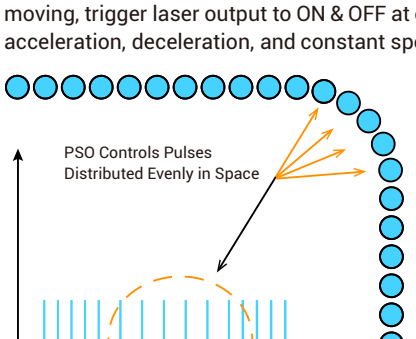


Functional Property 7

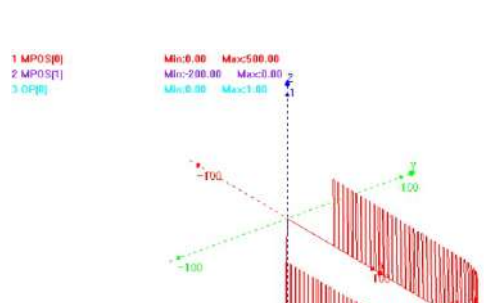
Open PSO Application in Laser Processing / Vision Fly-Shooting / Precision Dispensing

PSO: Position Synchronized Output. Laser is controlled precisely by triggering laser pulse at precise position to switch with fixed gap.

Real-time capture encoder feedback (/pulse) to do position comparison, and do phase synchronization with laser output signal. While moving, trigger laser output to ON & OFF at constant distance or custom distance, then make pulses be average in processed object, including acceleration, deceleration, and constant speed.



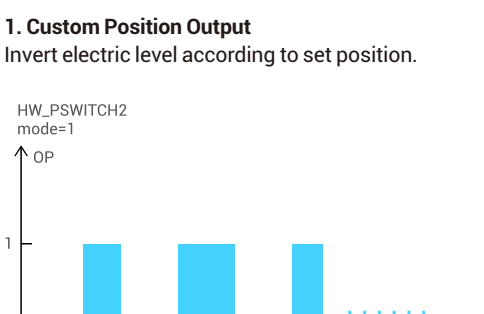
PSO Laser Output & Motion Control



PSO Laser Output Simulation – Oscilloscope

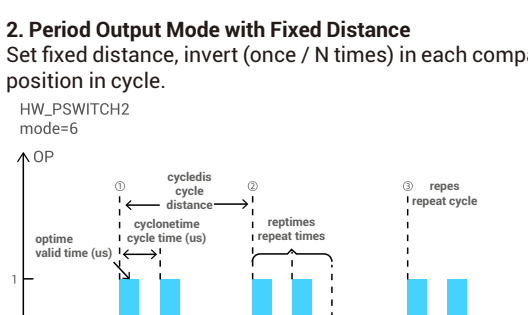
1. Custom Position Output

Invert electric level according to set position.



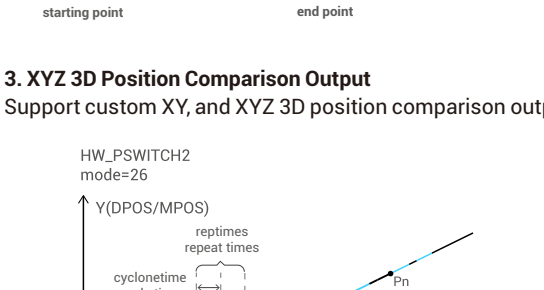
2. Period Output Mode with Fixed Distance

Set fixed distance, invert (once / N times) in each comparison position in cycle.



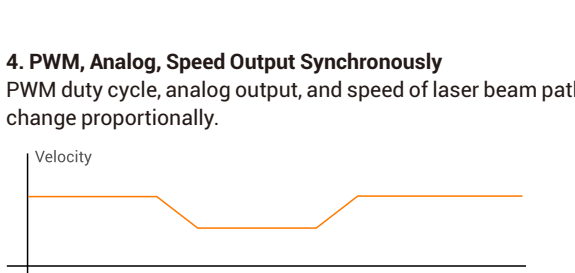
3. XYZ 3D Position Comparison Output

Support custom XY, and XYZ 3D position comparison output.



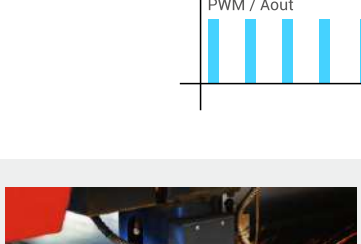
4. PWM, Analog, Speed Output Synchronously

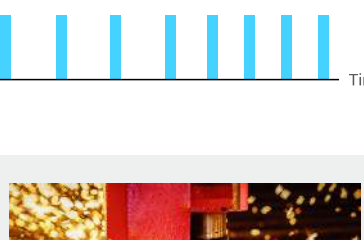
PWM duty cycle, analog output, and speed of laser beam path change proportionally.



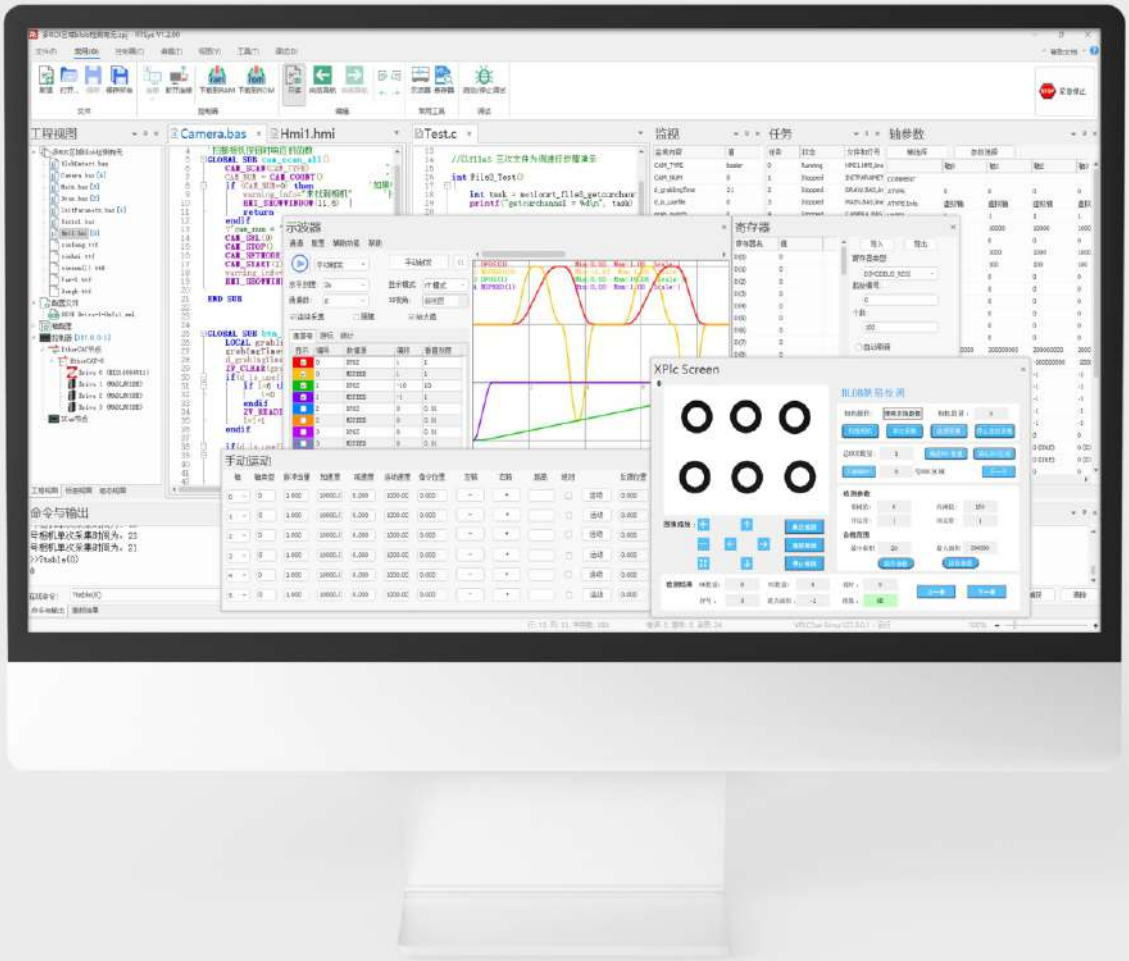
Applications:

Laser Scan Marking, large-Format Splicing Marking, Fly Marking, Large-Format Laser Cutting, Laser Fly Cutting, Laser Welding, Laser Drilling & Molding, Scan + Motion Axis Linkage Marking, Laser Cleaning, Laser Polishing, Laser Cladding, Laser Additive Manufacturing, Wafer Scribing & Marking, PCB & FPCB Drilling, 3D Processing, etc.





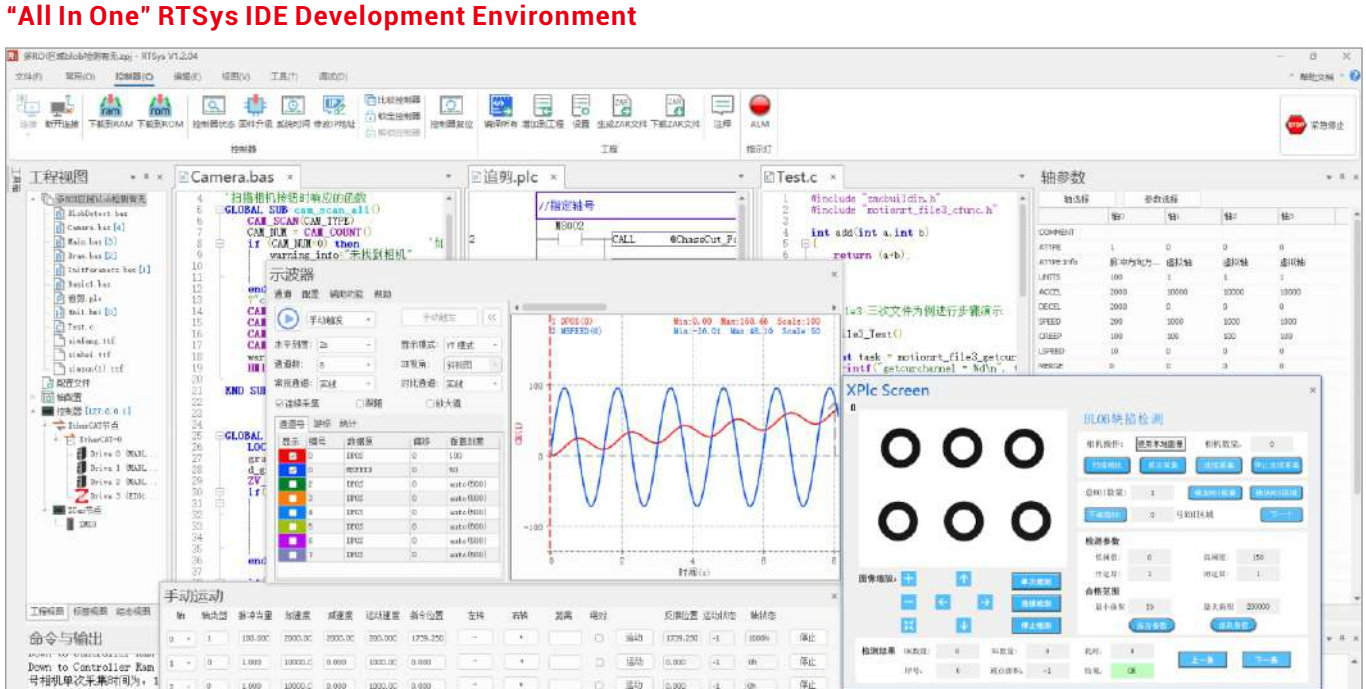
Zmotion Software Introduction



Software IDE "RTSys" Introduction

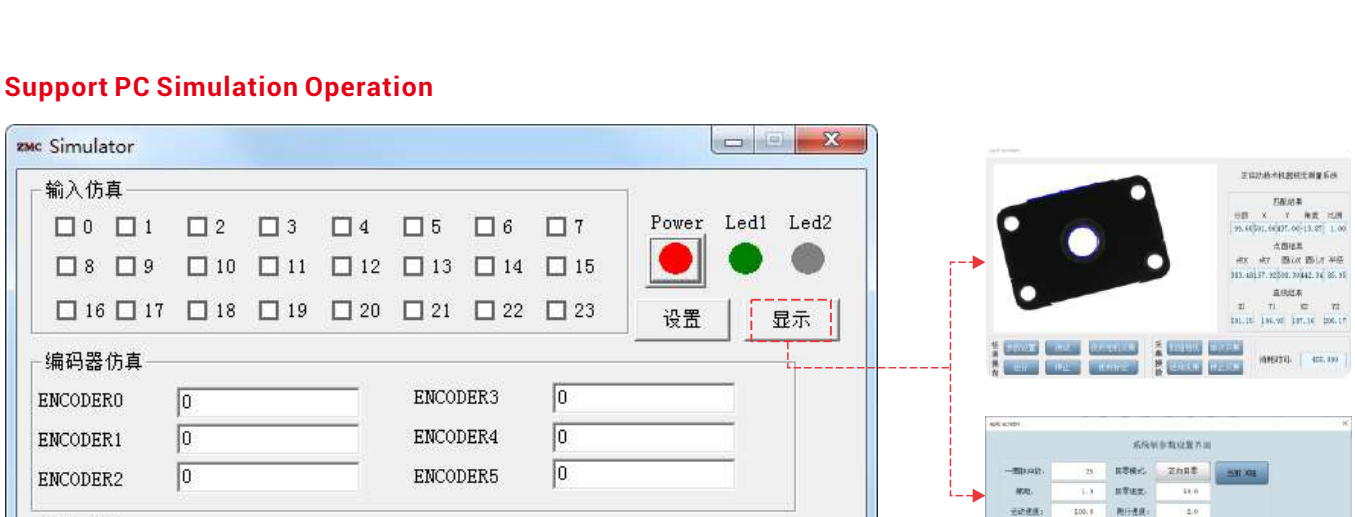
RTSys is one free PC development IDE software, updated from ZDevelop (initial software), which can program, debug, and diagnose Zmotion motion controllers. You can easy to edit codes and do configurations. And after quick-start your application, real-time debugging is supported. In addition, RTSys has Chinese & English by default.

"All In One" RTSys IDE Development Environment



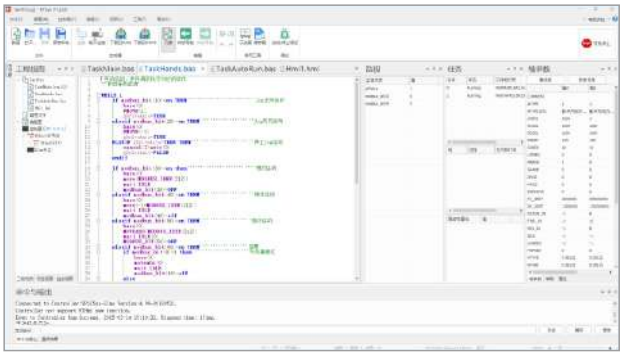
Integrate with Basic, PLC, HMI, Vision

Support PC Simulation Operation



Simulator IP: 127.0.0.1, no controller, it also can debug & diagnose program, including machine vision local image simulation & debugging.

Programming Languages



RTBasic

RTBasic

RTBasic is the main programming language for Zmotion motion controllers. It provides all standard program grammars: variable, array, condition judgement, loop, math algorithm. In addition, extended Basic commands & function provide powerful motion control functions: single-axis motion, multi-axis interpolation, synchronous / asynchronous motions, IO & AIO control, etc.

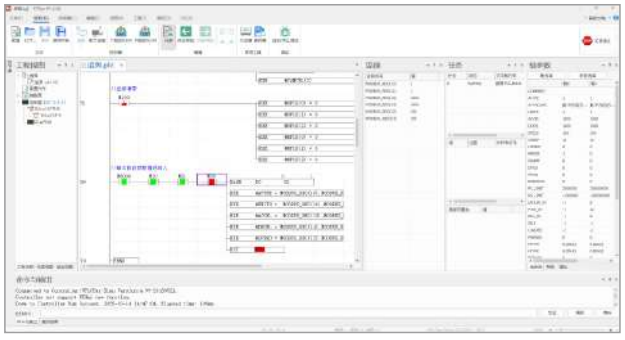
[Support "self-defined SUB"] -- edit some general functions as custom SUB. Except this, G code SUB is valid.

[Support "real-time & multi-task"] -- several Basic programs can be built and run, then complex applications become easier.

[Support "interrupt" function] -- for example, power-down interrupt, which can record the state when power off, namely, convenient to restore after powered on.

"More details, please refer to Zmotion RTBasic Programming Manual".

You also can learn and test some examples in RTSys (simulator).

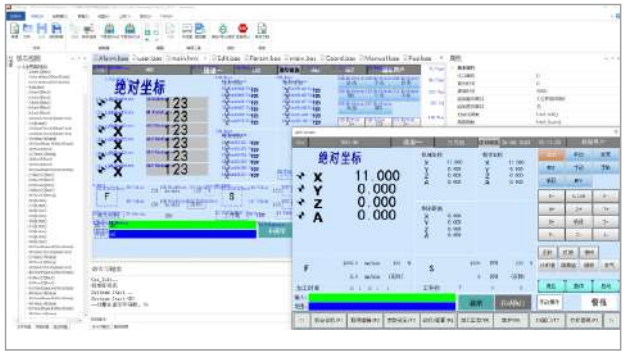


RTPlc

RTPlc Ladder Diagram

RTPLC is the PLC language for Zmotion motion controller, LAD or instruction list can be used, and the usage is same as market common PLC commands. Therefore, it is easy to program for users who are familiar with PLC.

Support linkage programming between RTPLC and RTBasic .



RTHmi

RTHmi Configuration

RTHmi is used to develop motion controller corresponding human-interface.

And it can program together with RTBasic & RTPlc when the controller supports HMI function.

In addition, only one time upgrade, HMI program and controller program can be updated synchronously.

"More details, please refer to Zmotion RTHmi Programming Manual".

You also can learn and test some examples in RTSys (simulator).

XPLC CNC Standard System

Custom G Code CNC Standard System

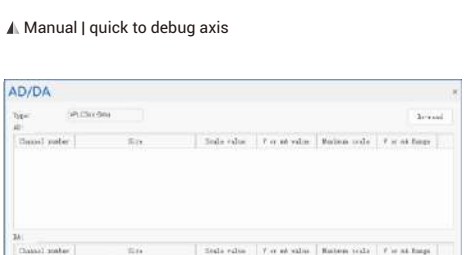
One open-source CNC standard system that is running on programmed RTHmi. You can edit technology program through G code directly. At the same time, you can customize / add required function.

Development Debug & Diagnosis

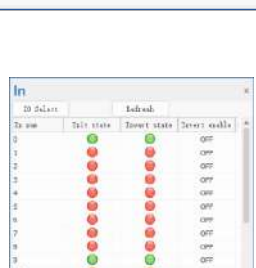
- watch controller running state
- support RTBasic, RTPLC and RTHMI
- support manual operation
- support online debug
- support simulation (controller & HMI)
- support multi-task running
- support oscilloscope
- support IN & OP
- support checking registers' data
- encrypt program, lock controller -- protect user's intellectual property

Quick & Easy Debugging

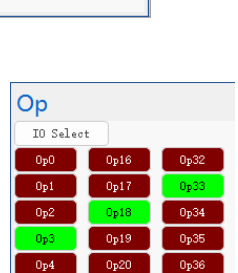
Manual | quick to debug axis



AD/DA | capture & control analog

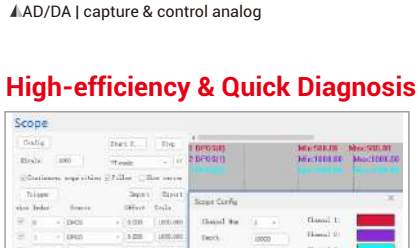


IN | real-time watch IN, custom IO state

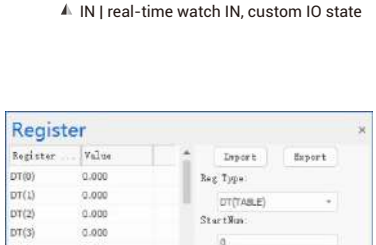


OP | real-time watch OUT & output

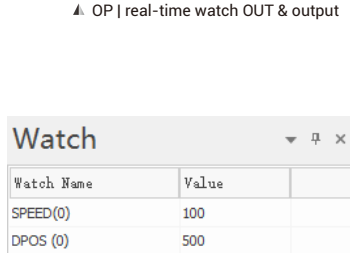
High-efficiency & Quick Diagnosis



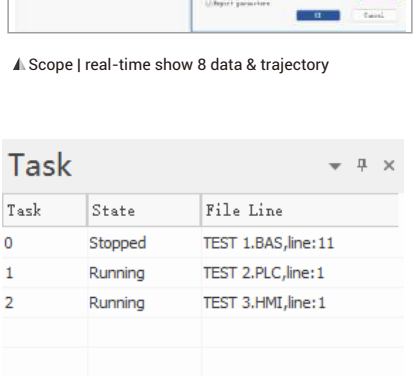
Scope | real-time show 8 data & trajectory



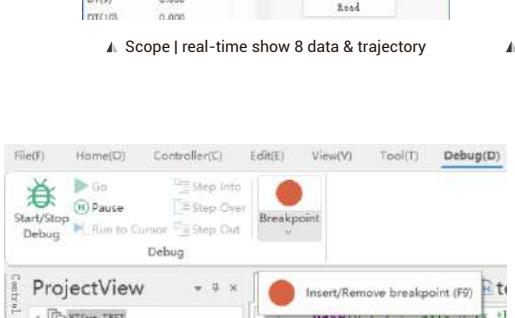
Scope | real-time show 8 data & trajectory



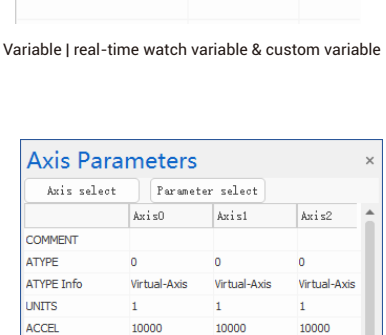
Variable | real-time watch variable & custom variable



Task | real-time watch tasks



Debug | set breakpoints, etc.

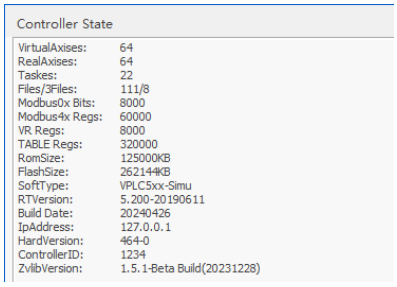


Axis Parameters | real-time see axis parameters & states

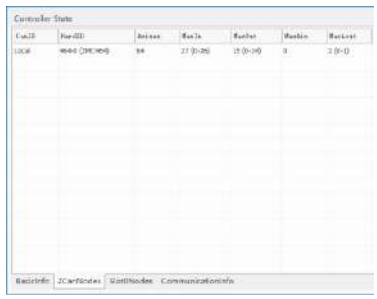
Development Debug & Diagnosis

- watch controller running state
- support RTBasic, RTPLC and RTHMI
- support manual operation
- support online debug
- support simulation (controller & HMI)
- support multi-task running
- support oscilloscope
- support IN & OP
- support checking registers' data
- encrypt program, lock controller -- protect user's intellectual property

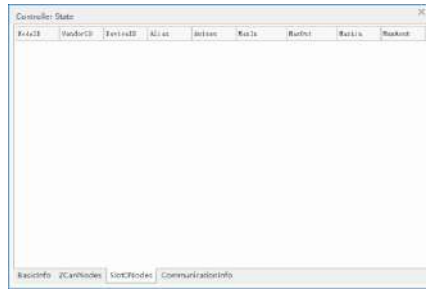
High-efficiency & Quick Diagnosis



BasicInfo: controller basic information



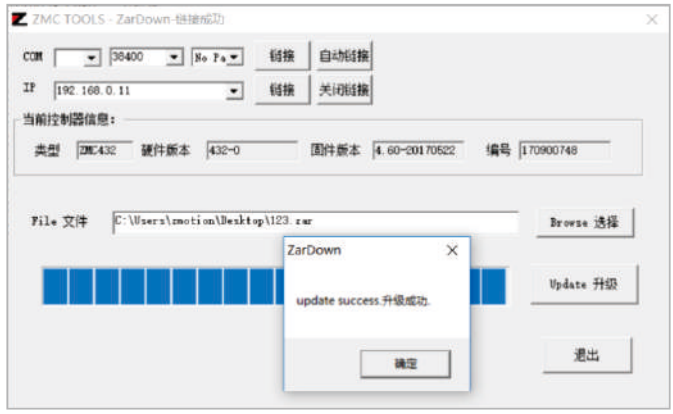
ZCanNodes | node configuration of local controller, IO & AIO by CAN expansion module



Slot0Nodes | node configuration of local controller, IO & AIO of EtherCAT/RTEX drive expansion module

Quick to Upgrade Firmware & User Program

Update Firmware | easy to update firmware for new functions



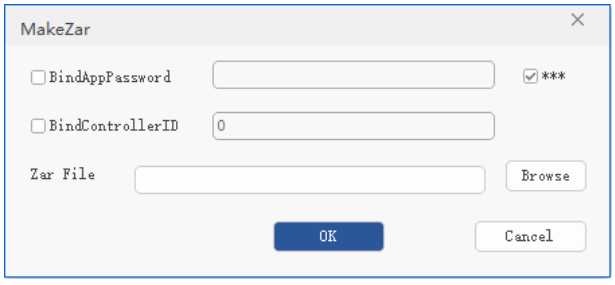
Update User Program | ZDevelop generates compiled ZAR file, then users can remote update, also can protect source codes.

Multiple Encryption -- Protect Your Intellectual Property

01. program only can be downloaded (can't upload)

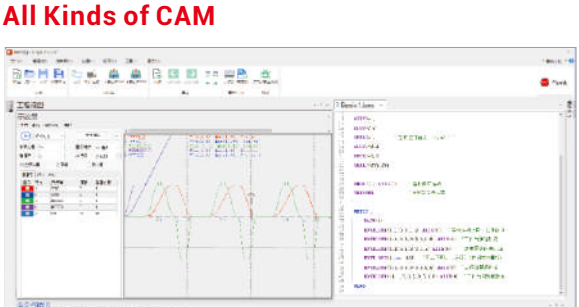
02. password: oversize character & store by irreversible algorithm

03. controller is with unique No.: it can lock user program, one single controller or several by APP_PASS.



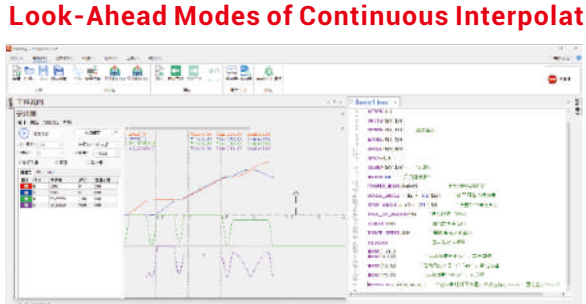
Motion Commands Easy to Use

All Kinds of CAM



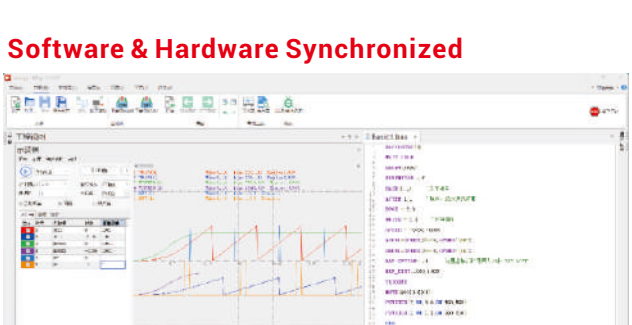
cam cambox movelink moveslink
flexlink movelink_modify

Look-Ahead Modes of Continuous Interpolation



merge corner_mode decel_angle stop_angle
force_speed zsmooth full_sp_radius

Software & Hardware Synchronized



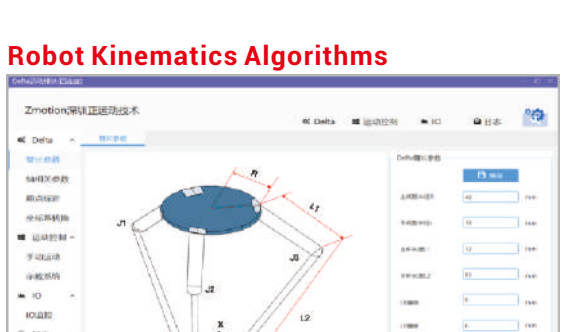
◭ software output synchronously

Software Synchronized Output

move_op move_op2
move_table move_delay
move_synmove move_aout
move_asynmove, move_task
moveop_delay, move_pwm

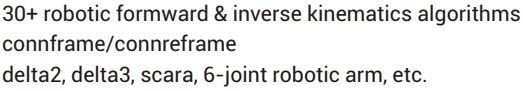
Hardware Latch Synchronously “regist”
Hardware Output Synchronously “hw_pswitch”
Hardware Timer “hw_timer”
Precision Position Output “move_op”

Robot Kinematics Algorithms

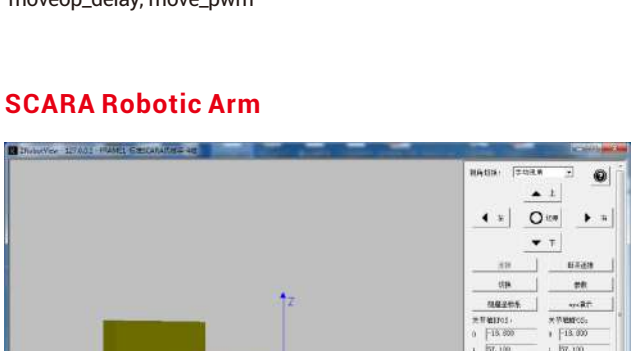


◭ 30+ robotic forward & inverse kinematics algorithms

30+ robotic formward & inverse kinematics algorithms
connframe/connreframe
delta2, delta3, scara, 6-joint robotic arm, etc.

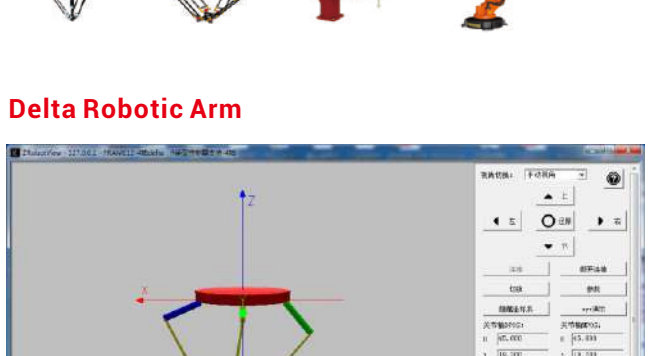


SCARA Robotic Arm



◭ ZRobotView SCARA Robotic Arm Simulation | standard 4-axis SCARA, lifting SCARA, special SCARA, 6 degrees of freedom/palletizing/collaborative/spraying robot, etc.

Delta Robotic Arm



◭ ZRobotView Delta Robotic Arm Simulation | standard 4-axis Delta, 2-axis Delta, 3-axis Delta

Open G Code ZMotion NC Platform

Zmotion NC is one optional function for ZMC4XX and above controllers. It provides ISO standard G code commands and rich functions, like, multi-channel, cutter compensation, macro process, 3D simulation, preview, etc. And NC processing codes made by different CAD/CAM software are valid, UG. MasterCam, ArtCAM, etc. For G code files, it supports files with suffix ".cnc/.nc". Applications: engraving & milling machine, carving machine, drilling center, etc.

other file formats can be expanded through "ZG_EXFILE" command.

CNC Parser: ISO Standard G Code Instruction Set

```
G00 X4.296 Y-7.427 Z3.23   ;一般格式，关键字之间以空格区分，“-”代表参数为负
                           ;“+”代表参数为正数，默认省略
G00X4.296Y-7.427Z3.23      ;无空格区分也可支持，可观性差些
G00X4. 296Y- 7.427Z3.23    ;空格出现位置不影响最终识别的代码，效果同上
G0 X4 Y5 Z3                ;可省略关键字参数的前导 0，参数为整数时可不带小数
G0 X.4 Y-.5 Z3.            ;可省略小数点前的 0，和小数点后的 0
                           ;等同于 G00 X0.400 Y-0.500 Z3.000
g0 y4 z3 x5                ;关键字不区分大小写，同行关键字的顺序无意义
y4 z3 x5 g0                ;但同行代码不能同时出现同组关键字，如 G0、G1、G2
N160 G1 Z.444 F200.        ;F200.等同 F200.00，表示 XYZ 轴进给速度
```

Motion Related: G0, G1, G2, G3...

Distance Mode: G90, G91

Tool Tip Radius Compensation: G40, G41, G42

Tool Length Compensation: G43, G44, G49

Feed Mode: G94, G95

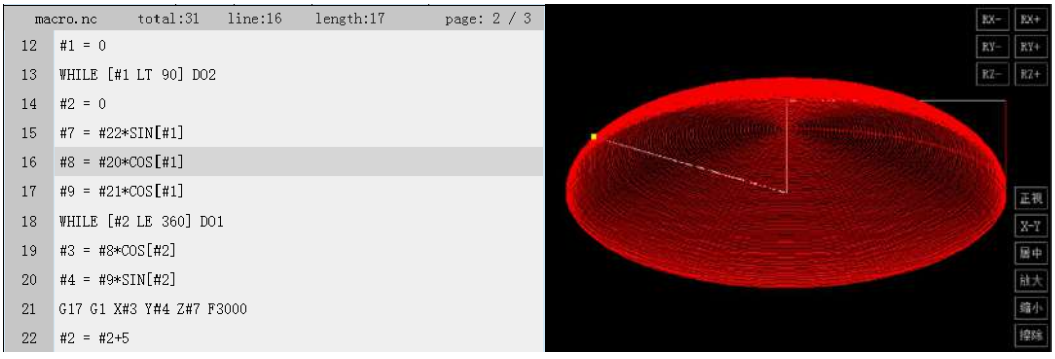
Main-Axis Speed Mode: G96, G97

M Related Functions: M0, M1, M2, M30

...

CNC Parser: Macro-Program

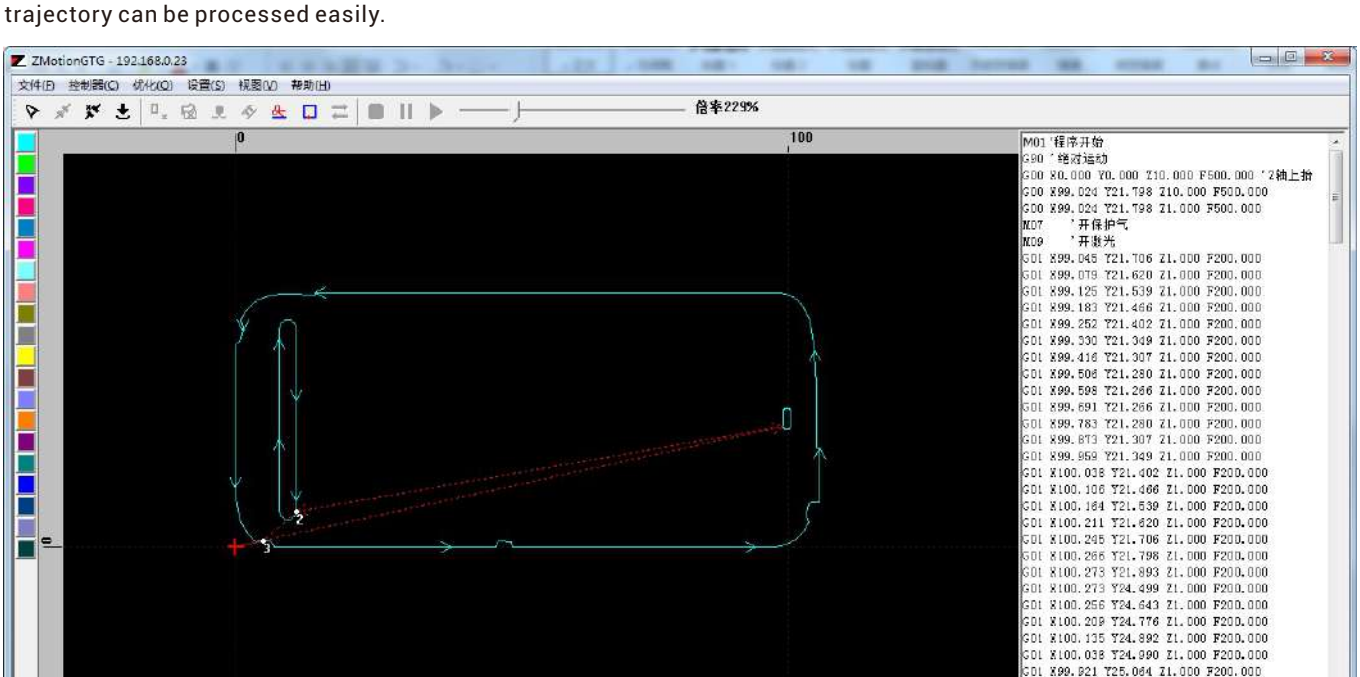
Support type B macro program, including macro variable, macro-operation instruction, macro-control commands.



processing code and processing picture of semi-ellipsoid sphere programmed by macro program.

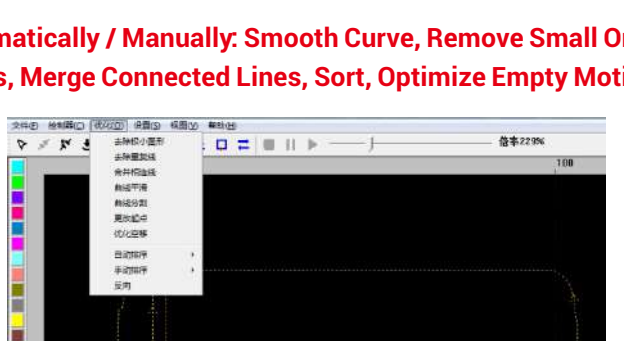
ZMotion CAD V2.0 Software Platform

Zmotion CAD V2.0 is a tool software related to RTSys, which can import graphic files (DXF, PLT, AI) to transfer them into Basic codes / G codes for controller, then download codes into controller or import 3 file into controller, corresponding trajectory can be processed easily.



Optimize Graphic Automatically / Manually: Smooth Curve, Remove Small One, Remove Duplicate Lines, Merge Connected Lines, Sort, Optimize Empty Motion.

Automatic Optimization

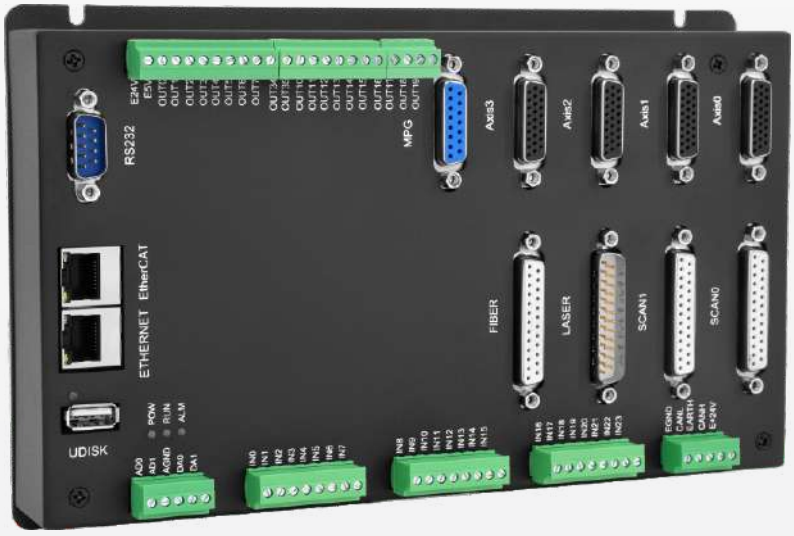


Manual Optimization

Technology Parameters

- it can set processing path's origin.
- absolute / relative control modes.
- support simulation and information showing.
- it can add/delete action parameters (self-define) before/after processing.
- heights of axis Z processing and empty motion can be set freely.
- custom graph length precision unit, (reference 0.01-0.5)
- support look-ahead function, automatic apart arc as segments, corner deceleration, chamfering,

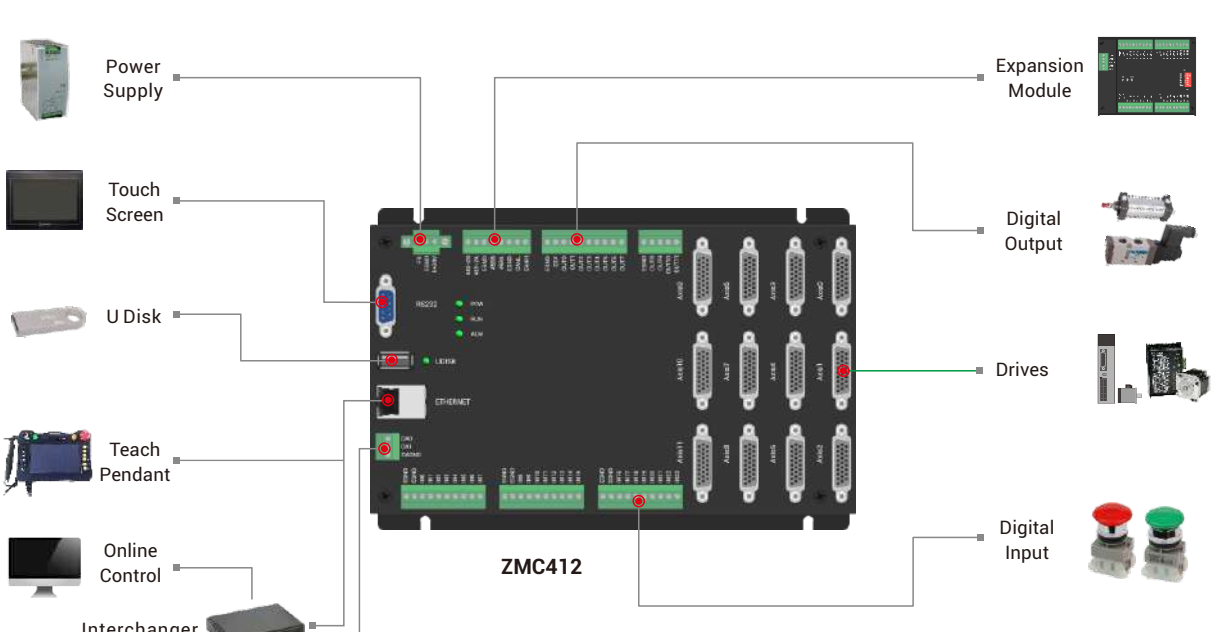
Motion Controller



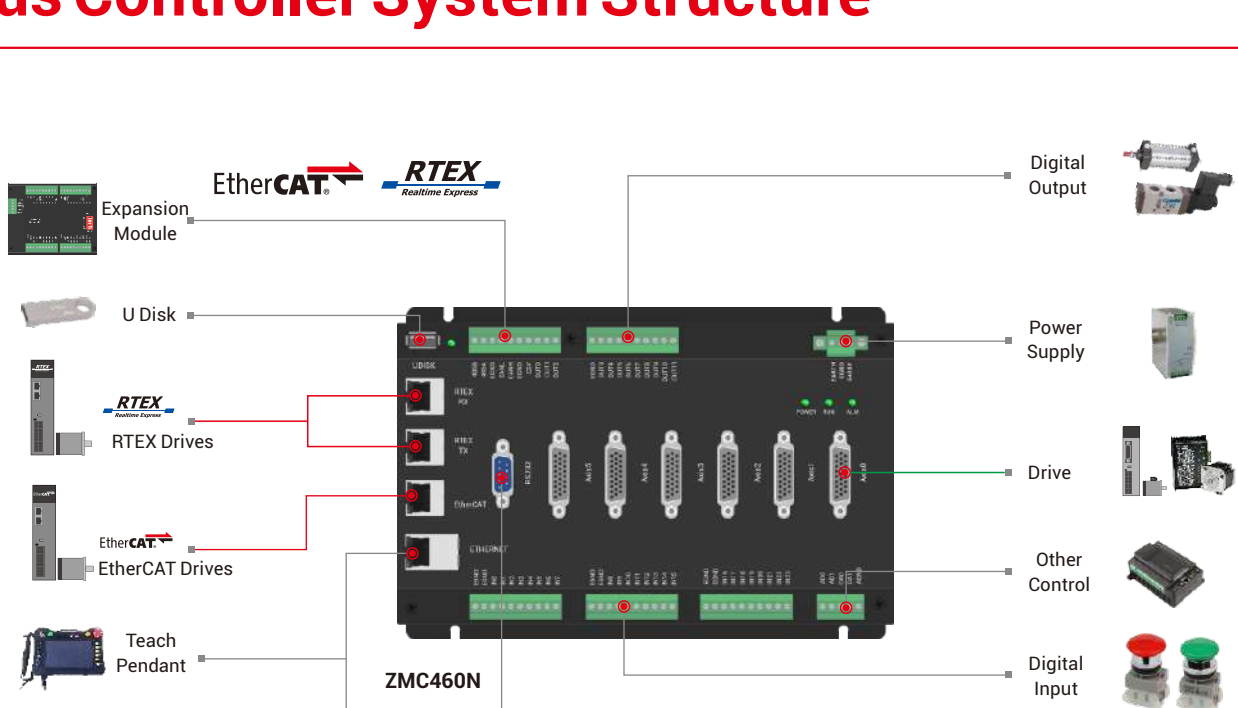
ZMC408SCAN-V22

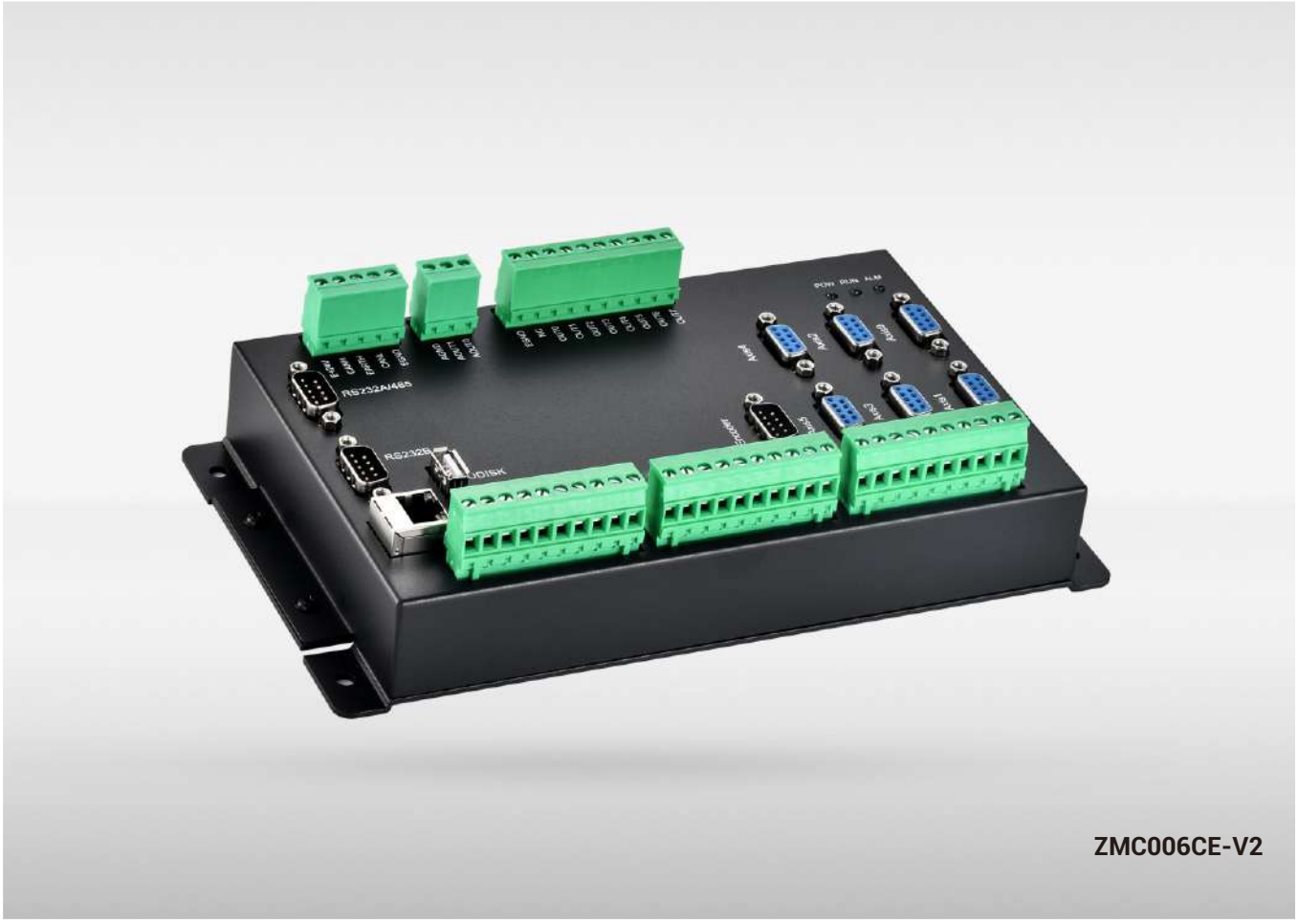
ZMC432M

Pulse Controller System Structure



Bus Controller System Structure





ZMC0XX Controller

ZMC0XX economical multi-axis motion controller is a kind of pulse standalone motion controller. Support up to 6 axes for some simple trajectory control, such as, linear interpolation, circular interpolation, helical interpolation, etc.

Applications: pulse within 6-axis -- electronic semiconductor equipment (detection equipment, assembly equipment, locking equipment, soldering machine), dispensing equipment, assembly line, etc.

Functional Features

- Axis: up to 6-axis (include virtual-axis)
- IO: up to 30 INs & 14 OUTs
- Communication: 2 RS232/RS485 (standard)
- Analog: 2 DAs, max 512 ADs & 512 DAs by ZCAN expansion
- Pulse Mode: directional + pulse/double pulse
- Functions:

  01. support encoder input, which can be configured as handwheel mode.

  02. support IO expansion by ZCAN, max 4096 INs & 4096 OUTs synchronously.

  03. axis position limit, origin signal can be configured as any IN.

  04. max output current is 300mA, which can directly drive some solenoid valve.

  05. electronic cam & gear, position latch, synchronous follow, virtual axis, etc.

  06. a variety of encryption methods to protect user's program.

- Performance:

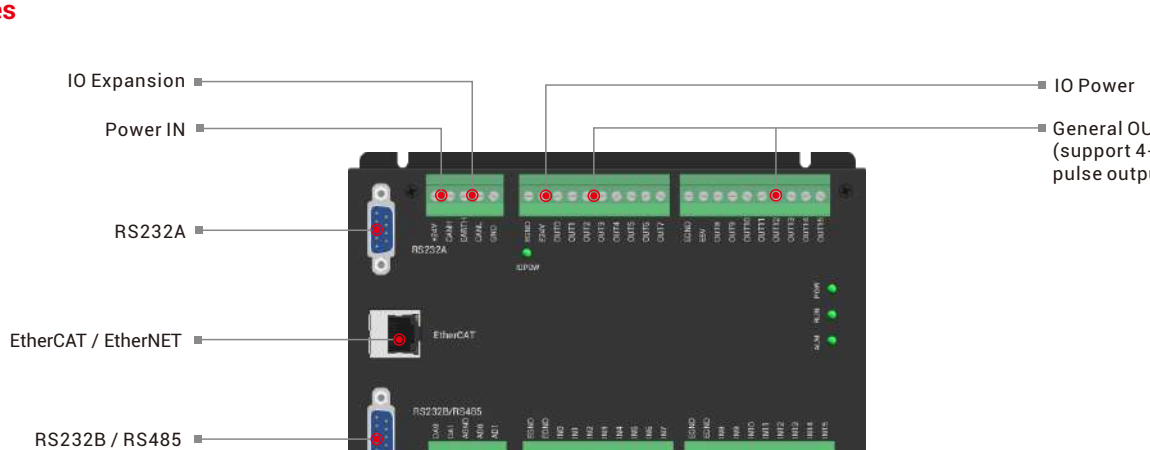
  01. max output frequency can reach 5MHz.

  02. support up to 6 axes for linear / any circular / helical interpolation.

Models

Models	Image	Axis	En-coder	Pulse Frequency	Inner IN & OUT	Inner AD	Inner DA	Axis Motion Buffer	Space	Task	Power Down Store	232	485	ECAT	USB	Size (mm)	Functional Description
ZMC004BEA-V2		4	2	500k (single-ended)	16/16	2	2	32	380k	8	1024	2	1	1	-	177*122	point, line, arc, cam, continuous interpolation
ZMC004WEA-V2		4	2	500k (single-ended)	16/16	2	2	32	380k	8	1024	2	1	1	-	177*122	point, line, arc, cam, continuous interpolation
ZMC004CE-V2		4	1	5M	30/14	-	2	128	300K	10	1024	2	1	1	1	226*127	point, line, arc, cam, continuous interpolation
ZMC006CE-V2		6	1	5M	30/14	-	2	128	300k	10	1024	2	1	1	1	226*127	point, line, arc, cam, continuous interpolation

Interfaces



ZMC004WEA-V2

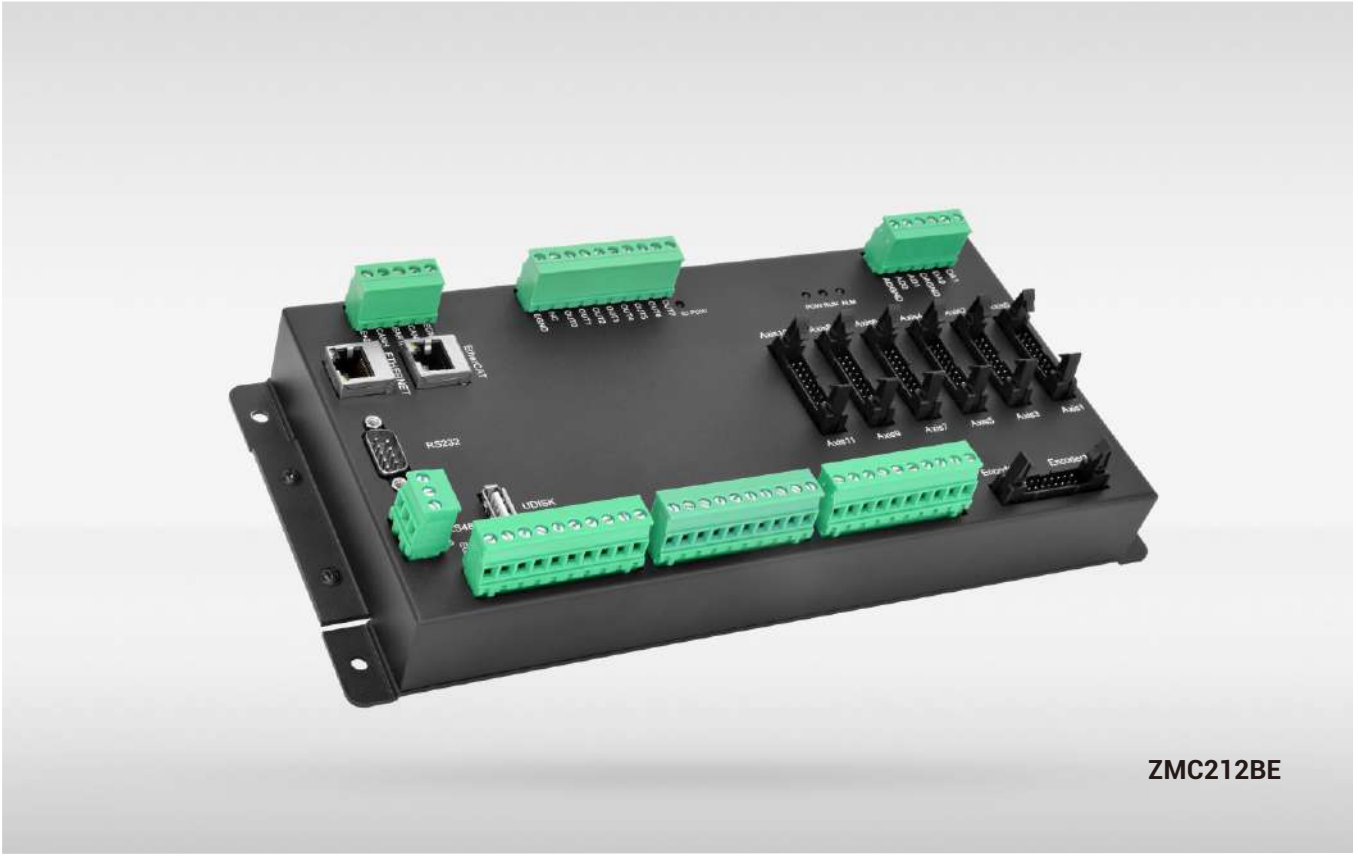
PIN No.	Encoder Method	Description
1	EA+	Encoder A +
2	EA-	Encoder A -
3	EB+	Encoder B +
4	EB-	Encoder B -
5	GND	Internal 0V
6	EZ+	Encoder Z +
7	EZ-	Encoder Z -
8	Internal +5V Power Supply	Internal +5V Power
9	-	-

Encoder Interface (DB9 Male Head) **ZMC006CE-V2**

PIN No.	Name	Description
1	PUL+	Pulse Differential +
2	PUL-	Pulse Differential -
3	DIR+	Directional Differential +
4	DIR-	Directional Differential -
5	GND	Inner 0V
6	ALM(IN24-29)	General IN, Recommend for Drive Alarm
7	SERVON(OUT8-13)	General OUT Recommend for Drive Enable
8	Internal +5V Power	Internal +5V Power
9	EGND	External Ground

Pulse-Axis (DB9 Female Head) **ZMC006CE-V2**

Note: refer to "User Manual" for more models and details.



ZMC2XX Controller

ZMC2XX economical multi-axis motion controller is a kind of standalone motion controller, there are pulse and bus types. Support up to 12 axes, 16 axes can be extended for complex trajectory control, such as, linear interpolation, any circular / space arc interpolation, helical interpolation, ellipse interpolation, etc.

Applications: electronic semiconductor equipment (detection, assembly, locking, soldering), dispensing, non-standard, printing & packaging, textile & garment, medical equipment, assembly line, etc.

Functional Features

- Axis: up to 16-axis (include virtual-axis)
- IO: 24 INs & 8 OUTs
- Communication: RS232, RS485, USB, EtherNET
- Analog: 2 DAs & 2 DAs, max 512 ADs & 512 DAs by ZCAN expansion
- Pulse Mode: directional + pulse/double pulse
- Functions:

01. support encoder input, which can be configured as handwheel mode.
02. support IO expansion by ZCAN, max 4096 INs & 4096 OUTs synchronously.
03. axis position limit, origin signal can be configured as any IN.
04. electronic cam & gear, position latch, synchronous follow, virtual axis, comparison output, etc.
05. max output current is 300mA, it can directly drive some solenoid valve.
06. support multi-file & multi-task, and PC programs & controller internal programs can work synchronously.
07. a variety of encryption methods to protect user's program.
08. support power failure detection & power failure storage.

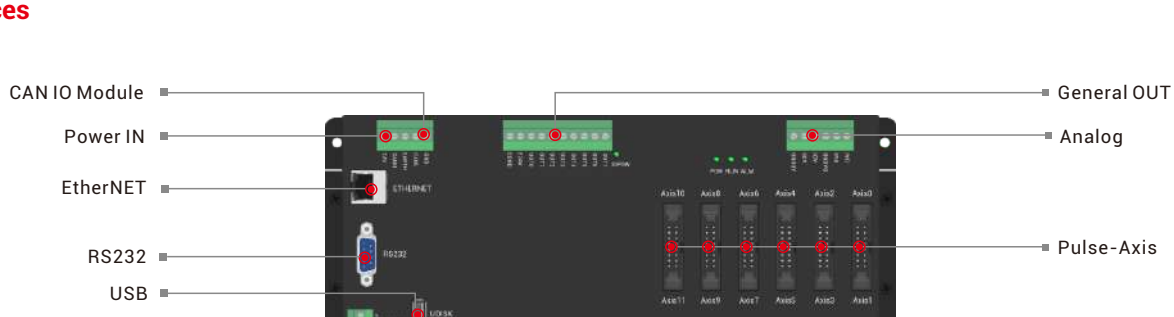
- Performance:

01. max output frequency can reach 10MHz.
02. max 16 axes for linear/any circular/arc/helical/elliptic interpolation.
03. support multi-machine independent continuous interpolation.

Models

Model	Image	Axis	En-coder	Pulse Frequency	Inner IN & OUT	Inner AD	Inner DA	Axis Motion Buffer	Space	Task	Power Down Store	232	485	Net	ECAT	USB	Size (mm)	Functional Description
ZMC212B		12	2	10M	24/8	2	2	512	460k	13	1024	1	1	1	-	1	280*127	point, line, arc, cam, continuous interpolation, robotic arm commands
ZMC212BE		12	2	10M	24/8	2	2	512	460k	13	1024	1	1	1	1	1	280*127	point, line, arc, cam, continuous interpolation, robotic arm commands

Interfaces

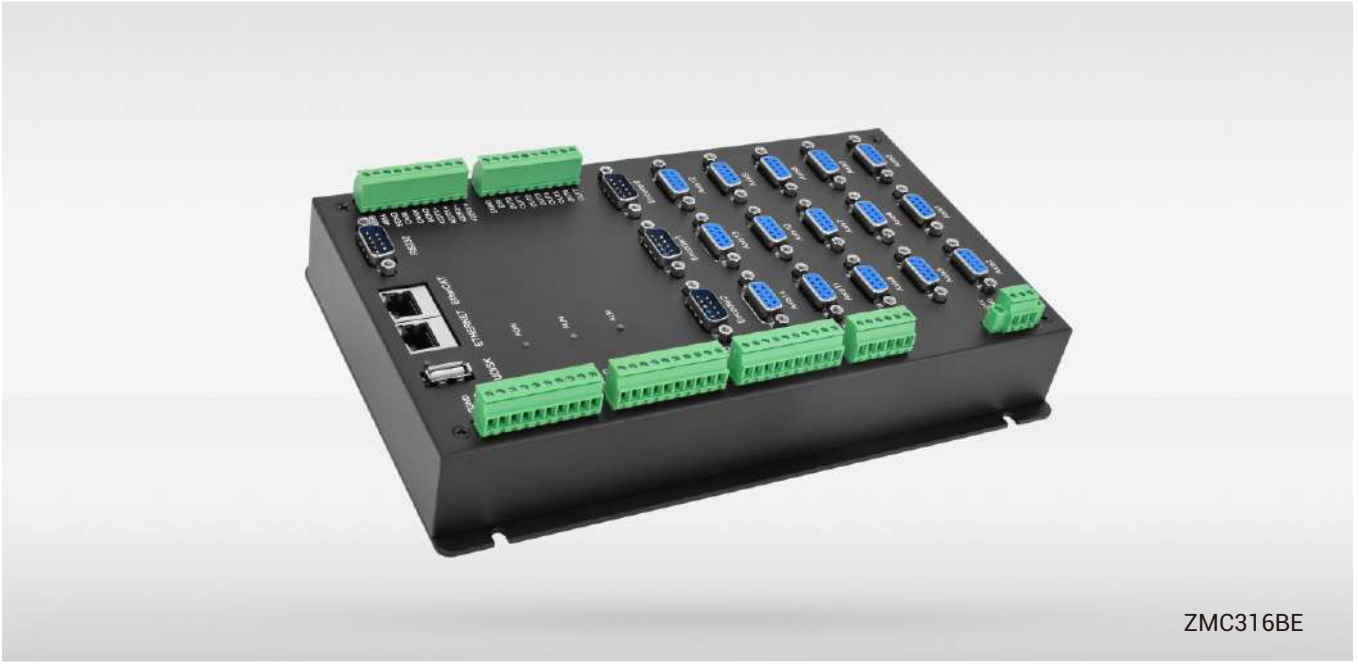


ZMC212B

PIN NO.	Pulse Output Method Name	Encoder Method Name
1	PUL1 + (Pulse Differential+)	Ea1 + (Encoder Differential+)
2	PUL1 - (Pulse Differential-)	EA1 - (Encoder Differential-)
3	DIR1 + (Directional Differential+)	EB1 + (Encoder Differential+)
4	DIR1 - (Direction Differential-)	EB1 - (Encoder Differential-)
5	Inner 0V	Inner 0 V
6	-	EZ1 + (Encoder Differential+)
7	-	EZ1 - (Encoder Differential-)
8	Internal +5V Power	Internal +5V Power
9	PUL0 + (Pulse Differential+)	EA0 + (Encoder Differential+)
10	PUL0 - (Pulse Differential-)	EA0 - (Encoder Differential-)
11	DIR0 + (Direction Differential+)	EB0 + (Encoder Differential+)
12	DIR0 - (Direction Differential-)	EB0 - (Encoder Differential-)
13	Inner 0V	Inner 0V
14	-	EZ0 + (Encoder Differential+)
15	-	EZ0 - (Encoder Differential-)
16	Internal +5V Power	Internal +5V Power

Pulse-Axis (16 PIN Horn) **ZMC212B**

Note: refer to "User Manual" for more models and details.



ZMC316BE

ZMC3XX -- Pulse

ZMC3XX high-performance multi-axis motion controller is a kind of pulse standalone motion controller. Itself supports max 16 axes, but 24 axes can be expanded to realize complex continuous trajectory control.

Functional Features:

- Axis: up to 32axis (include virtual-axis)
- IO: up to 48 INs & 32 OUTs
- Communication: RS232, RS485, RS422, USB, EtherNET.
- Analog: 4 ADs & 2 DAs, max 256 ADs & 128 DAs by ZCAN expansion
- Pulse Mode: directional + pulse / double pulse
- Functions:
  - 01. support encoder input, which can be configured as handwheel mode.
  - 02. support IO expansion by ZCAN, max 512 INs & 512 OUTs synchronously.
  - 03. axis position limit, origin signal can be configured as any IN.
  - 04. max output current is 300mA, which can directly drive some solenoid valve.
  - 05. electronic cam & gear, position latch, synchronization, virtual axis, comparison output
  - 06. support multi-file & multi-task, programs of PC, controller can work synchronously.
  - 07. a variety of encryption methods to protect user's program.
  - 08. support power failure detection & power failure storage.
  - 09. support several robotic arm algorithms (SCARA, Delta).
  - 10. support pulse closed-loop, pitch compensation, etc.
- Performance:
  - 01. max output frequency can reach 10MHz.
  - 02. support up to 16 axes for linear/any circular/space arc/helical/elliptic interpolation.
  - 03. support multi-machine independent continuous interpolation.

ZMC3XX -- Bus

EtherCAT RTEX Realtime Express

ZMC3E/N high-performance multi-axis motion controller supports EtherCAT bus (N: dual-bus of EtherCAT & RTEX) and pulse. Itself supports max 16 axes (EtherCAT / RTEX + pulse), but 24 axes can be expanded to realize complex continuous trajectory control.

Functional Features:

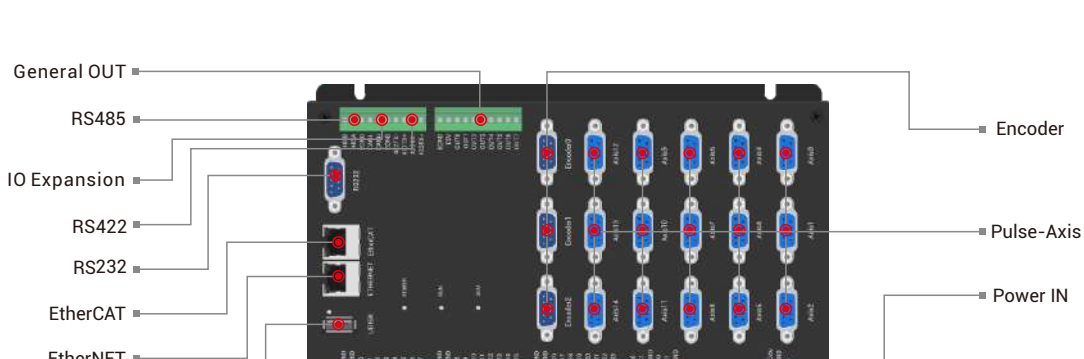
- Axis: up to 22-axis (include virtual-axis)
- IO: up to 52 INs & 28 OUTs
- Communication: RS232, RS485, RS422, USB, EtherNET, EtherCAT / EtherCAT & RTEX
- Analog: 2 DAs & 2 ADs, max 256 ADs & 128 DAs by ZCAN expansion
- Pulse Mode: directional + pulse / double pulse
- Functions:
  - 01. support encoder input, which can be configured as handwheel mode.
  - 02. max 4096 INs & 4096 OUTs can be extended synchronously by EtherCAT / CAN.
  - 03. axis position limit, origin signal can be configured as any IN.
  - 04. max output current is 300mA, which can directly drive some solenoid valve.
  - 05. electronic cam & gear, position latch, synchronous follow, virtual axis, etc.
  - 06. hardware comparison output, hardware timer, precision output in motion.
  - 07. support multi-file & multi-task, PC & controller's programs work synchronously.
  - 08. a variety of encryption methods to protect user's program.
  - 09. support power failure detection & power failure storage.
  - 10. support several robotic arm algorithms (SCARA, Delta).
  - 11. support pulse closed-loop, pitch compensation, etc.
- Performance:
  - 01. EtherCAT fastest refresh cycle is 500μs.
  - 02. max output frequency can reach 10MHz.
  - 03. support max 12 axes for linear/any circular/arc/helical/spline interpolation.
  - 04. support multi-machine independent continuous interpolation.

Applications: robot (SCARA, Delta, 6-joint), electronic semiconductor equipment (detection, assembly, locking, soldering), dispensing, non-standard, printing & packaging, textile & garment, stage entertainment equipment, medical equipment, assembly line, etc.

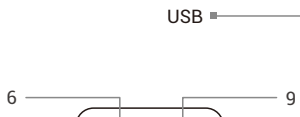
Models

Model	Image	Axis	En-coder	Pulse Frequency	Inner IN & OUT	AD	DA	Axis Motion Buffer	Space	Task	Power Down Store	232	422	485	Net	ECAT	RTEX	USB	Size (mm)	Functional Description
ZMC303		3	3+1	10M	24+3/8+3	2	2	64	300k	10	1024	1	1	1	1	–	–	1	205*134	point, line, arc, cam, continuous interpolation, robotic arm commands
ZMC304		4	4+1	10M	24+3/8+4	2	2	128	300k	10	1024	1	1	1	1	–	–	1	205*134	point, line, arc, cam, continuous interpolation, robotic arm commands
ZMC304X		4	4	10M	24+4/12+4	2	2	128	2000k	12	1024	1	1	1	1	–	–	1	205*134	point, line, arc, cam, continuous interpolation, robotic arm commands
ZMC306X		6	6	10M	24+6/12+6	2	2	128	2000k	12	1024	1	1	1	1	–	–	1	205*134	point, line, arc, cam, continuous interpolation, robotic arm commands
ZMC306E		6	2	10M	24+2/16+2	2	2	512	6144k	10	1024	1	1	1	1	1	–	1	205*135	point, line, arc, cam, continuous interpolation, robotic arm commands
ZMC306N		6	2	10M	24+2/16+2	2	2	512	6144k	10	1024	1	1	1	1	1	1	1	205*135	point, line, arc, cam, continuous interpolation, robotic arm commands
ZMC306BE		6	6	10M	40+12/16+2	4	2	128	2000k	15	1024	1	1	1	1	1	–	1	292*188	point, line, arc, cam, continuous interpolation, robotic arm commands
ZMC308BE		8	8	10M	40+16/16+16	4	2	128	2000k	15	1024	1	1	1	1	1	–	1	292*188	point, line, arc, cam, continuous interpolation, robotic arm commands
ZMC316BE		15+1	3	10M	24+15/8+15	2	2	512	16M	18	1024	1	1	1	1	1	–	1	241*149	point, line, arc, cam, continuous interpolation, robotic arm commands

Interfaces

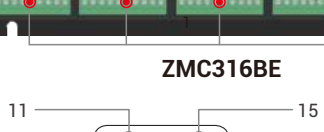


ZMC316BE



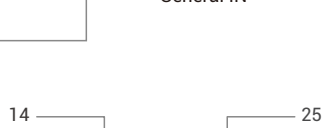
PIN No.	Name	Description
1	PUL+	Pulse Differential+
2	PUL-	Pulse Differential-
3	DIR+	Directional Differential+
4	DIR-	Directional Differential-
5	GND	Inner 0V
6	IN24-38/ALM	General IN (Recommend do drive alarm)
7	OUT8-22/ENA	General OUT (Recommend do drive enable)
8	5V	Internal 5V
9	EGND	External Ground

Pulse-Axis (DB9 Female Head) **ZMC316BE**



PIN No.	Pulse Out Method	Description
1	PUL+	Pulse Differential +
2	DIR+	Directional Differential +
3	GND	Inner 0V
4	EA+	Encoder Phase A+
5	EB+	Encoder Phase B+
6	EZ+	Encoder Phase Z+
7	ALM(IN24-29)	General IN (Recommend do drive alarm)
8	EGND	External Ground
9	PUL-	Pulse Differential-
10	DIR-	Directional Differential-
11	Internal +5V Power	Internal +5V Power
12	EA-	Encoder A-
13	EB-	Encoder B-
14	EZ-	Encoder Z-
15	SERVON(OUT8-13)	General OUT (Recommend do drive enable)

Pulse-Axis & Encoder (DB15 Female Head) **ZMC303/304**



PIN No.	Name	Description
1	EGND	External Power Ground
2	IN40-47/ALM	IN, better do Drive Alarm
3	OUT16 18.../ENABLE	OUT, better do Drive Enable
4	EA-	Encoder A-
5	EB-	Encoder B-
6	EZ-	Encoder Z-
7	Internal+5V	Internal +5V Power
8	Reserved	Reserved
9	DIR+	Directional Differential+
10	GND	Inner 0V
11	PUL-	Pulse Differential-
12	Reserved	Reserved
13	GND	Inner 0V
14	OVCC	+24V
15	OUT17 19.../CLR	OUT, better Drive Alarm Clear
16	IN48-55/INP	IN, better on-position signals
17	EA+	Encoder A+
18	EB+	Encoder B+_
19	EZ+	Encoder Z+
20	GND	Internal 0V
21	GND	Internal 0V
22	DIR-	Directional Differential -
23	PUL+	Pulse Differential +
24	GND	Internal 0V
25	Reserved	Reserved

Pulse-Axis & Encoder (DB25 Female Head) **ZMC306BE/308BE**

Note: refer to "User Manual" for more models and details.

ZMC408CE ZMC460N

ZMC4XX – Pulse

ZMC4XX high-performance multi-axis motion controller is a kind of pulse standalone motion controller. Itself supports max 12 axes, but 32 axes can be expanded to realize complex continuous trajectory control.

ZMC4XX – Bus

ZMC4XX high-performance multi-axis standalone motion controller supports EtherCAT bus (N: dual-bus of EtherCAT & RTEX) and pulse. Itself supports max 64 axes EtherCAT (/60 axes RTEX) to realize complex continuous trajectory control.

Applications: robot (SCARA, Delta, 6-joint), electronic semiconductor equipment (detection, assembly, locking, soldering), dispensing, laser, non-standard, printing & packaging, textile & garment, stage entertainment equipment, medical equipment, assembly line, etc.

Functional Features

- Axis: up to 32-axis (include virtual-axis)
- IO: up to 36 INs & 24 OUTs
- Communication: RS232, RS485, USB, EtherNET.
- Analog: 2 DAs, max 256 ADs & 128 DAs by ZCAN expansion
- Pulse Mode: directional + pulse / double pulse / quadrature pulse
- Functions:
  01. support encoder input, which can be configured as handwheel mode.
  02. support IO expansion by ZCAN, max 512 INs & 512 OUTs synchronously.
  03. axis position limit, origin signal can be configured as any IN.
  04. max output current is 300mA, which can directly drive some solenoid valve.
  05. electronic cam & gear, position latch, synchronization, virtual axis, comparison output.
  06. pulse closed-loop, pitch compensation, hardware comparison output (HW_PSWITCH2), hardware timer, precision output in motion, etc.
  07. support multi-file & multi-task, PC & controller's program work synchronously.
  08. a variety of encryption methods to protect user's program.
  09. support power failure detection & power failure storage.
  10. support several robotic arm algorithms (SCARA, Delta).
  11. support 2 PWM outputs with 1M frequency.
- Performance:
  01. max output frequency can reach 10MHz.
  02. support up to 16 axes for linear/any circular/space arc/helical/elliptic interpolation.
  03. support multi-machine independent continuous interpolation.

Functional Features

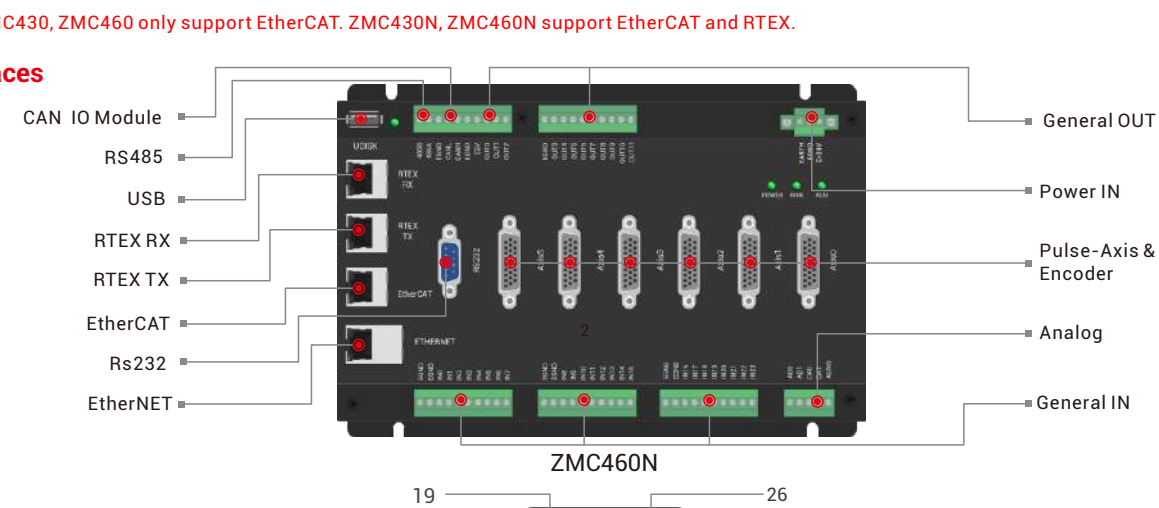
- Axis: up to 64-axis EtherCAT
- IO: up to 40 INs & 32 OUTs
- Communication: RS232, RS485, USB, EtherNET, EtherCAT / EtherCAT & RTEX
- Analog: 2 DAs, max 256 ADs & 128 DAs by ZCAN expansion
- Pulse Mode: directional + pulse / double pulse / quadrature pulse
- Functions:
  01. support encoder input, which can be configured as handwheel mode.
  02. support IO expansion by ZCAN, max 512 INs & 512 OUTs synchronously.
  03. axis position limit, origin signal can be configured as any IN.
  04. max output current is 300mA, which can directly drive some solenoid valve.
  05. electronic cam & gear, position latch, synchronization, virtual axis, comparison out.
  06. support pulse closed-loop, pitch compensation, hardware comparison output (HW_PSWITCH2), hardware timer, precision output in motion, etc.
  07. support multi-file (62) & multi-task (22), PC program and controller inner program can work at the same time.
  08. a variety of encryption methods to protect user's program.
  09. support power failure detection & power failure storage.
  10. support several robotic arm algorithms (SCARA, Delta).
  11. support 12 PWM outputs with 1M frequency.
- Performance:
  01. EtherCAT fastest refresh cycle (within 16-axis) is 100μs.
  02. max output frequency can reach 10MHz.
  03. support up to 16 axes for linear/any circular/arc/helical/elliptic interpolation.
  04. support multi-machine independent continuous interpolation.
  05. mix interpolation of EtherCAT/RTEX multi-bus-axis + pulse axis.

Models

Model	Image	Axis	En-coder	Pulse Frequency	Hand-wheel	Inner IN & OUT	AD	DA	Axis Motion Buffer	Space	Task	Power Down Store	232	485	Net	ECAT	RTEX	USB	Size (mm)	Functional Description
ZMC406-V2		6	6	10M	–	24+6/12+6	–	2	4096	32M	22	8000	1	1	1	1	–	1	205*136	point, line, arc, cam, continuous interpolation, robotic arm commands
ZMC408CE		8	8	10M	1	24+16/16+16	2	2	4096	32M	22	8000	1	1	1	1	–	1	221*144	point, line, arc, cam, continuous interpolation, robotic arm commands
ZMC412		12	12	10M	–	24+12/12+12	–	2	4096	32M	22	8000	1	2	1	–	–	1	250*164	point, line, arc, cam, continuous interpolation, robotic arm commands
ZMC416BE		15+1	3+1	10M	–	24+15/8+15	2	2	4096	64M	22	8000	1	1	1	1	–	1	241*149	point, line, arc, cam, continuous interpolation, robotic arm commands
ZMC432-V2		32	6+1	10M	–	24+6/12+6	–	2	4096	32M	22	8000	1	1	1	1	–	1	205*136	point, line, arc, cam, continuous interpolation, robotic arm commands
ZMC432H		32	6	10M	–	24+12/12+12	2	2	4096	32M	22	8000	1	1	1	1	–	1	205*136	point, line, arc, cam, continuous interpolation, robotic arm commands
ZMC432N		32	6	10M	–	24+6/12+6	–	2	4096	32M	22	8000	1	1	1	–	1	1	216*146	point, line, arc, cam, continuous interpolation, robotic arm commands
ZMC464		64	3+2	10M	–	24+3/12+33	–	2	4096	32M	22	8000	1	1	1	1	-	1	205*136	point, line, arc, cam, continuous interpolation, robotic arm commands
ZMC430N		30	6+4	10M	–	24+6/12+6	2	2	4096	32M	22	8000	1	1	1	1	0/1	1	216*143	point, line, arc, cam, continuous interpolation, robotic arm commands
ZMC460N		60	6+4	10M	–	24+6/12+6	2	2	4096	32M	22	8000	1	1	1	1	0/1	1	216*143	point, line, arc, cam, continuous interpolation, robotic arm commands

Note: ZMC430, ZMC460 only support EtherCAT. ZMC430N, ZMC460N support EtherCAT and RTEX.

Interfaces



ZMC460N

PIN No.	Signal	Description	PIN No.	Signal	Description
1	EGND	External Power Ground	14	OVCC	E+24V OUT (better only for servo IO)
2	IN24-29 / ALM	IN, recommended to rive alarm	15	Reserved	Reserved
3	OUT12-17 / ENABLE	OUT, recommended to drive enable	16	Reserved	Reserved
4	EA-	Encoder Input	17	EA+	Encoder Input
5	EB-	Encoder Input	18	EB+	Encoder Input
6	EZ-	Encoder Input	19	EZ+	Encoder Input
7	+5V	Power Output	20	GND	Internal Power Ground
8	Reserved	Reserved	21	GND	Internal Power Ground
9	DIR+	Servo / Stepper Directional Output	22	DIR-	Servo / Stepper Directional Output
10	GND	Internal Power Ground	23	PUL+	Servo / Stepper Pulse Output
11	PUL-	Servo / Stepper Pulse Output	24	GND	Internal Power Ground
12	Reserved	Reserved	25	Reserved	Reserved
13	GND	Internal Power Ground	26	Reserved	Reserved

◭ Pulse-Axis & Encoder (DB26 Female Head) **ZMC4XX**

Note: refer to "User Manual" for more models and details.

ZMC432M Series

EtherCAT

ZMC432M high-performance multi-axis motion controller is a EtherCAT vertical modular motion controller, which supports RTBasic, PLC programming. It supports 32 axes (EtherCAT + pulse ≤ 32) at most.

Valid Motion Control Functions: point, electronic cam, linear, circular, continuous interpolation, laser PWM, robot algorithm.

Applications: electronic semiconductor equipment (detection, assembly, locking, soldering), dispensing equipment, laser processing device, printing & packaging, textile & garment, medical equipment, assembly line, industrial robot, etc.

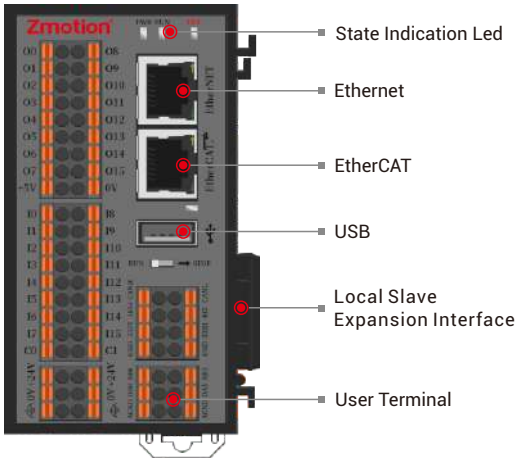
Functional Features:

- **Axis**: up to 32-axis motion control (EtherCAT + 8 single-ended pulse axes)
- **IO:** 16 INs & 16 OUTs -- (4 single-ended encoder IN, 4 high-speed latch, 4 high-speed hardware position comparison output, 4 general PWM)
- **Communication:** RS232, RS485, EtherNET, EtherCAT
- **Analog:** 2 ADs, 2 DAs
- **Pulse Mode:** directional + pulse
- **Functions**
  01. max 4096 INs & 4096 OUTs are extend by CAN /EtherCAT synchronously.
  02. support encoder input, which can be configured as handwheel mode.
  03. axis position limit, origin signal can be configured as any IN.
  04. max output current is 300mA, which can directly drive some solenoid valve.
  05. electronic cam & gear, latch, synchronization, virtual axis, comparison out.
  06. support pulse closed-loop, pitch compensation, hard comparison output (HW_PSWITCH2), hardware timer, precision output in motion, etc.
  07. support multi-file (62) & multi-task (22), and PC program & controller inner program can work at the same time.
  08. a variety of encryption methods to protect user's program.
  09. support power failure detection & power failure storage.
  10. everal robotic arm algorithms (SCARA, Delta) of R model.
- **Performance:**
  01. EtherCAT fastest refresh cycle is 125μs.
  02. support hybrid interpolation of EtherCAT and pulse.
  03. U disk can read & write files, and upgrade program, then it is convenient to remote maintain.
  04. support PLC, RTBasic, RTHmi programming, and all kinds of PC programming languages are OK.
  05. support point, synchronous motion, motion superposition, electronic cam, linear, circular, continuous interpolation.

Models

Models	Image	Axis	En-coder	Pulse Fre	Inner IN & OUT	Inner AD	Inner DA	Axis Motion Buffer	Pro Space	Tasks	Power Down Save	232	485	Ether Net	ECAT	USB	Size (mm)	Functions
ZMC408M		8	4	500k	16/16	2	2	4096	32M	22	8000	1	1	1	1	1	95*46	point, line, arc, cam, continuous trajectory, robotic arm
ZMC432M-16		16	4	500k	16/16	2	2	4096	32M	22	8000	1	1	1	1	1	95*46	point, line, arc, cam, continuous trajectory, robotic arm
ZMC432M		32	4	500k	16/16	2	2	4096	128M	22	8000	1	1	1	1	1	95*46	point, line, arc, cam, continuous trajectory, robotic arm

Interfaces

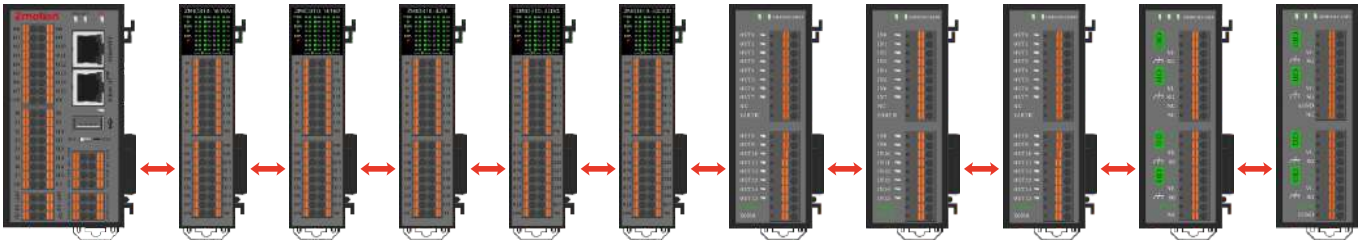


No.	Interfaces	Functions			
1	State Indication Led	POW	Power Led	Green	power conducted – ON
		RUN	Running Led	Green	run normally – ON
		ERR	Error Led	Red	run error – ON
2	U Disk	standard USB, connect to U disk			
3	EtherNET	standard Ethernet, connect to PC / ethernet devices			
4	EtherCAT	standard EtherCAT, connect to EtherCAT slave station			
5	User Terminal	power, RS232, Rs485, CAN, ADC, DAC, 16DI, 16DO			
6	Local Slave Port	connect to slave sub-expansion, don't hot-plugging			

Note: please check each controller user manual.

How to Install

Connect to ZMIO310 sub-expansion by local slave expansion interface.



Steps

- Open the gap clips of all modules.
- insert sub-expansion's master (front) interface to ZMC432M slave interface.
- Close the gap clips of all modules.

ZMC408SCAN-V22

Laser Scan Controller – ZMC408SCAN-V22

ZMC408SCAN-V22 laser galvanometer motion controller integrates laser control, scan control, with bus-axis / pulse-axis control. The controller itself supports 2 groups of XY scan axes (with scan feedback), but 32 axes motion control can be reached for complex continuous trajectory control. Also support hybrid interpolation among axes of scan, bus, pulse.

Laser scan motion controller supports XY2-100 scan protocol, and it can adapt to different functions' lasers, Fiber, UV, Carbon Dioxide.

Applications: metal / non-metal large-format splicing & marking & cutting, ordinary scan marking & welding & cutting, linkage marking & cutting of motion axis + scan axis, laser drilling & forming, etc.

Functional Features

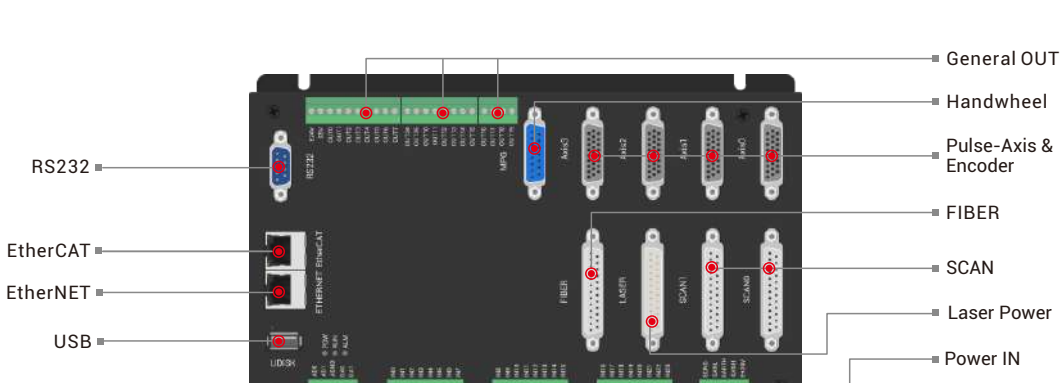
- Axis: up to 32 axes motion control
- IO: up to 32 INs & 28 OUTs
- Communication: RS232, RS485, U Disk, Ethernet, EtherCAT
- Analog: 2 ADs & 2 DAs, max 1024 ADs & 1024 DAs, 1 specialized AD & 1 specialized DA
- Pulse Mode: directional + pulse / double pulse
- Scan: scan-axis interface, with XY2-100 protocol
- Functions:
  01. specialized MPG handwheel interface.
  02. specialized DB25 laser control interface
  03. more IOs by ZCAN / EtherCAT, max 4096 isolated INs & OUTs.
  04. support electronic cam & gear, position latch, synchronous follow, virtual axis, comparison output, etc.
  05. support linear, circular interpolation, continuous trajectory, robot.
  06. support 8 high-speed PWM outputs.
  07. support multi-file & multi-task, and synchronization of controller & PC programs
- Performance:
  01. the max pulse output frequency can reach 10MHz.
  02. support hybrid interpolation among scan, pulse, and bus axes.
  03. the fastest EtherCAT refresh cycle within 16 axes is 100μs.

Models

Model	Image	Axis	Encoder	Scan Axes	Pulse Frequency	Laser	Hand-wheel	Inner IN & OUT	Inner AD	Inner DA	Axis Motion Buffer	Space	Task	Power Down Store	232	485	Net	ECAT	Size (mm)
ZMC408SCAN		8	4	4	10M	1	1	24+8/20+8	2	2	4096	128M	12	8000	1	1	1	1	239*149
ZMC408SCAN-V22		8	4	4	10M	2	1	24+8/20+8	2	2	4096	128M	12	8000	1	1	1	1	239*149

ZMC408SCAN-V22 VS ZMC408SCAN: ZMC408SCAN EXIO is replaced by FIBER -- ZMC408SCAN-V22.

Interfaces



ZMC408SCAN-V22

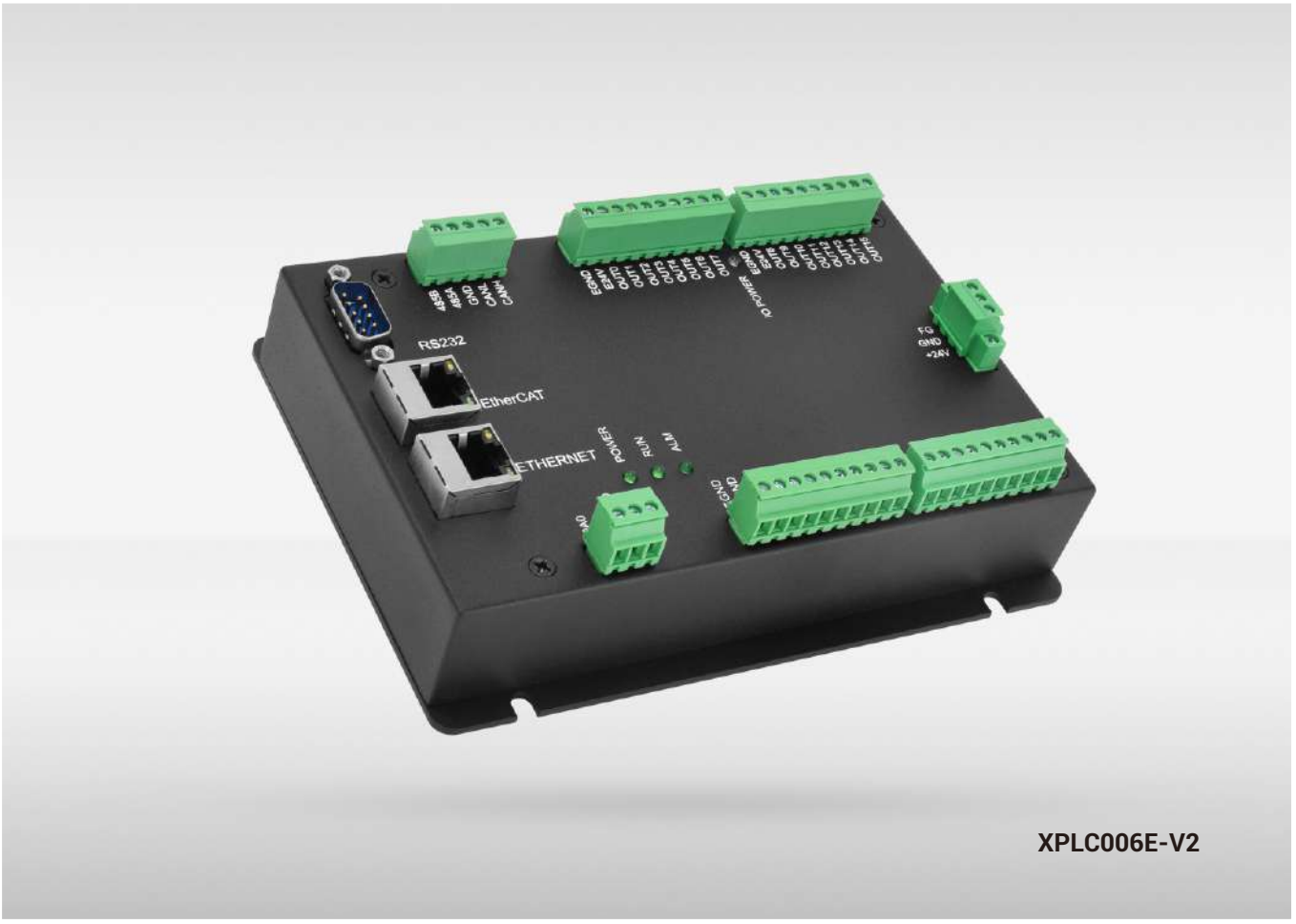
PIN No.	Name	Description
1 4 14	LAGND	Laser Analog Signal Reference Ground
2 3 13	NC	Reserved
5	Guide Control OUT32	PIN for Red Light Control OUT (24V)
6	ACON OUT33	PIN for Reserved OUT (24V)
7	LaserRequest OUT28	Laser Request OUT (24V)
8	Program start OUT29	Program Start OUT (24V)
9	ERST OUT30	Laser Reset OUT (24V)
10	LASER ON OUT31	Laser Enable OUT (24V)
11	PWM OUT9	Reserved for PWM, 24V Electric Level
12	Modulation-	Modulation Signal -
15	LASER_AD/NC AIN(2)	Reserved for Analog IN, 0-10V, 16-Bit Resolution
16	LASER_DA/NC AOUT(2)	(for special mode)
17	Error IN44	Laser Alarm IN (24V)
18	Emission EN IN45	Laser Emisson IN (24V)
19	Pow Active IN49	Laser Main Power has ON (24V)
20	Power ON IN48	Laser System Powered On IN (24V)
21	Laser standby IN47	Laser in Standby IN (24V)
22	Ready IN46	Laser in Ready IN (24V)
23 25	EGND	Reference Ground of Each Digital IN & OUT
24	Modulation+ OUT8	Modulation Signal +, 24V Electric Level

Laser Power Control Port (DB25 Male Head) **ZMC408SCAN**

PIN No.	Name	Description
1	Clk-	Clock Signal-
14	Clk+	Clock Signal+
2	SYNC-	Synchronization Signal-
15	SYNC+	Synchronization Signal+
3	X-	Scan X Signal-
16	X+	Scan X Signal+
4	Y-	Scan Y Signal-
17	Y+	Scan Y Signal+
5	Z-	Scan Z Signal-
18	Z+	Scan Z Signal+
6	Y RETURN-	Scan Y Feedback Signal-
19	Y RETURN+	Scan Y Feedback Signal+
7	Z RETURN-	Scan Z Feedback Signal-
20	Z RETURN+	Scan Z Feedback Signal+
8	X RETURN-	Scan X Feedback Signal-
21	X RETURN+	Scan X Feedback Signal+
9	NC	-
22	NC	-
10	NC	-
23	GND	Signal Ground, Public End
11	GND	Signal Ground, Public End
24	GND	Signal Ground, Public End
12	NC	-
25	NC	-
13	NC	-

SCAN (DB25 Female Head) **ZMC408SCAN**

Note: refer to "User Manual" for more models and details.



XPLC Series Controller

XPLC economical multi-axis standalone motion controller is compatible with EtherCAT and pulse, and supports PLC (ladder diagram) programming. Itself supports up to 32 axes motion control to realize point to point, linear motion, electronic cam, etc.

Applications: electronic semiconductor equipment (detection, assembly, locking, soldering), dispensing equipment, non-standard equipment, printing & packaging, textile & garment, medical equipment, assembly line, robot, etc.

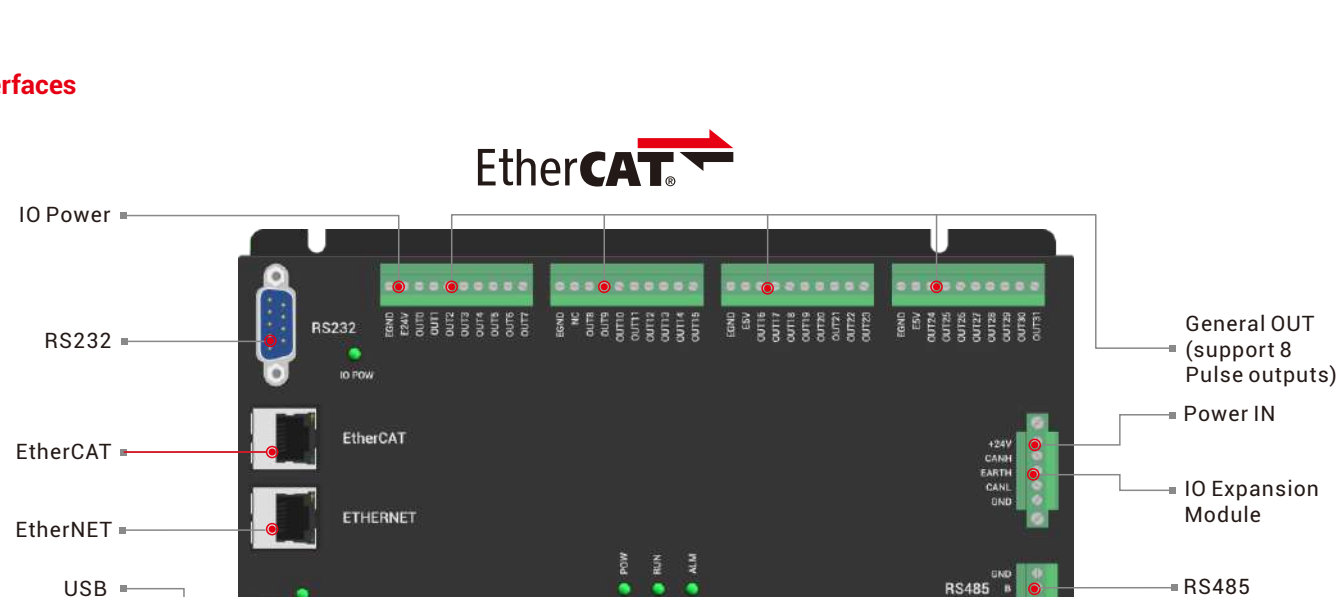
Functional Features

- Axis: up to 32-axis (include virtual-axis, EtherCAT, pulse axis)
- IO: up to 32 INs & 32 OUTs
- Communication: RS232, RS485, EtherNET.
- Analog: 2 DAs & 2 ADs, max 256 ADs & 128 DAs by ZCAN expansion
- Pulse Mode: directional + pulse / double pulse
- Functions:
  - 01. support encoder input, which can be configured as handwheel mode.
  - 02. support IO expansion by ZCAN, max 4096 INs & 4096 OUTs synchronously.
  - 03. axis position limit, origin signal can be configured as any IN.
  - 04. max output current is 300mA, which can directly drive some solenoid valve.
  - 05. support electronic cam, electronic gear, position latch, synchronous follow, virtual axis, etc.
  - 06. support multi-file & multi-task, programs of PC & controller can work synchronously.
  - 07. a variety of encryption methods to protect user's program.
  - 08. support power failure detection & power failure storage.
- Performance:
  - 01. EtherCAT fastest refresh cycle is 1ms.
  - 02. max pulse output frequency can reach 500kHz.
  - 03. support up to 32 axes for point motion, linear motion, and electronic cam.
  - 04. multi-machine can do continuous interpolation independently.

Models

Model	Image	Axis	En-coder	Pulse Frequency	Inner IN and OUT	Inner AD	Inner DA	Axis Motion Buffer	Space	Task	Power Down Store	232	485	Net	ECAT	USB	Size (mm)	Functional Description
XPLC004E-V2		4	–	–	16/16	–	2	32	6144k	6	1024	1	1	1	1	–	160*114.5	point, cam, line
XPLC006E-V2		6	–	–	16/16	–	2	32	6144k	6	1024	1	1	1	1	–	160*114.5	point, cam, line
XPLC008E-V2		8	–	–	16/16	–	2	32	6144k	6	1024	1	1	1	1	–	160*114.5	point, cam, line
XPLC016E-V2		16	–	–	16/16	–	2	32	6144k	6	1024	1	1	1	1	–	160*114.5	point, cam, line
XPLC664E-V2		6	2	500k (single -ended)	32/32	2	2	128	2M	10	1024	1	1	1	1	1	219*135	point, cam, line
XPLC864E-V2		6	2	500k (single -ended)	32/32	2	2	128	2M	10	1024	1	1	1	1	1	219*135	point, cam, line
XPLC1264E-V2		12	2	500k (single -ended)	32/32	2	2	128	2M	10	1024	1	1	1	1	1	219*135	point, cam, line
XPLC1664E-V2		16	2	500k (single -ended)	32/32	2	2	128	2M	10	1024	1	1	1	1	1	219*135	point, cam, line

Interfaces



XPLC864E2-V2

Note: refer to "User Manual" for more models and details.

XPLC300

XPLC300 multi-axis standalone motion controller is one EtherCAT vertical controller that supports PLC (ladder diagram) programming. Itself supports up to 12 EtherCAT axes, 16 axes motion control can be extended to realize point motion, linear motion, electronic cam, etc.

Applications: electronic semiconductor equipment (detection, assembly, locking, soldering), dispensing equipment, non-standard equipment, printing & packaging, textile & garment, medical equipment, assembly line, robot, etc.

Functional Features

- Axis: up to 16-axis (include virtual-axis, EtherCAT axis)
- IO: 1 IN, no OUT
- Communication: RS232, RS485, EtherNET, EtherCAT.
- Functions:

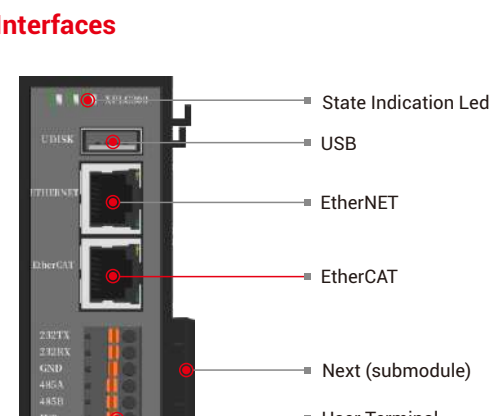
  01. support IO expansion by EtherCAT.
  02. local can expand 16 IO submodules / 8 AIO submodules.
  03. support reading & writing USB files and updating program for remote maintain.
  04. support PLC, Basic, HMI programming.
  05. support multi-file & multi-task programming, programs of PC and controller can work at the same time.
  06. support point motion, synchronous motion, motion superposition, electronic cam, linear interpolation, etc.
  07. support second development of all kinds of PC languages.
  08. a variety of encryption methods to protect user's program.
  09. support power failure detection & power failure storage.
- Performance:

  01. EtherCAT fastest refresh cycle is 1ms.
  02. support up to 16 axes for point motion, linear motion, electronic cam.

Models

Model	Image	Axis	Inner IN & OUT	IO Sub-Modules (local extend)	AIO Sub-Modules (local extend)	Axis Motion Buffer	Space	Task	Power Off Store	232	485	Net	ECAT	USB	Size (mm)	Functional Description
XPLC304E		4	1/0	16	8	128	6144kB	12	1024	1	1	1	1	1	108*32*95	point, electronic cam, linear interpolation
XPLC306E		6	1/0	16	8	128	6144kB	12	1024	1	1	1	1	1	108*32*95	point, electronic cam, linear interpolation
XPLC308E		8	1/0	16	8	128	6144kB	12	1024	1	1	1	1	1	108*32*95	point, electronic cam, linear interpolation
XPLC312E		12	1/0	16	8	128	6144kB	12	1024	1	1	1	1	1	108*32*95	point, electronic cam, linear interpolation

Interfaces

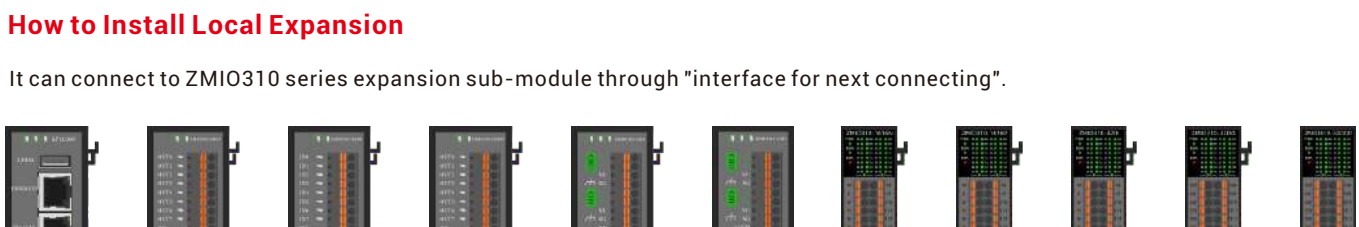


No.	Name	Functional Description			
1	State Indication Led	POW	Power Led	Green	Power ON -- ON
		RUN	Run Led	Green	Run Well -- ON
		ALM	Error Led	Red	Run Error -- ON
2	USB	standard USB port for connecting to U disk			
3	EtherNET	standard Ethernet to link with PC / other net devices			
4	EtherCAT	Standard Ethernet to link with EtherCAT slave			
5	User Terminal	9 pin port, power, RS232, RS485, IN0			
6	For Next after Local Expansion	connect to next sub-module, not support hot plugging			

Note: refer to "User Manual" for more models and details.

How to Install Local Expansion

It can connect to ZMIO310 series expansion sub-module through "interface for next connecting".



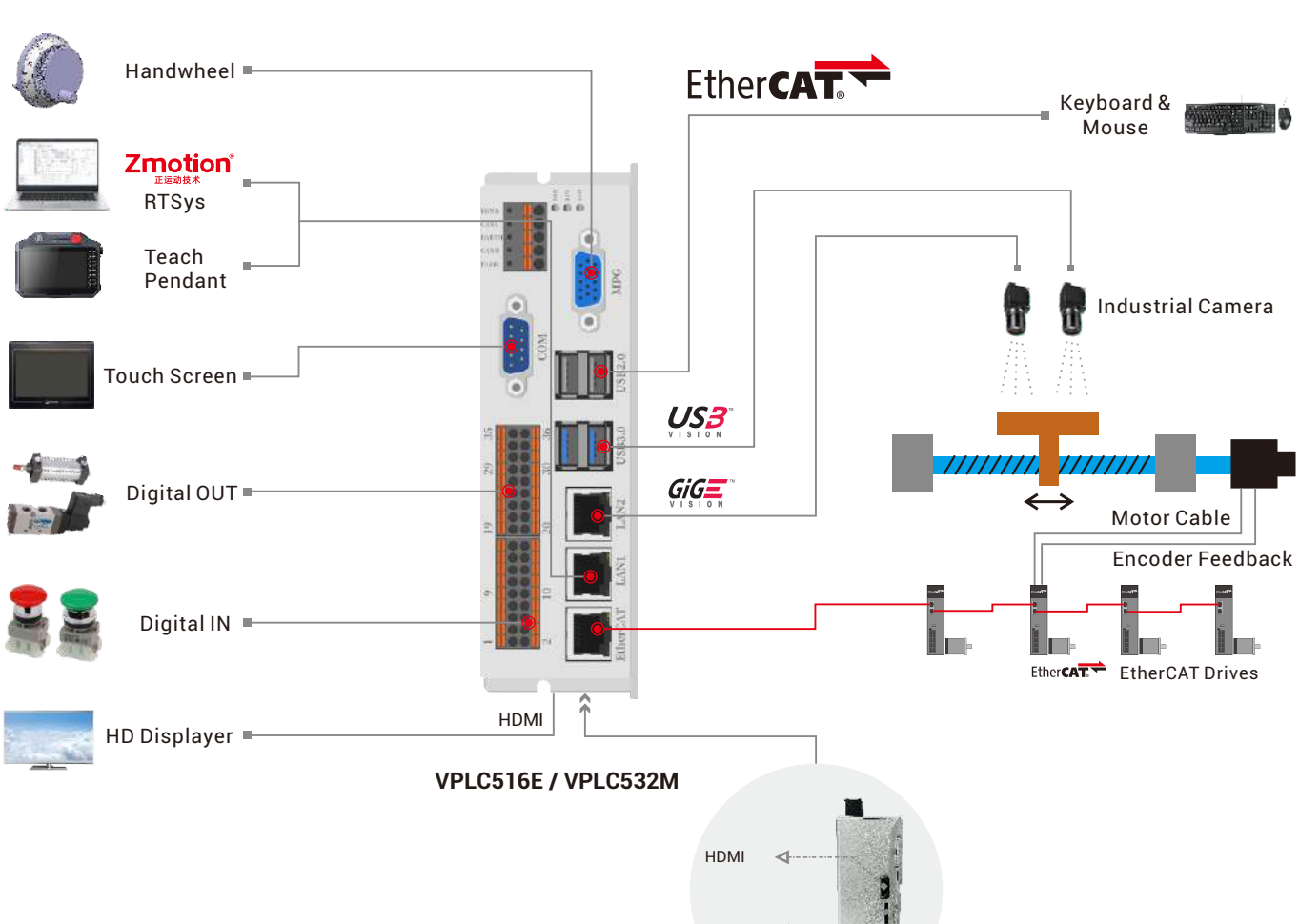
How to Install:

- open all modules' clearance snaps.
- connect front level expansion interface of sub-module to behind level expansion interface of XPLC300 controller (/ sub-module).
- close all modules' clearance snap.

Vision Motion Controller

VPLC Controllers

VPLC516E / VPLC532M System Structure



Support QT Programming

Machine Vision Functions

Positioning | Measurement | Detection | Identification

Motion Control Functions

Robot Algorithm | Vision Fly-Shooting PWM & Speed Synchronized

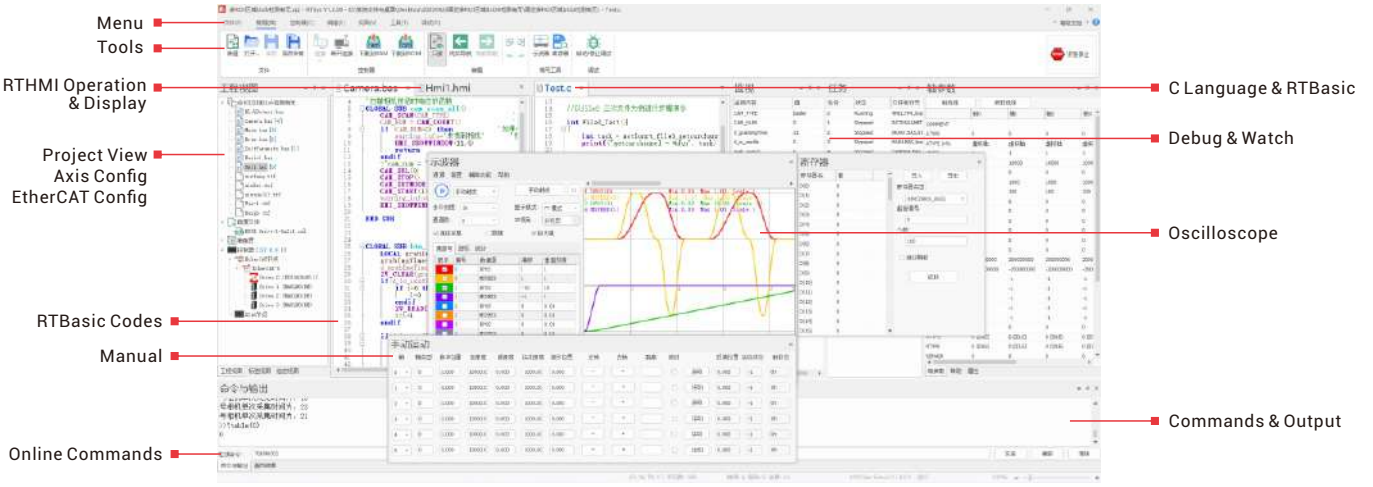
Position Precision Output PSO (1D/2D/3D)

Electronic Cam | Multi-Axis Interpolation | Small-Segment Look-Ahead

- one-stop-shop development by RTSys
- develop PLC, Basic, HMI, Motion, Vision, etc.
- replace PC+Windows+Vision algorithm+control card
- support mainstream cameras & EtherCAT servos
- easy to develop vision by Basic / PLC
- direct data interaction, faster one level than PCI/PCIe
- expand Basic commands by C, real-time & flexible

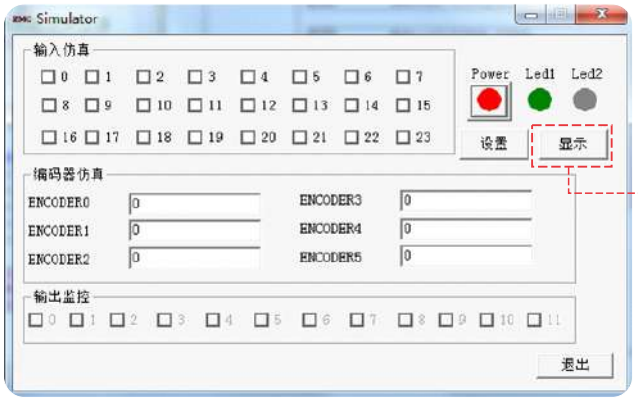
RTSys Features

- Integrate Basic, PLC, HMI, with machine vision.



RTSys is a one-stop-shop development software that integrates machine vision and motion control functions. It supports secondary development of RTBasic, RTPLC (ladder diagram), RTHMI, and machine vision RTVision. What's more, it supports rich functions for complex motion control development, like, hybrid programming, real-time simulation, online tracking & diagnosis & debugging, etc., and for vision control, it can rapidly realize vision positioning, measurement, identification, detection.

Easy & Quick Start



- Self R&D Industrial IDE Software.
- It also can simulate and debug local graphics when there is no controller.

Vision Functional Features

Vision Positioning

Blob Analysis

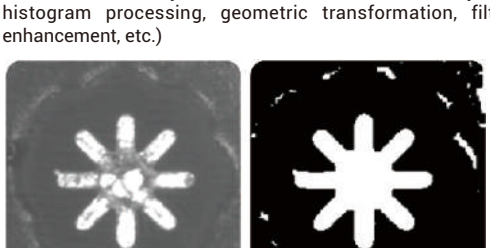
Vision Measurement

Detection & Recognition

Vision Function Description

Image Preprocessing

Highlight the feature to be detected, eliminate image noise & interference to extract, identify, detect the feature accurately. (binarization, histogram processing, geometric transformation, filtering, image enhancement, etc.)



Applications: scratch detection, contour extraction, blob analysis, etc.

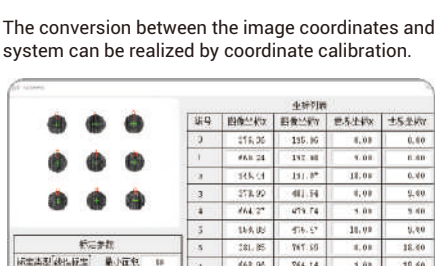
Vision Positioning

By learning a specific template or fixed feature, then find which feature meets the conditions in the detection area, and return its coordinate (in the image).

Applications: assembly line positioning, robotic arm grasping, etc.

Camera Calibration

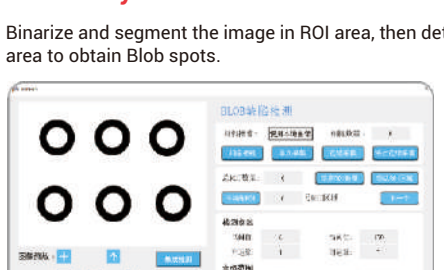
The conversion between the image coordinates and the world coordinate system can be realized by coordinate calibration.



Applications: visual positioning's offset correction, length / area measurement, etc.

Blob Analysis

Binarize and segment the image in ROI area, then detect it in the connection area to obtain Blob spots.



Applications: product counting, product defect testing, etc.

Vision Measurement

Measure the image's target or area feature, which mainly are length, circle, angle, arc, size measurement, etc.)

Applications: workpiece size measurement, assembly detection, etc.

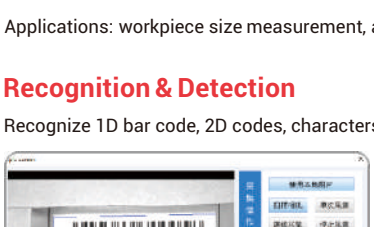
Defect Detection

Defect defects on the surface of the workpiece, like, spots, pits, scratches, color error, etc.

Applications: phone glass cover scratch detection, metal surface scratch detection, etc.

Recognition & Detection

Recognize 1D bar code, 2D codes, characters in a specific area.



Applications: assembly line material testing, food package testing, product information acquisition and entry, etc.

Vision Fly-Shooting

(motion control) "precision output" & "PSO" + machine vision functions for vision fly-shooting -- "high-speed" & "high-precision" of intelligent equipment.

Applications: robotic visual sorting, visual loading & unloading, etc.

VPLC516E / VPLC532M

EtherCAT

VPLC516E/VPLC532M is one EtherCAT vision motion controller. Itself supports max 16 axes, but can be expanded to 32 axes to achieve complex motion control and machine vision applications (motion: electronic cam, linear, circular, continuous processing, robotic arm, etc., vision: positioning, measurement, detection, identification).

Applications: 3C electronics, lithium batteries, printing & packaging, food & medicine, robot, assisting robots, semiconductors, laser, etc.

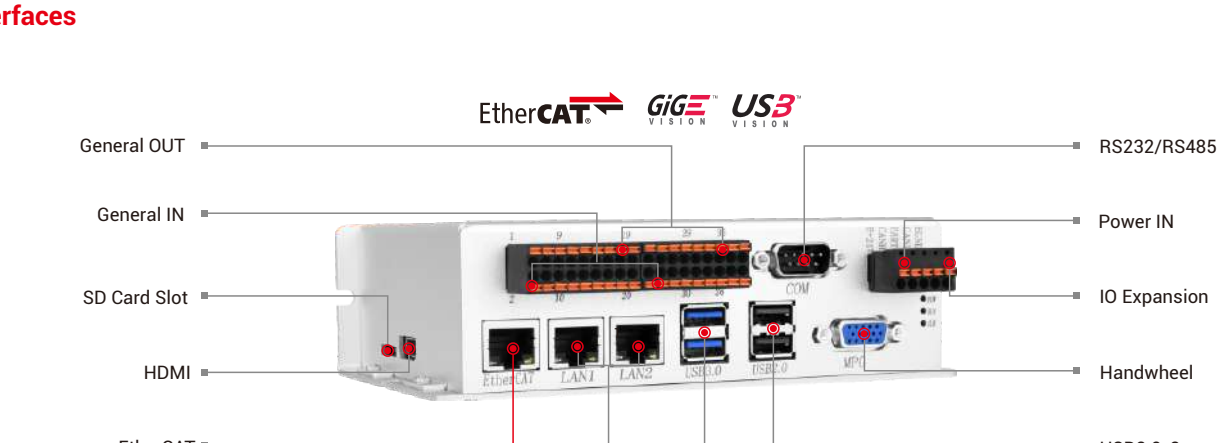
Functional Features

- Axis: up to 32 EtherCAT axes (include virtual-axis)
- IO: 16 INs & 16 OUTs
- Communication: RS232, RS485, USB, EtherNET, EtherCAT, CAN
- Analog: max 512 ADs & 512 DAs by ZCAN expansion
- Pulse Mode: directional + pulse
- Functions:
  - 01. support vision fly-shooting.
  - 02. 1 "handwheel" interface (12 Ins).
  - 03. 2 camera interfaces (USB3.0 & GiGE).
  - 04. max 4096 INs & 4096 OUTs can be extended by EtherCAT.
  - 05. 2 precision outputs, for position synchronized output (PSO).
  - 06. support 30+ robot algorithms (Delta, SCARA, 6-joint, dual rotate, etc.).
  - 07. support electronic cam, line, arc, continuous processing, etc.
  - 08. a variety of encryption methods to protect user's program.
  - 09. support power failure detection & power failure storage.
  - 10. support RTBasic multi-file & multi-task programming.
- Performance:
  - 01. EtherCAT fastest refresh cycle (within 16-axis) is 1000μs.
  - 02. max pulse output frequency can reach 500kHz.
  - 03. support up to 16 axes for interpolations of line, arc, helical, ellipse.
  - 04. support multi-machine independent continuous interpolation.
  - 05. direct data interaction, faster one level than PCI/PCIe
  - 06. Linux system, replace "IPC + machine vision + motion control".

Models

Model	Image	Axis	En-coder	Pulse Fre-quency	Inner AD	Inner DA	PWM	Inner IN and OUT	Axis Motion Buffer	Space	Task	Power off Store	232	485	Net	ECAT	HDMI	USB 2.0	USB 3.0	SD Card Slot	Size (mm)	Functional Description
VPLC516E-4		4	1+1	500k single ended	-	-	2	16/16	4096	64M	22	8000	1	1	2	1	1	2	2	1	162*47*119	point, line, arc, cam, continuous motion, robotic arm command
VPLC516E -6-8		6	1+1	500k single ended	-	-	2	16/16	4096	64M	22	8000	1	1	2	1	1	2	2	1	162*47*119	point, line, arc, cam, continuous motion, robotic arm command
VPLC516E-8		8	1+1	500k single ended	-	-	2	16/16	4096	64M	22	8000	1	1	2	1	1	2	2	1	162*47*119	point, line, arc, cam, continuous motion, robotic arm command
VPLC516E		16	1+1	500k single ended	-	-	2	16/16	4096	64M	22	8000	1	1	2	1	1	2	2	1	162*47*119	point, line, arc, cam, continuous motion, robotic arm command

Interfaces



VPLC516E

PIN No.	Signal	Description	PIN No.	Signal	Description
1	H-5V	Supply Power for Handwheel	9	Hs3	Select Axis 3
2	HA-	Encoder A Signal	10	HS4	Select Axis 4
3	HB-	Encoder B Signal	11	EGND	External Power Ground
4	HEMGN	Emergency Stop	12	HS5	Select Axis 5
5	NC	-	13	HS2	Select Axis 2
6	HX1	Select X1 Ratio	14	HS1	Select Axis 1
7	HX10	Select X10 Ratio	15	Hs0	Select Axis 0
8	Hx100	Select X100 Ratio	-	-	-

Hanwheel Interface (DB15 Female Head) **VPLC516E**

Note: refer to "User Manual" for more models and details.

VPLC532E

EtherCAT

VPLC532E is one EtherCAT vision motion controller. Itself supports max 32 axes to achieve complex motion control and machine vision applications (motion: electronic cam, linear, circular, continuous processing, robotic arm, etc., vision: positioning, measurement, detection, identification).

Applications: 3C electronics, lithium batteries, printing & packaging, food & medicine, robot, assisting robots, semiconductors, laser, etc.

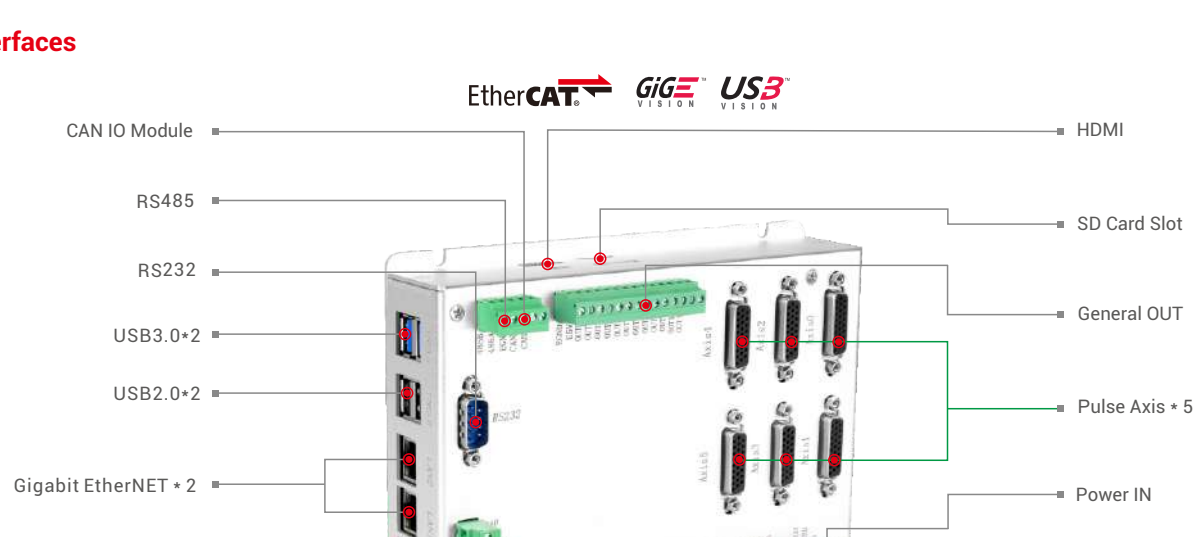
Functional Features

- Axis: up to 32 EtherCAT axes
- IO: 24+6 INs & 12+6 OUTs
- Communication: RS232, RS485, USB, EtherNET, EtherCAT, CAN
- Analog: 2 DAs, max 512 ADs & 512 DAs by ZCAN expansion
- Pulse Mode: directional + pulse / dual pulse
- Functions:
  - 01. support vision fly-shooting.
  - 02. 6 pulse-axis interfaces on board.
  - 03. 2 camera interfaces (USB3.0 & GiGE).
  - 04. max 4096 INs & 4096 OUTs can be extended by EtherCAT.
  - 05. 2 precision outputs, for position synchronized output (PSO).
  - 06. support 30+ robot algorithms (Delta, SCARA, 6-joint, dual rotate, etc.).
  - 07. support electronic cam, line, arc, continuous processing, etc.
  - 08. a variety of encryption methods to protect user's program.
  - 09. support power failure detection & power failure storage.
  - 10. support RTBasic multi-file & multi-task programming.
- Performance:
  - 01. EtherCAT fastest refresh cycle (within 16-axis) is 1000μs.
  - 02. max pulse output frequency can reach 10MHz.
  - 03. support up to 16 axes for interpolations of line, arc, helical, ellipse.
  - 04. support multi-machine independent continuous interpolation.
  - 05. direct data interaction, faster one level than PCI/PCIe
  - 06. Linux system, replace "IPC + machine vision + motion control".

Models

Model	Image	Axis	En-coder	Pulse Fre-quency	Inner AD	Inner DA	PWM	Inner IN and OUT	Axis Motion Buffer	Space	Task	Power off Store	232	485	Net	ECAT	HDMI	USB 2.0	USB 3.0	SD Card Slot	Size (mm)	Functional Description
VPLC532E-6-8		6	6	10M	-	2	4	24+6/12+6	4096	64M	26	8000	1	1	2	1	1	2	2	1	184*140	point, line, arc, cam, continuous motion, robotic arm command
VPLC532E-16		16	6	10M	-	2	4	24+6/12+6	4096	64M	26	8000	1	1	2	1	1	2	2	1	184*140	point, line, arc, cam, continuous motion, robotic arm command
VPLC532E		32	6	10M	-	2	4	24+12/12+12	4096	64M	26	8000	1	1	2	1	1	2	2	1	184*140	point, line, arc, cam, continuous motion, robotic arm command

Interfaces



VPLC532E

PIN No.	Signal	Description	PIN No.	Signal	Description
1	EGND	External Power Ground	14	OVCC	E+24V Output (better only for Servo IO)
2	IN24-29/ALM	General IN, recommended to do Drive Alarm	15	OUT18-23/CLR	Digital OUT, better do Drive Alarm Clear
3	OUT12-17/ENABLE	General OUT, recommended to do Drive Enable	16	IN30-35/INP	Digital IN, better do on-position
4	EA-	Encoder Input	17	EA+	Encoder Input
5	EB-	Encoder Input	18	EB+	Encoder Input
6	EZ-	Encoder Input	19	EZ+	Encoder Input
7	+5V	Encoder Input	20	GND	Internal Power Ground
8	Reserved	Power Output	21	GND	Internal Power Ground
9	DIR+	Reserved	22	DIR-	Servo / Stepper Directional Output
10	GND	Servo / Stepper Directional Output	23	PUL+	Servo / Stepper Pulse Output
11	PUL-	Internal Power Ground	24	GND	Internal Power Ground
12	Reserved	Servo / Stepper Pulse Output	25	Reserved	Reserved
13	GND	Reserved	26	Reserved	Reserved
		Internal Power Ground			

▲ Pulse & Encoder (DB26 Female Head) **VPLC532E**

Note: refer to "User Manual" for more models and details.

VPLC711 / VPLC712

VPLC7XX Controller

VPLC7XX is one IPC vision motion controller based on x86, and it matches with Zmotion researched (national produced) Windows real-time motion soft kernel "MotionRT", then VPLC7XX becomes real-time motion controller or real-time PLC. VPLC7XX supports EtherCAT. Motion control can be 4-240 axes, for linkage, up to 16 axes. And the minimal period is 500us. Moreover, it is with powerful functions (√high-speed & high-precision). Specifically, some required functions in automatic industry, high-speed DI/DO, pulse control, handwheel control, etc.

Applications: high-speed & high-precision -- semiconductor, 3C electronics, new energy, automobile production line, laser, etc.

VPLC711 Hardware Parameters

01. x86 high-performance CPU -- 64 axes synchronous motion (1ms) by EtherCAT
02. interfaces on board -- RS232, RS485, EtherNet*5, EtherCAT, USB3.0*4
03. 20 DI -- 4 (high-speed color patch latch), 2 (high-speed single-ended encoder)
04. 20 DO -- 4 (high-speed single-ended pulse), 4 groups of high-speed PWM
05. support DVI-D, HDMI display, and multiple net-ports' IP can be different.

VPLC712Hardware Parameters

01. x86 high-performance CPU -- 240 axes synchronous motion by EtherCAT
02. interfaces on board -- RS232, RS485, EtherNet, EtherCAT, USB2.0. USB4.0
03. 20 DI -- 4 (high-speed color patch latch), 2 (high-speed single-ended encoder)
04. 20 DO -- 4 (high-speed single-ended pulse), 4 groups of high-speed PWM
05. support HDMI display, and dual-Ethernet IP can be different.

Motion Control Functions

point to point, electronic cam, linear interpolation, circular interpolation, continuous trajectory processing, robot.

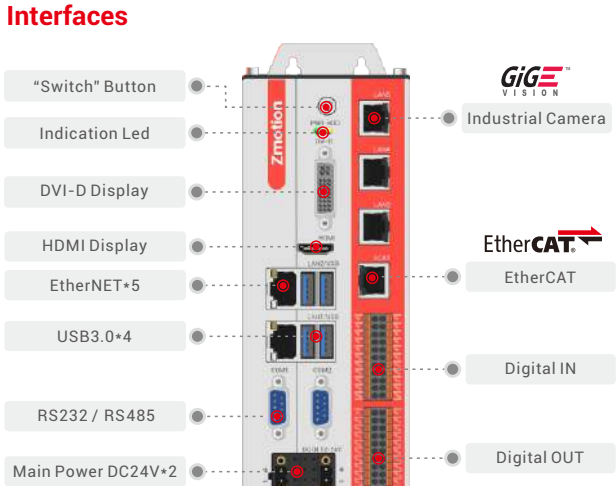
high-speed PSO OUTs on the board, support 1D / 2D / 3D high-speed position synchronized output.

Applications can be vision fly-shooting, high-speed dispensing, laser.

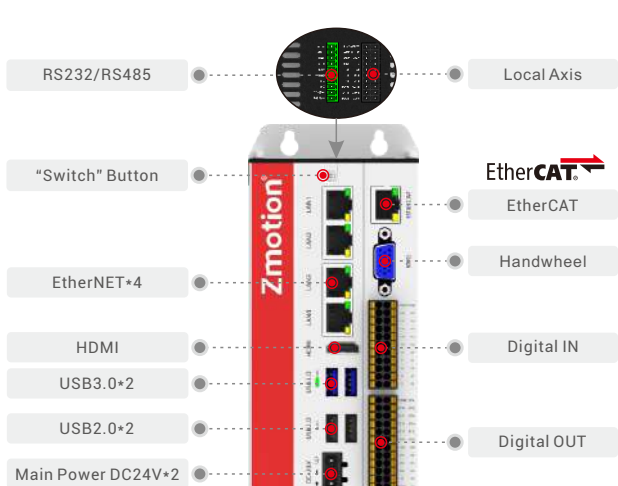
Machine Vision Functions

Positioning | Blob Analysis | Measurement | Detection & Recognition

Interfaces

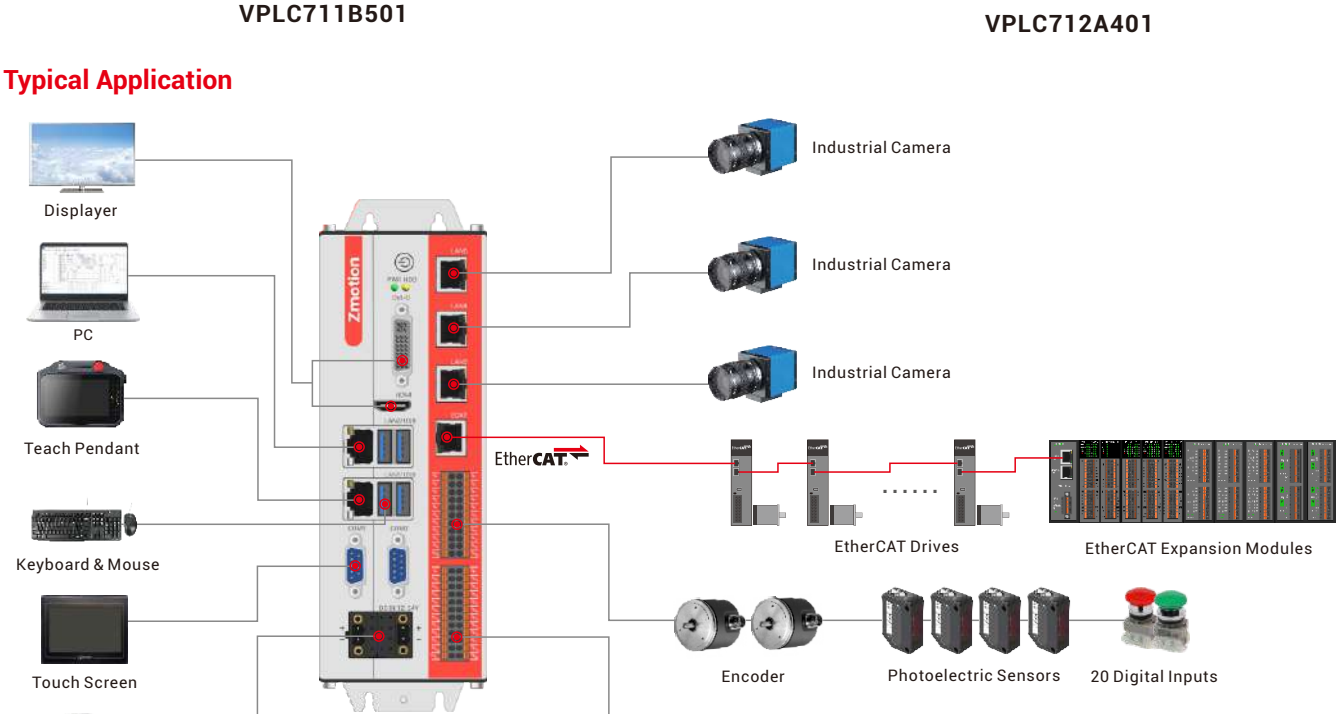


VPLC711B501



VPLC712A401

Typical Application



Order Information

Hardware

VPLC711B201
VPLC711B501
VPLC712A201
VPLC712A401

1 2 3 4

1. Product Series
2. CPU Model
3. EtherNET Number
4. Hardware Version No.

For Example:
VPLC712A401-AX64-MO8-HW-ZV-R6-YYY

Software

AX64 - MO8 - HW - ZV - R - F - YYYY

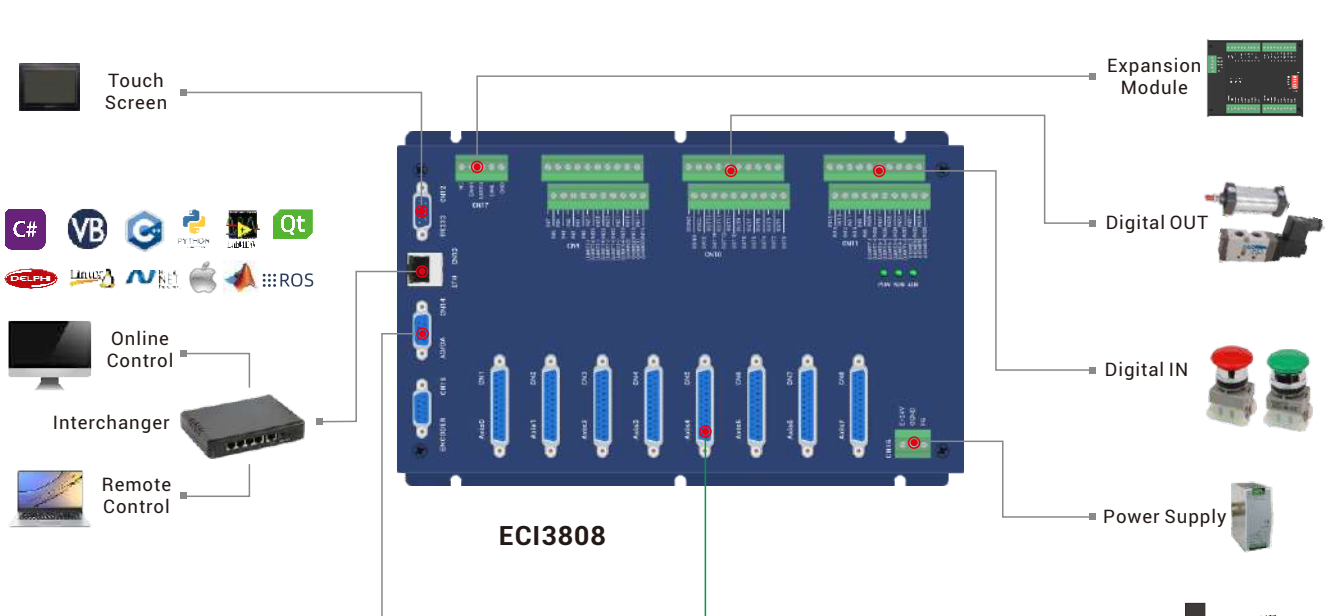
1 2 3 4 5 6 7

1. 64 Axes (6-128)
2. Motion Control
3. PSO
4. Vision Control
5. R1 Ordinary Robot
   R6 6-Joint & Special Robots
6. F = Fast version, cycle of 125us
7. YYYY – User Customized Functions

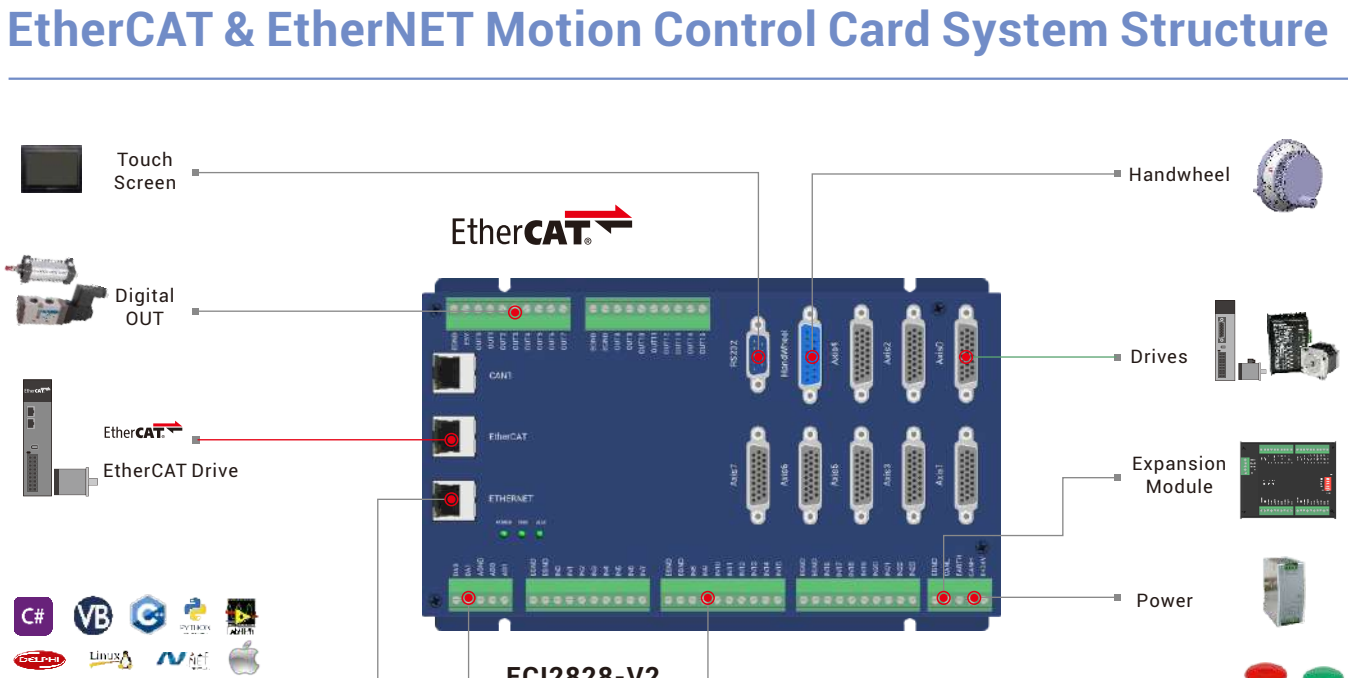
EtherNET Motion Control Card

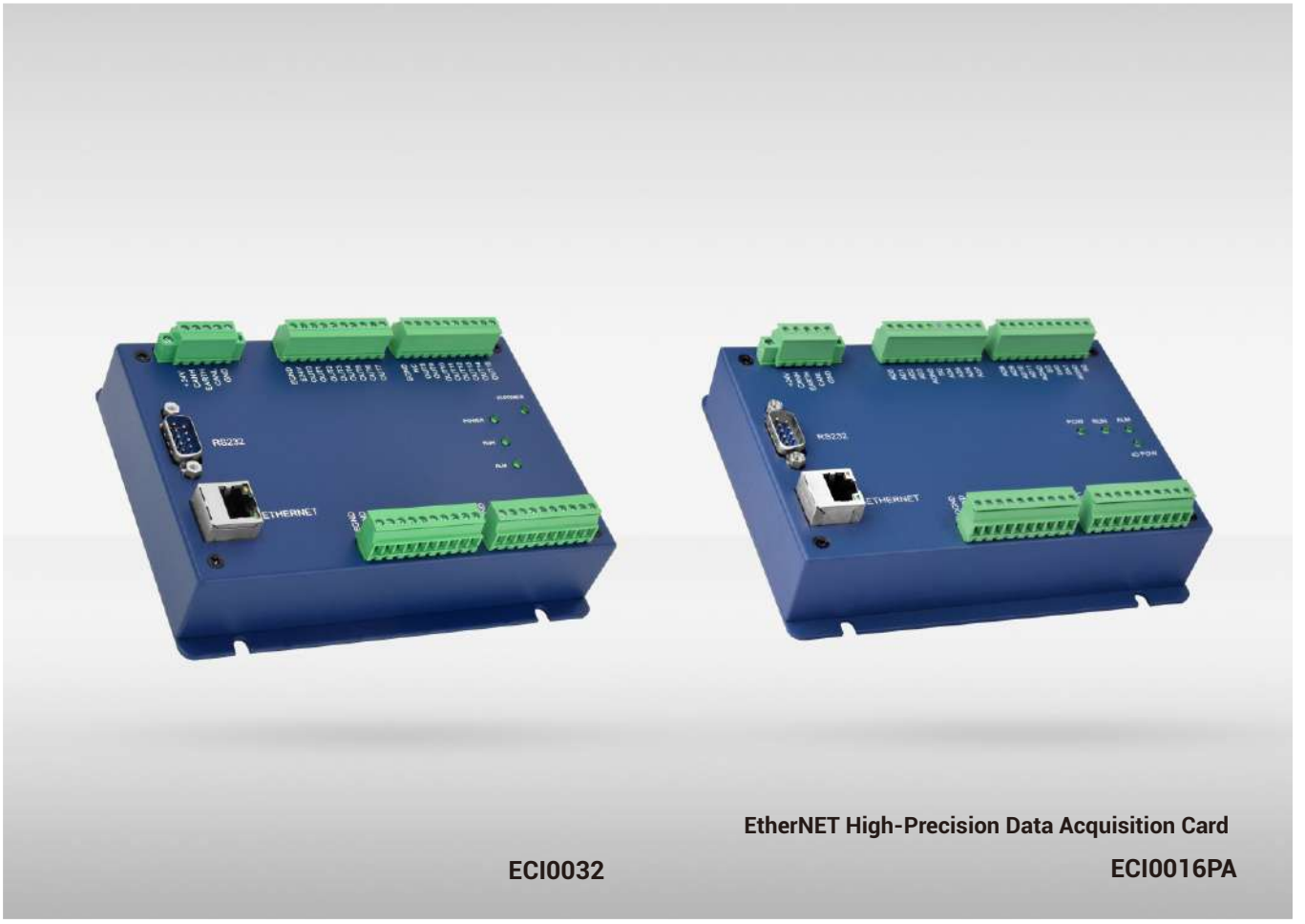
ECI2828-V2

Pulse & EtherNET Motion Control Card System Structure



EtherCAT & EtherNET Motion Control Card System Structure





ECI0032

EtherNET High-Precision Data Acquisition Card

ECI0016PA

ECI Network IO Card

ECI IO Card: Network IO control card, which supports IO and AIO expansion.

Functional Features

- IO: 16 INs & 16 OUTs (ECI0032), 32 INs & 32 OUTs (ECI0064),
- Communication: RS232, EtherNET
- Analog: support ZCAN expansion, max 128 ADs & 64 DAs.
- Functions:

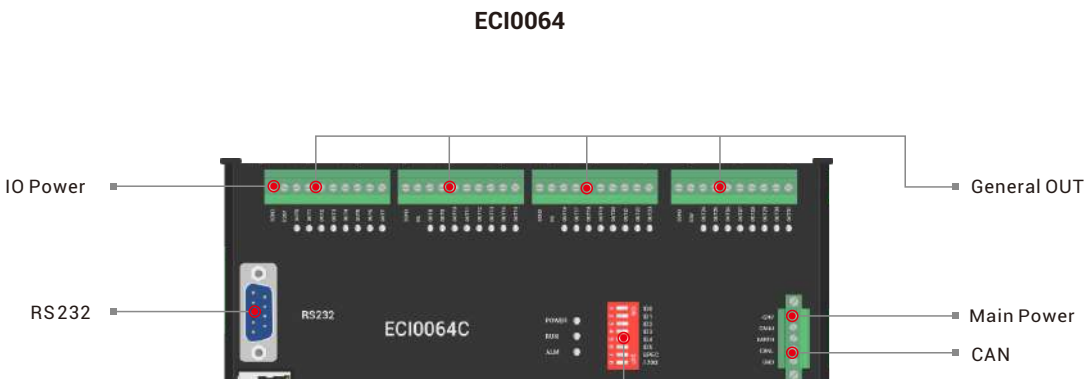
01. 256 digital inputs and 256 digital outputs can be expanded by CAN at the same time.
02. max output current can reach 300mA, which directly drive some solenoid valve.
03. support multi-file programming, PC program and controller inner program can work simultaneously.
04. a variety of encryption methods to protect your program.
05. it can be used for ZCAN slave station expansion.

Models

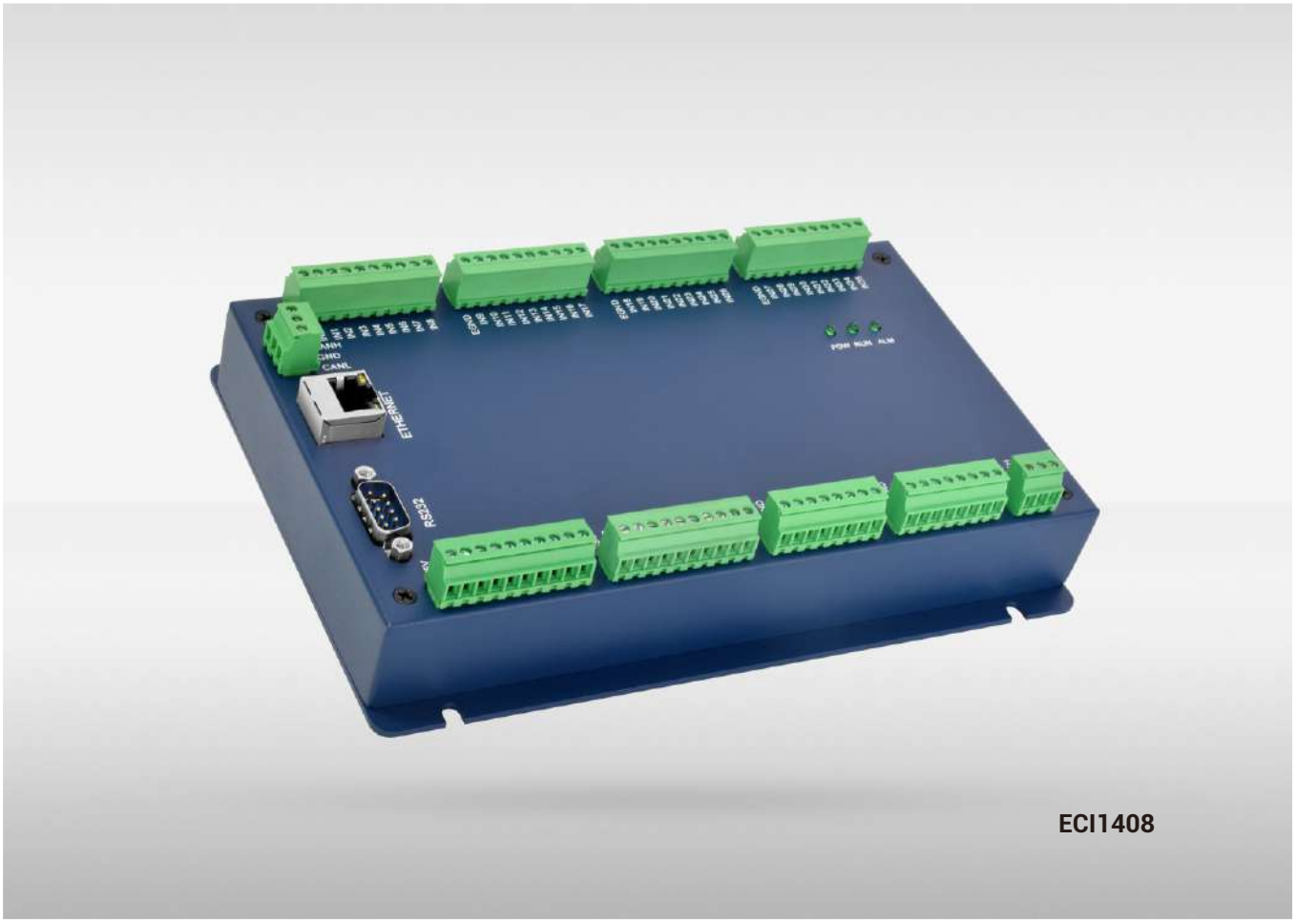
Model	Image	Axis	Encoder	Inner IN & OUT	Inner AD	Inner DA	Axis Motion Buffer	Space	Task	232	422	485	NET	USB	Size (mm)	Functional Description
ECI0016PA		0	0	8/8	12 16bit	2 12bit	-	3k	3	1	-	-	1	-	150*114	8 IN & 8 OUT (with over-current protection)
ECI0032		0	0	16/16	-	-	-	3k	2	1	-	-	1	-	150*114	16 IN & 16 OUT (with over-current protection)
ECI0032B		0	0	16/16	-	-	-	3k	2	1	-	-	1	-	150*114	16 IN & 16 OUT (with over-current protection) can run offline
ECI0064		0	0	32/32	-	-	-	3k	1	1	-	-	1	-	192*129	32 IN & 32 OUT (with over-current protection)
ECI0064B		0	0	32/32	-	-	-	3k	2	1	-	-	1	-	192*129	32 IN & 32 OUT (with over-current protection) can run offline
ECI0064C		0	0	32/32	-	-	-	3k	1	1	-	-	1	-	194*110	32 IN & 32 OUT (with over-current protection) can run offline

Interfaces

ECI0064



ECI0064C



ECI1000 Series Card

ECI1000 economical multi-axis motion control card is one pulse network card. Itself supports max 4 axes, 6 axes motion control can be extended to realize simple control, linear, circular, helical interpolation, etc.

Applications: within 6 pulse axes -- electronic semiconductor equipment (detection, assembly, locking, soldering), dispensing equipment, assembly line, etc.

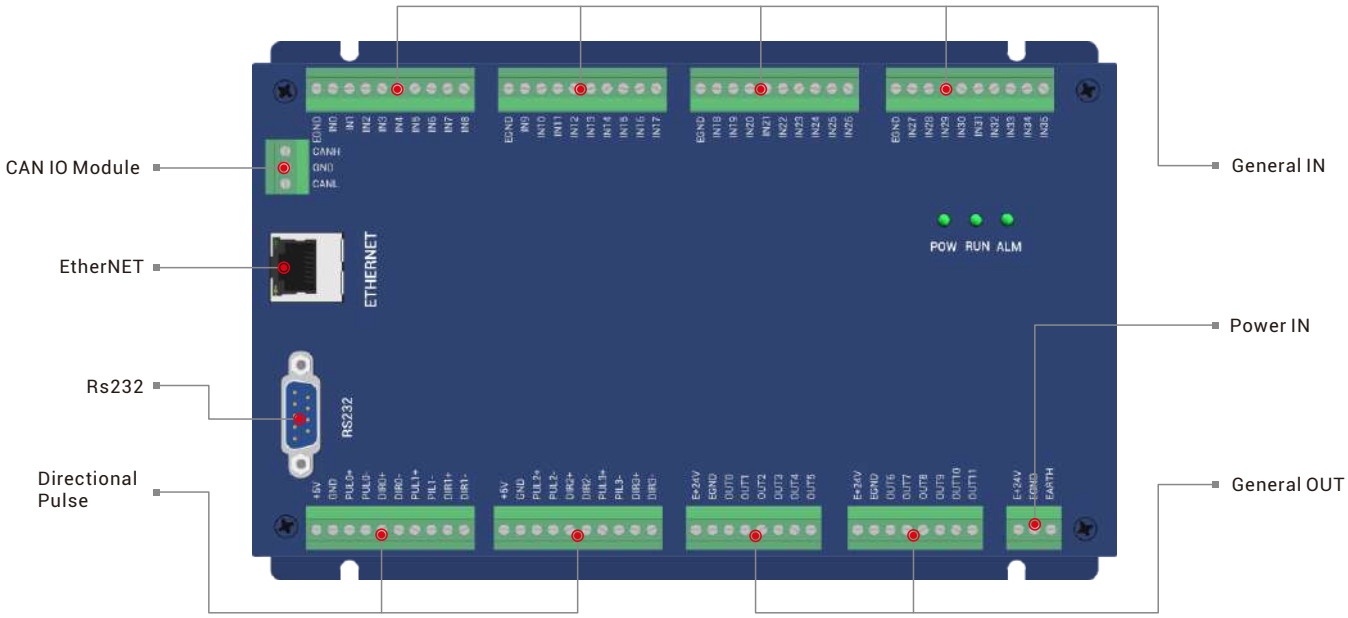
Functional Features

- Axis: up to 6-axis (include virtual-axis)
- IO: up to 36 INs & 12 OUTs
- Communication: RS232, EtherNET
- Analog: support ZCAN expansion, max 128 ADs & 64 DAs
- Pulse Mode: directional + pulse / dual-pulse
- Functions:
  - 01. support encoder input, which can be configured as handwheel mode.
  - 02. max 256 INs & 256 OUTs can be expanded by CAN synchronously.
  - 03. axis position limit, origin signal can be configured as any IN.
  - 04. max output current is 300mA, it can directly drive some solenoid valve.
  - 05. support electronic cam & gear, position latch, synchronization, virtual axis
  - 06. support multi-file & multi-task.
  - 07. a variety of encryption methods to protect user's program.
- Performance:
  - 01. max pulse output frequency can reach 5MHz.
  - 02. support up to 6 axes for linear, circular, helical interpolation.
  - 03. support multi-machine independent continuous interpolation.

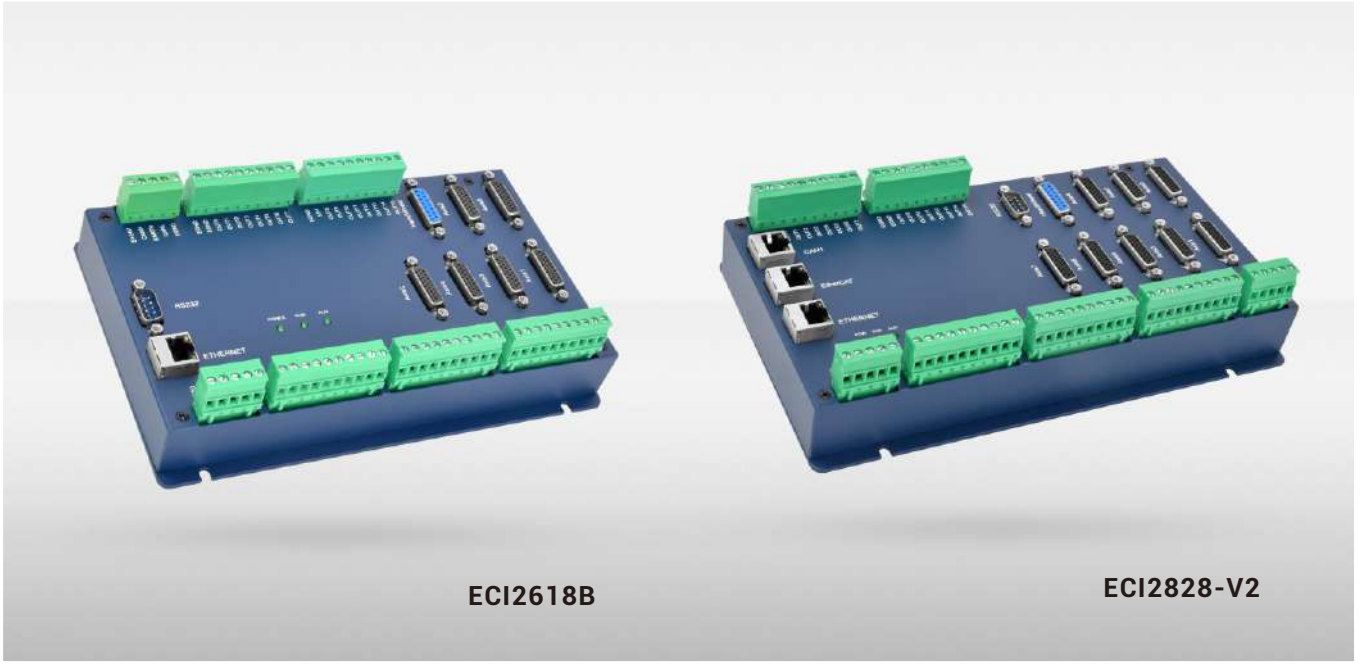
Models

Model	Image	Axis	Encoder	Pulse Frequency	Inner IN and OUT	Inner AD	Inner DA	Axis Motion Buffer	Space	Task	232	422	485	NET	USB	Size (mm)	Functional Description
ECI1408		4	2 (24V)	5M	36/12	-	-	128	3k	1	1	-	-	1	-	205*138	point, line, arc, cam, continuous interpolation

Interfaces



ECI1408



EtherCAT

ECI2000 -- Pulse

ECI2000 economical multi-axis motion control card is one pulse and modular type network card. Itself supports max 6 axes, 12 axes motion control can be extended to realize simple control, linear, circular, helical interpolation, etc.

Functional Features

- Axis: up to 12-axis (include virtual-axis)
- IO: up to 30 INs & 20 OUTs
- Communication: RS232, EtherNET
- Analog: support ZCAN expansion, max 128 ADs & 64 DAs
- Pulse Mode: directional + pulse / dual-pulse
- Functions:
  - 01. support encoder input, which can be configured as handwheel mode.
  - 02. max 256 INs & 256 OUTs synchronously can be expanded by ZCAN.
  - 03. axis position limit, origin signal can be configured as any IN.
  - 04. max output current is 300mA, it can directly drive some solenoid valve.
  - 05. support electronic cam & gear, position latch, synchronization, virtual axis.
  - 06. support multi-file & multi-task programming.
  - 07. a variety of encryption methods to protect user's program.
- Performance:
  - 01. max pulse output frequency can reach 10MHz.
  - 02. support up to 12 axes for linear, circular, helical interpolation.
  - 03. support multi-machine independent continuous interpolation.

ECI2000 -- EtherCAT

ECI2828-V2 Series economical multi-axis motion control card is one bus and modular type network card. Itself supports max 8 axes, 16 axes motion control can be extended to realize simple control, linear, circular, helical interpolation, etc.

Functional Features

- Axis: up to 16-axis (include virtual-axis)
- IO: up to 40 INs & 32 OUTs
- Communication: RS232, EtherNET, EtherCAT
- Analog: support ZCAN expansion, max 128 ADs & 128 DAs
- Pulse Mode: directional + pulse / dual-pulse
- Functions:
  - 01. support encoder input, which can be configured as handwheel mode.
  - 02. max 1024 INs & 1024 OUTs synchronously can be expanded by ZCAN.
  - 03. axis position limit, origin signal can be configured as any IN.
  - 04. max output current is 300mA, it can directly drive some solenoid valve.
  - 05.electronic cam & gear, position latch, synchronization, virtual axis.
  - 06. support multi-file & multi-task programming.
  - 07. a variety of encryption methods to protect user's program.
- Performance:
  - 01. max pulse output frequency can reach 10MHz.
  - 02. support up to 16 axes for linear, circular, helical interpolation.
  - 03. support multi-machine independent continuous interpolation.

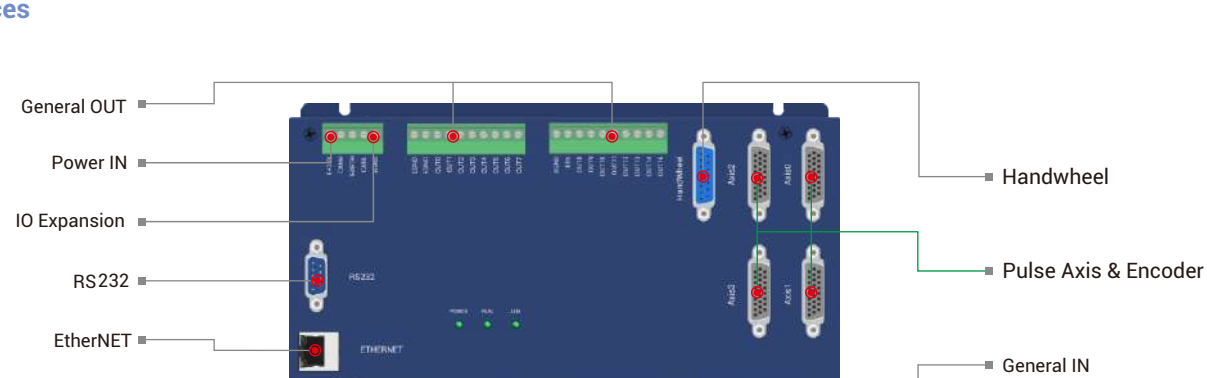
Applications: within 12 pulse axes -- electronic semiconductor equipment (detection, assembly, locking, soldering), dispensing equipment, assembly line, etc.

Models

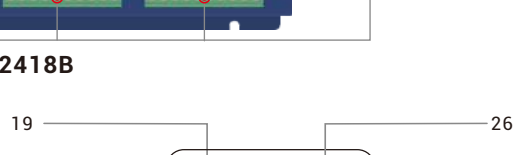
Model	Image	Axis	En coder	Hand wheel	Pulse Frequency	Inner IN and OUT	Inner AD	Inner DA	Axis Motion Buffer	Space	Task	232	ECAT	NET	USB	Size (mm)	Functional Description
ECI2408		4	4	-	10M	24+4/8+4	-	-	128	4k	2	1	-	1	-	201*134	point, line, arc, cam, continuous interpolation
ECI2608		6	6	-	10M	24+6/8+6	-	-	128	4k	2	1	-	1	-	201*134	point, line, arc, cam, continuous interpolation
ECI2418B		4	4	1	10M	24+8/16+4	2	2	128	4k	3	1	-	1	-	220*139	point, line, arc, cam, continuous interpolation
ECI2618B		6	6	1	10M	24+12/16+6	2	2	128	4k	3	1	-	1	-	220*139	point, line, arc, cam, continuous interpolation
ECI2A18B		10	6	1	10M	24+12/16+6	2	2	128	4k	1	1	-	1	-	220*139	point, line, arc, cam, continuous interpolation
ECI2618BL5/L24		6	6	1	10M	24+12/16+6	2	2	128	4k	1	1	-	1	-	220*139	point, line, arc, cam, continuous interpolation
ECI2A18BL5/L24		10	6	1	10M	24+12/16+6	2	2	128	4k	1	1	-	1	-	220*139	point, line, arc, cam, continuous interpolation
ECI2828-V2		8	8	1	10M	24+16/16+16	2	2	512	128k	2	1	1	1	-	245*139	point, line, arc, cam, continuous interpolation

Note: models of ECI2418B, ECI2618B, ECI2A18B, ECI2618BL, ECI2828-V2. + HW means they support precision control, for fly-shooting, precision dispensing, etc.

Interfaces



ECI2418B



PIN No.	Name	Description
1	H-5V	Power for Handwheel
2	HA-	Encoder A
3	HB-	Encoder B
4	HEMGN	Emergency Stop
5	NC	-
6	HX1	Select X1 Ratio
7	HX10	Select X10 Ratio
8	HX100	Select X100 Ratio
9	HSU	Select Axis 3
10	NC	-
11	EGND	External Power Ground
12	NC	-
13	HSZ	Select Axis 2
14	HSY	Select Axis 1
15	HSX	Select Axis 0

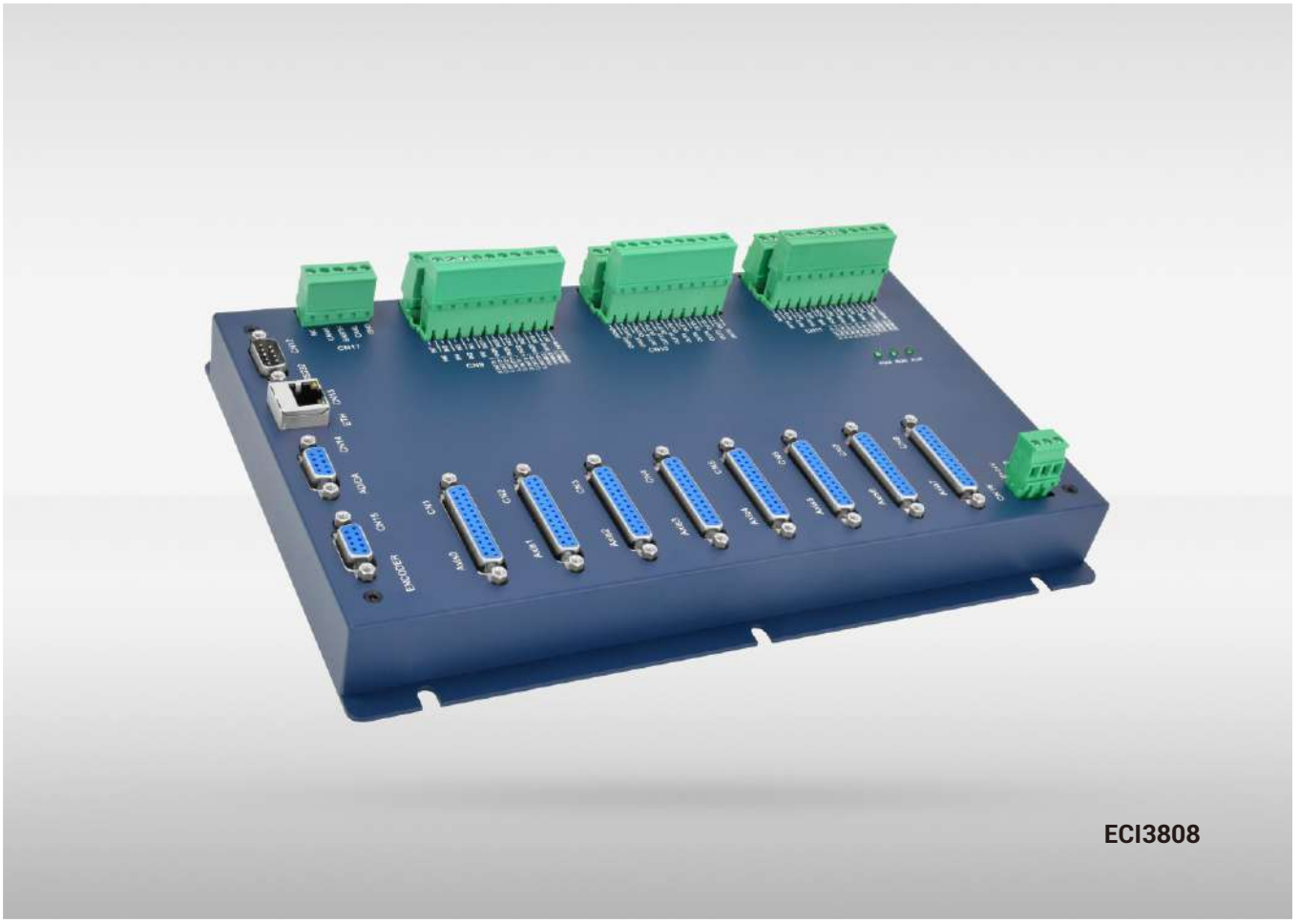
PIN No.	Name	Description
1	EGND	External Power Ground
2	IN24-29/ALM	IN, better do Drive Alarm
3	OUT16-21/ENABLE	OUT, better do Drive Enable
4	EA-	Encoder Input
5	EB-	Encoder Input
6	EZ-	Encoder Input
7	+5V	Power Output
8	Reserved	Reserved
9	DIR+	Servo/Stepper Directional Out
10	GND	Digital Ground
11	PUL-	Servo/Stepper Pulse Out
12	Reserved	Reserved
13	GND	Digital Ground

PIN No.	Name	Description
14	OVCC	+24V Out - better only Servo IO
15	Reserved	Reserved
16	IN30-35/INP0S	IN (better do on-position)
17	EA+	Encoder Input
18	EB+	Encoder Input
19	EZ+	Encoder Input
20	GND	Digital Ground
21	GND	Digital Ground
22	DIR-	Servo/Stepper Directional Out
23	PUL+	Servo / Stepper Pulse Output
24	GND	Digital Ground
25	Reserved	Reserved
26	Reserved	Reserved

◭ Handwheel (DB15 Female Head) **ECI2418B / ECI2618B**

◭ Pulse & Encoder (DB26 Female Head) **ECI2418B / ECI2618B**

Note: refer to "User Manual" for more models and details.



ECI3000 Series

ECI3000 economical multi-axis motion control card is one pulse type network card. Itself supports max 8 axes, 12 axes motion control can be extended to realize simple control, linear, circular, helical interpolation, etc.

Applications: within 10 pulse axes -- electronic semiconductor equipment (detection, assembly, locking, soldering), dispensing equipment, assembly line, etc.

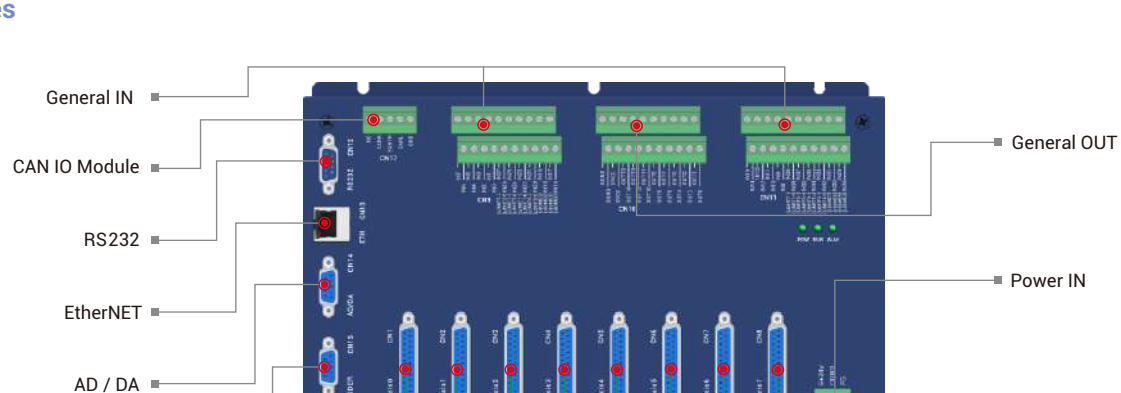
Functional Features

- Axis: up to 12-axis (include virtual-axis)
- IO: up to 48 INs & 32 OUTs
- Communication: RS232, EtherNET
- Analog: up to 4 ADs & 2 DAs, max 128 ADs & 64 DAs by ZCAN
- Pulse Mode: directional + pulse / dual-pulse
- Functions:
  - 01. support encoder input, which can be configured as handwheel mode.
  - 02. max 256 INs & 256 OUTs synchronously can be expanded by ZCAN.
  - 03. axis position limit, origin signal can be configured as any IN.
  - 04. max output current is 300mA, which can directly drive some solenoid valve.
  - 05. support electronic cam, electronic gear, position latch, synchronous follow, virtual axis, etc.
  - 06. support multi-file & multi-task programming.
  - 07. a variety of encryption methods to protect user's program.
- Performance:
  - 01. max pulse output frequency can reach 10MHz.
  - 02. support up to 12 axes for linear, circular, helical interpolation.
  - 03. support multi-machine independent continuous interpolation.

Models

Model	Image	Axis	En-coder	Pulse Frequency	Inner IN and OUT	Inner AD	Inner DA	Axis Motion Buffer	Space	Task	232	422	485	NET	USB	Size (mm)	Functional Description
ECI3608		6	6+1	10M	40+6/16+12	4	2	128	4k	1	1	-	-	1	-	292*188	point, line, arc, cam, continuous interpolation, robotic arm commands
ECI3808		8	8+1	10M	40+8/16+16	4	2	128	4k	1	1	-	-	1	-	292*188	point, line, arc, cam, continuous interpolation, robotic arm commands

Interfaces



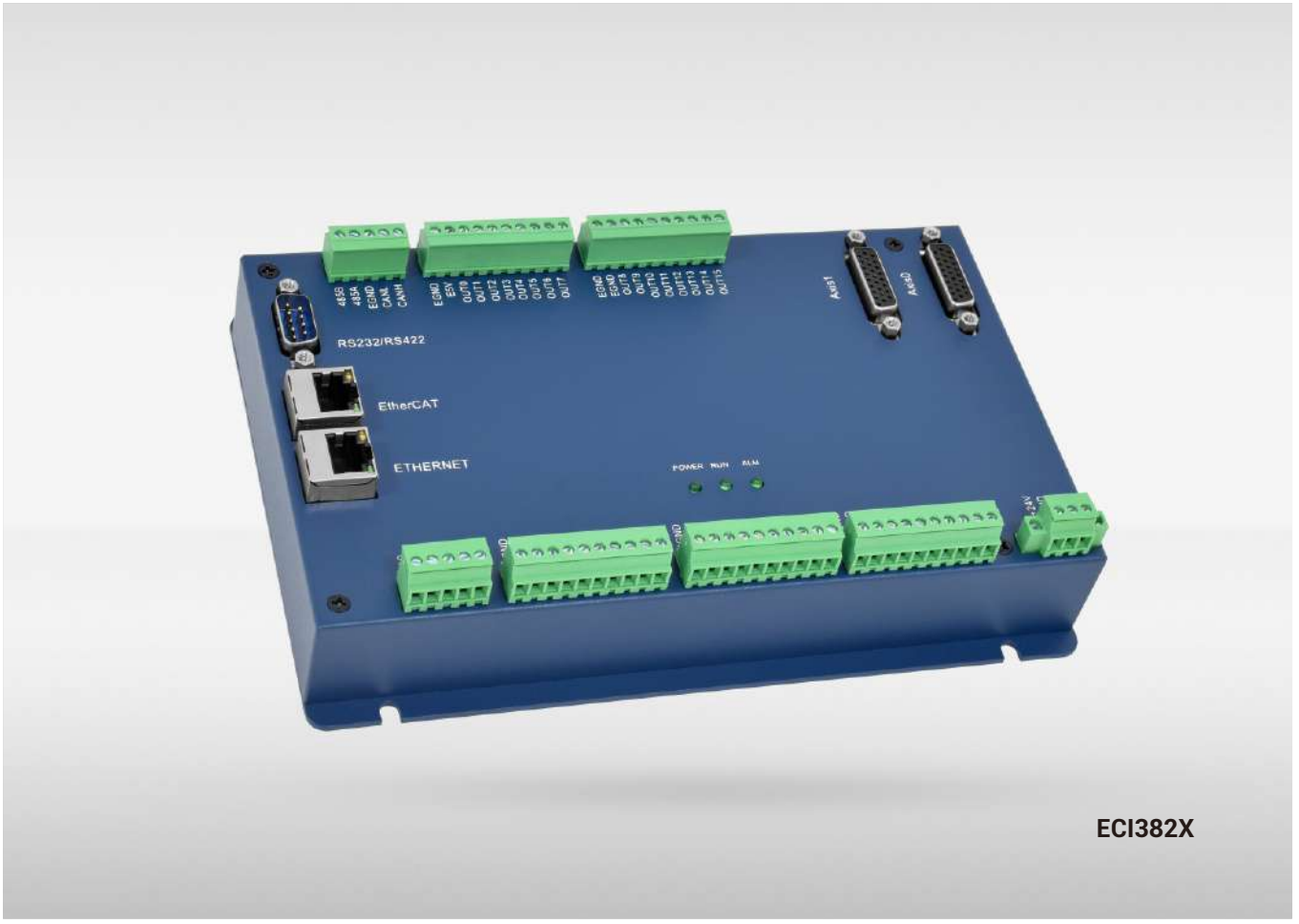
ECI3808

PIN No.	Name	Description
1	EGND	External Power Ground
2	IN40-47/ALM	General IN, better do Drive Alarm
3	OUT16 18.../ENABLE	OUT, better do Drive Enable
4	EA-	Encoder A -
5	EB-	Encoder B -
6	EZ-	Encoder Z -
7	Internal +5V Power	Internal +5V Power
8	Reserved	Reserved
9	DIR+	Directional Differential +
10	GND	Internal 0V
11	PUL-	Pulse Differential -
12	Reserved	Reserved

PIN No.	Name	Description
13	GND	Internal 0V
14	OVCC	+24V
15	OUT17 19.../CLR	OUT, better do Drive Alarm Clear
16	Reserved	Reserved
17	EA+	Encoder A +
18	EB+	Encoder B +
19	EZ+	Encoder Z +
20	GND	Internal 0V
21	GND	Internal 0V
22	DIR-	Directional Differential -
23	PUL+	Pulse Differential +
24	GND	Internal 0V
25	Reserved	Reserved

Pulse & Encoder (DB25 Female Head) **ECI3000 Series**

Note: refer to "User Manual" for more models and details.



ECI382X Card -- EtherCAT

ECI382X economical multi-axis motion control card is one bus and modular type network card. There are 4-12 axes for point, linear, circular, helical interpolation, etc., and it supports PSO function for vision fly-shooting, dispensing control, laser energy control.

Applications: within 12 axes (pulse & bus) -- 3C electronics, semiconductor equipment, dispensing equipment, non-standard equipment, etc.

Functional Features

- Axis: 4-12 axes
- IO: 26 INs & 18 OUTs
- Communication: RS232, EtherNET, EtherCAT
- Analog: 2 ADs & 2 DAs, max 256 ADs & 128 DAs after expansion
- Pulse Mode: directional + pulse / dual-pulse
- Functions:

  01. EtherCAT synchronized period is 1ms.
  02. support encoder input, which can be configured as handwheel mode.
  03. max 256 isolated INs & 256 isolated OUTs can be expanded by EtherCAT synchronously .
  04. max output current is 300mA, which can directly drive some solenoid valve.
  05. support electronic cam & gear, position latch, synchronous follow, virtual axis, etc.
  06. axis position limit, origin signal can be configured as any IN.
  07. a variety of encryption methods to protect user's program.

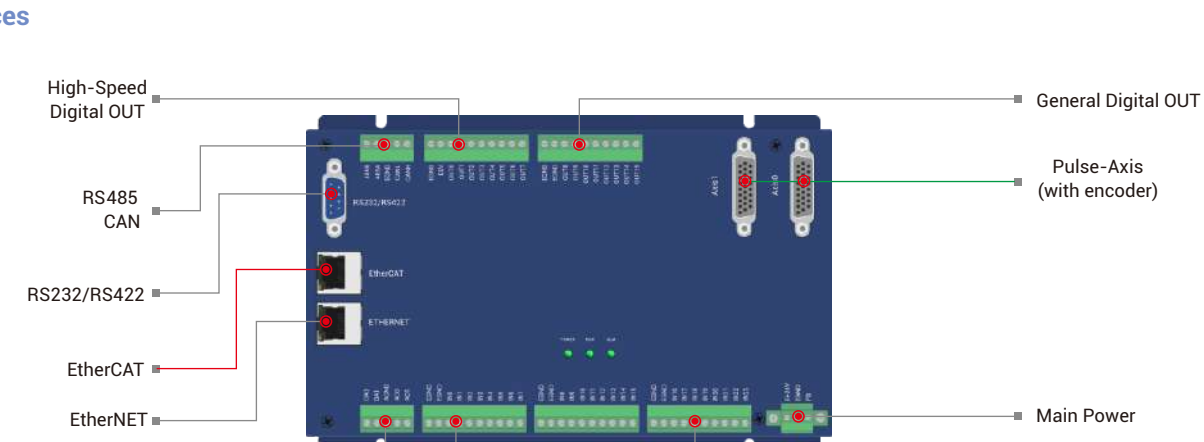
- Performance:

  01. max pulse output frequency can reach 10MHz.
  02. support up to 16 axes (include virtual-axis) for linear interpolation, circular, interpolation, helical interpolation, continuous interpolation.
  03. support 1D/2D/3D PSO function for vision fly-shooting, dispensing control, laser energy control.

Models

Model	Image	Axis	En-coder	Total Axes	Pulse Fre quency	Inner IN and OUT	Inner AD	Inner DA	Axis Motion Buffer	Space	Task	232	422	485	NET	Size (mm)	Functional Description
ECI3428		4	2+2	16	10M	24+2/16+2	2	2	512	128k	1	1	1	1	1	205*135	point, line, arc, cam, continuous interpolation,
ECI3628		6	2+2	16	10M	24+2/16+2	2	2	512	128k	1	1	1	1	1	205*135	point, line, arc, cam, continuous interpolation,
ECI3828		8	2+2	16	10M	24+2/16+2	2	2	512	128k	1	1	1	1	1	205*135	point, line, arc, cam, continuous interpolation,
ECI3A28		10	2+2	16	10M	24+2/16+2	2	2	512	128k	1	1	1	1	1	205*135	point, line, arc, cam, continuous interpolation,
ECI3C28		12	2+2	16	10M	24+2/16+2	2	2	512	128k	1	1	1	1	1	205*135	point, line, arc, cam, continuous interpolation,

Interfaces



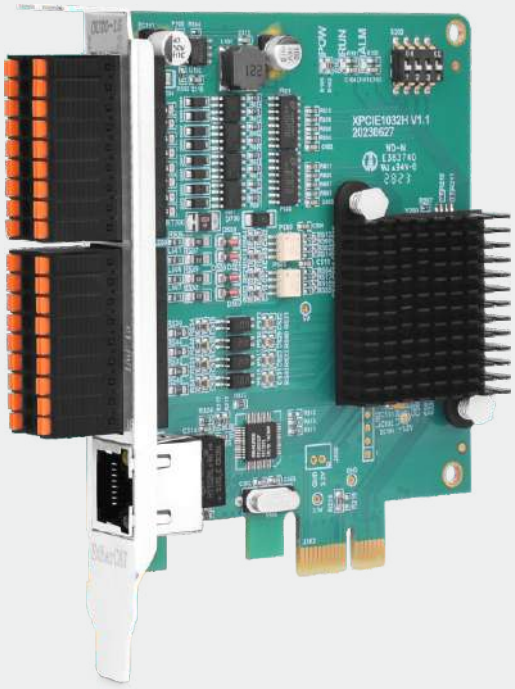
PIN No.	Name	Description
1	EGND	External Power Ground
2	IN24.../ALM	General IN, better do Drive Alarm
3	OUT16.../ENABLE	General OUT, better do Drive Enable
4	EA-	Encoder Input
5	EB-	Encoder Input
6	EZ-	Encoder Input
7	+5V	Internal +5V Power Output
8	Reserved	Reserved
9	DIR+	Servo/Stepper Directional Out
10	GND	Internal Power Ground
11	PUL-	Servo/Stepper Pulse Out
12	Reserved	Reserved
13	GND	Internal Power Ground

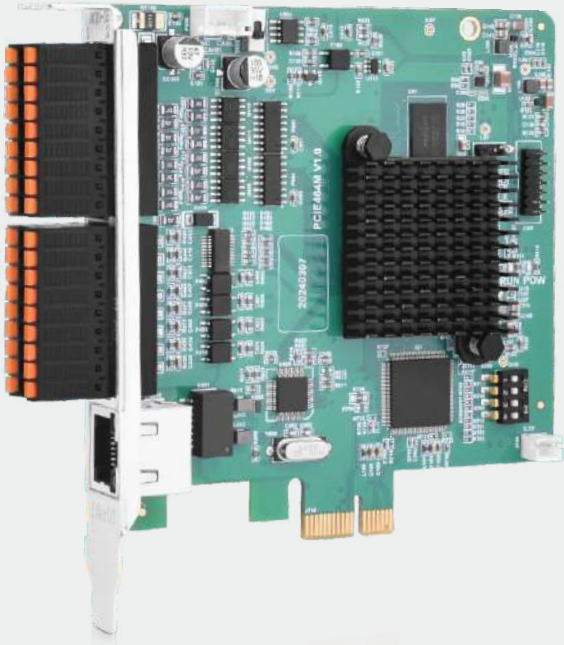
PIN No.	Name	Description
14	OVCC	E24V Output (better only for Servo IO)
15	Reserved	Reserved
16	Reserved	Reserved
17	EA+	Encoder Input
18	EB+	Encoder Input
19	EZ+	Encoder Input
20	GND	Internal Power Ground
21	GND	Internal Power Ground
22	DIR-	Servo/Stepper Directional Out
23	PUL+	Servo/Stepper Pulse Out
24	GND	Internal Power Ground
25	Reserved	Reserved
26	Reserved	Reserved

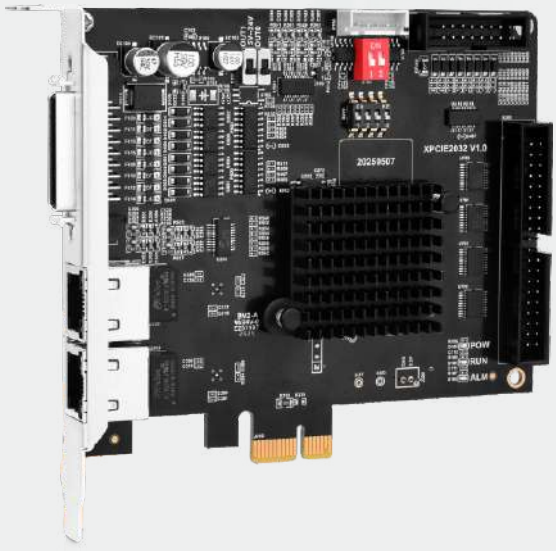
▲ Pulse & Encoder (DB26 Female Head)

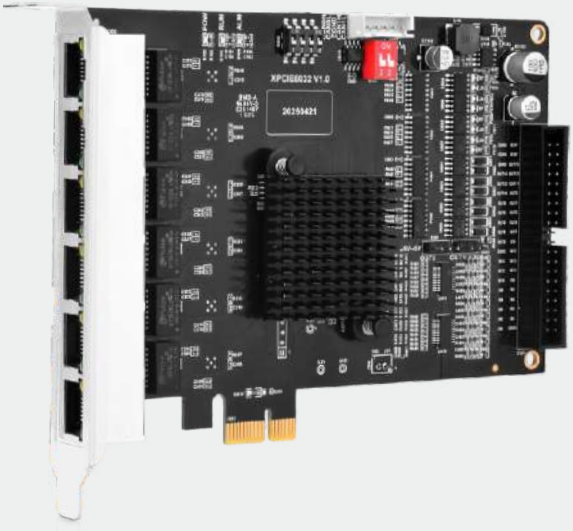
Note: refer to "User Manual" for more models and details.

PC-based Motion Control Card



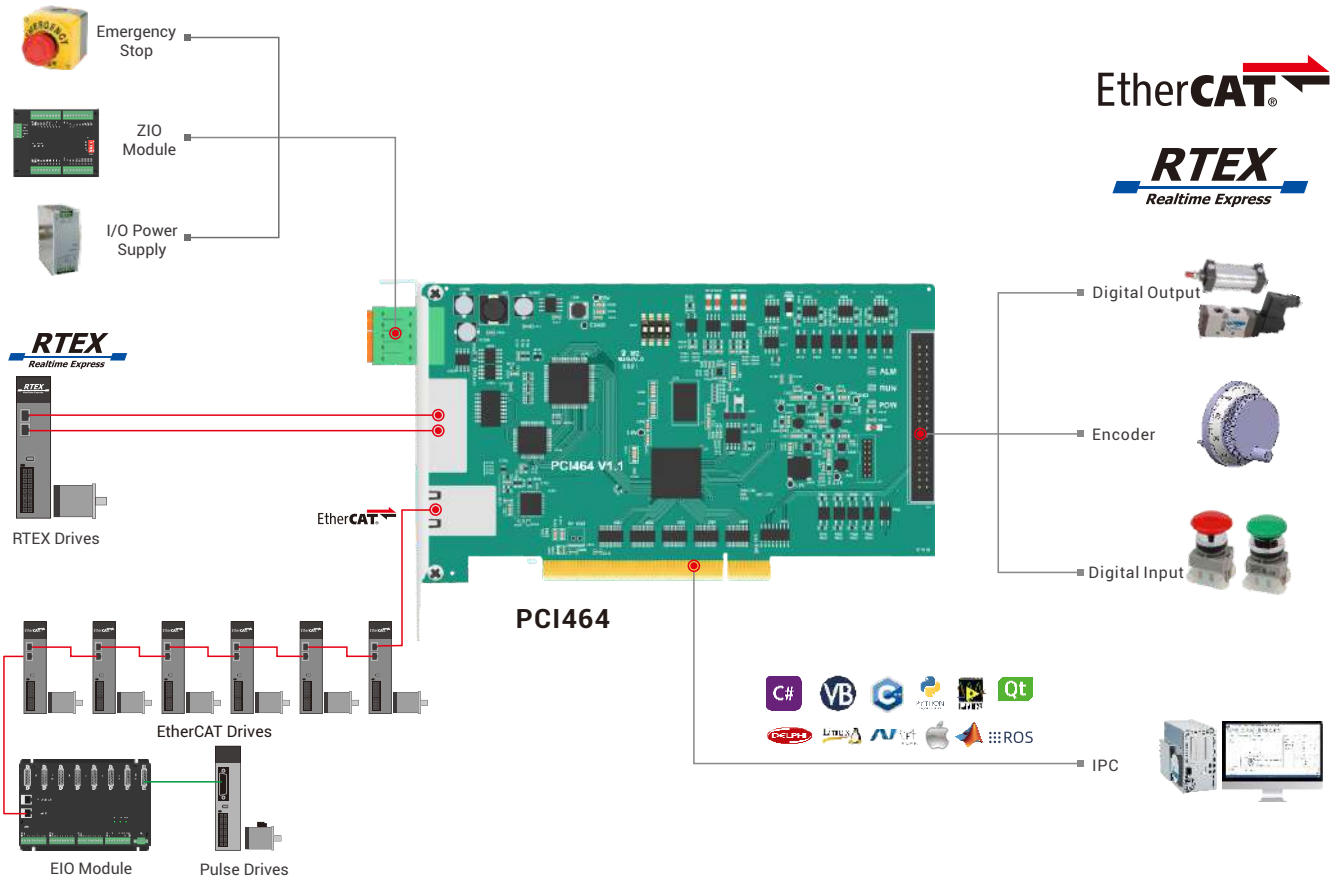




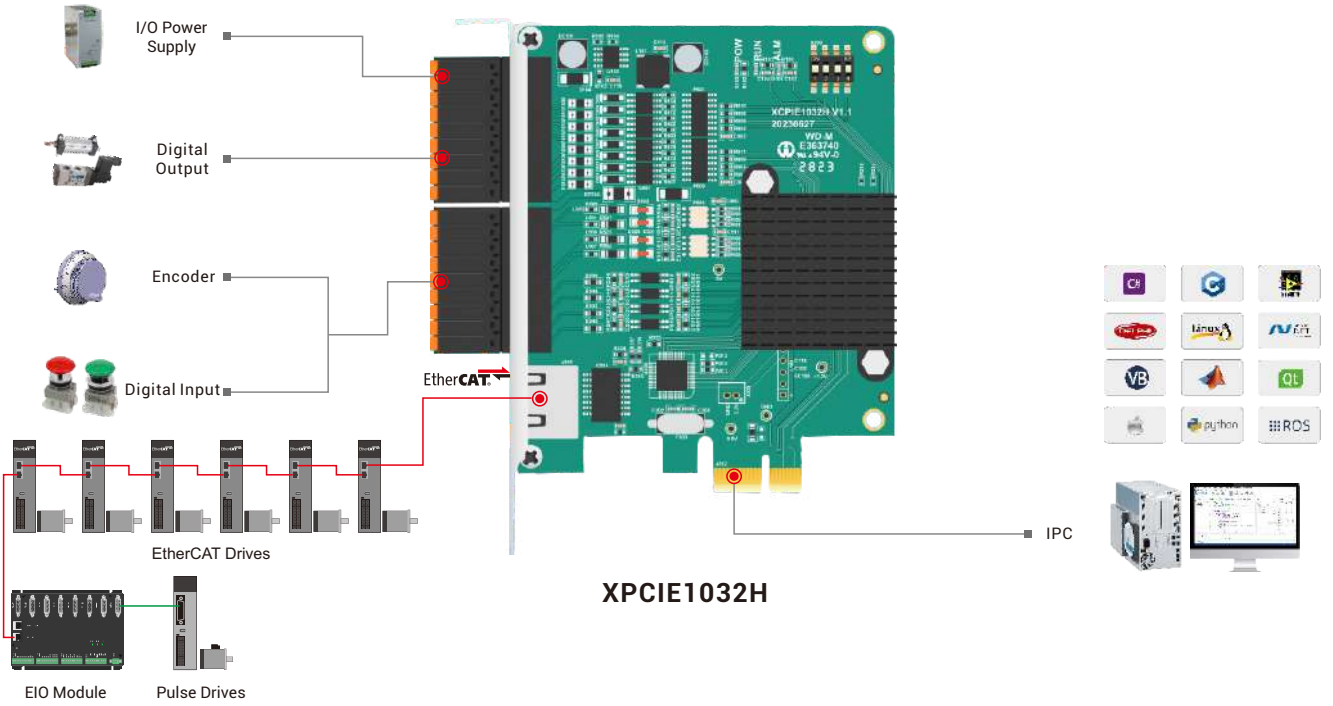


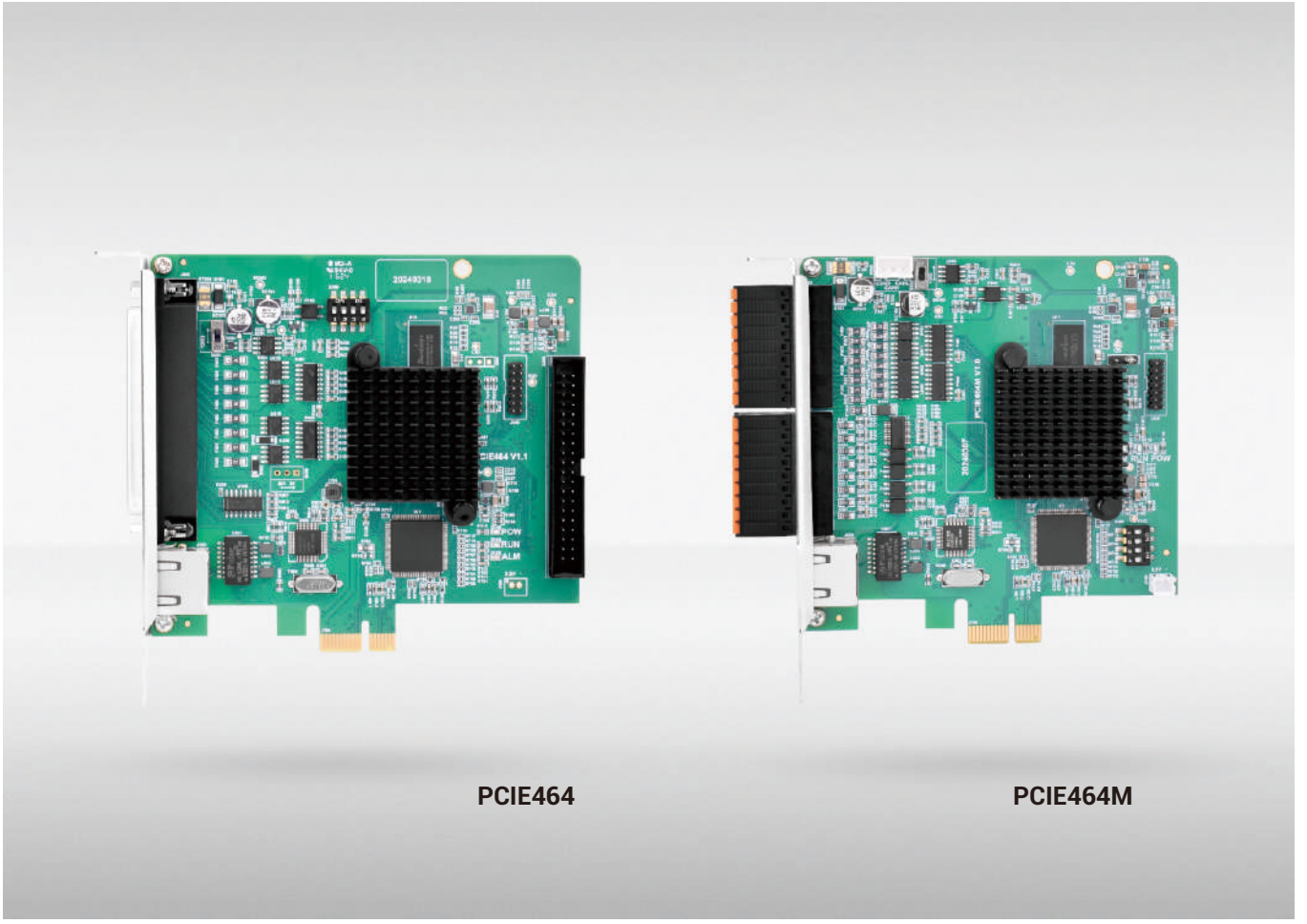
XPCIE1032H / PCIE464M / XPCIE2032H / XPCIE6032H

PCI Bus Control Card System Diagram



XPCIE EtherCAT Control Card System Diagram





PCIE464 PCIE464M

PCIE464

EtherCAT

PCIE464 motion control card is one EtherCAT and pulse type card that is with PCIE interface. It can control several stepper motors or digital servo motors. And it can achieve many functions, multi-axis point motion, interpolation, handwheel control, encoder position detection, IO control, position latch, etc.

Applications: high-speed & high-precision -- 3C electronics, detection equipment, semiconductor equipment, SMT processing, laser, optical communication equipment, lithium & photovoltaic, non-standard automatic equipment, etc.

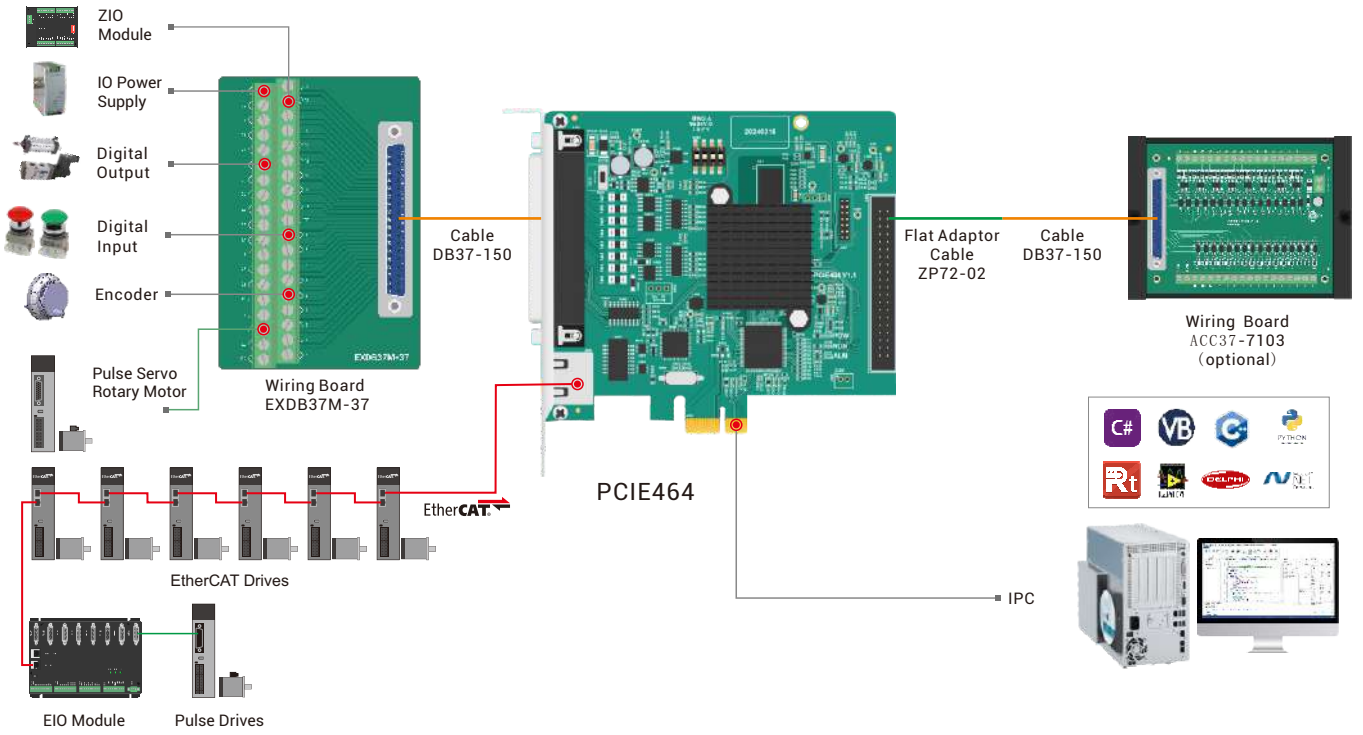
Functional Features

- Axis: 64 axes (EtherCAT)
- IO: 8 INs & 8 OUTs (more IO, please use with ACC37 together)
- Communication: PCIe
- Analog: max 128 ADs & 64 DAs after ZCAN expansion
- Pulse Mode: directional + pulse / dual-pulse
- Functions:
  - 01. support encoder input, which can be configured as handwheel mode.
  - 02. max 4096 INs & 4096 OUTs can be reached by EtherCAT / CAN.
  - 03. axis position limit, origin signal can be configured as any IN.
  - 04. max output current is 300mA, which can directly drive some solenoid valve.
  - 05. electronic cam & gear, position latch, synchronous follow, virtual axis, etc.
  - 06. support RTBasic multi-task running (real-time program).
    support card inner C language real-time program running.
  - 07. PSO modes: high-speed vision fly shooting, dispensing, laser, etc.
  - 08. "power-off storage": encryption & protect user's program.
  - 09. valid operation systems: Windows7, Windows10, Windows11, Linux.
- Performance:
  - 01. 16-axis EtherCAT fastest refresh cycle is 100μs.
  - 02. max pulse output frequency can reach 10MHz.
  - 03. support max 16 axes for linear, circular, helical, elliptical interpolation.
  - 04. support multi-machine independent continuous interpolation.
  - 05. support hybrid interpolation of EtherCAT + pulse axes.

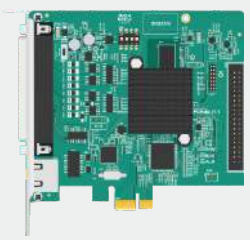
Models

Model	Image	Axis	En coder	Pulse Fre-quency	Inner IN & OUT	Program Space	PWM	High-Speed Latch	High-Speed HW	Motion Buffer	ECAT	Size (mm)	Functions
PCIE464-AX16		16	3	10M/500k	8+16/8+16	1920k	8	4	8	4096	1	144*120	point motion, cam, linear, circular, continuous interpolation, robotic arm.
PCIE464-AX32		32	3	10M/500k	8+16/8+16	1920k	8	4	8	4096	1	144*120	point motion, cam, linear, circular, continuous interpolation, robotic arm.
PCIE464-AX64		64	3	10M/500k	8+16/8+16	1920k	8	4	8	4096	1	144*120	point motion, cam, linear, circular, continuous interpolation, robotic arm.
PCIE464M-AX16		16	3	500kHz	16/16	1920k	4	4	12	4096	1	105*120	point motion, cam, linear, circular, continuous interpolation, robotic arm.
PCIE464M-AX32		32	3	500kHz	16/16	1920k	4	4	12	4096	1	105*120	point motion, cam, linear, circular, continuous interpolation, robotic arm.
PCIE464M-AX64		64	3	500kHz	16/16	1920k	4	4	12	4096	1	105*120	point motion, cam, linear, circular, continuous interpolation, robotic arm.

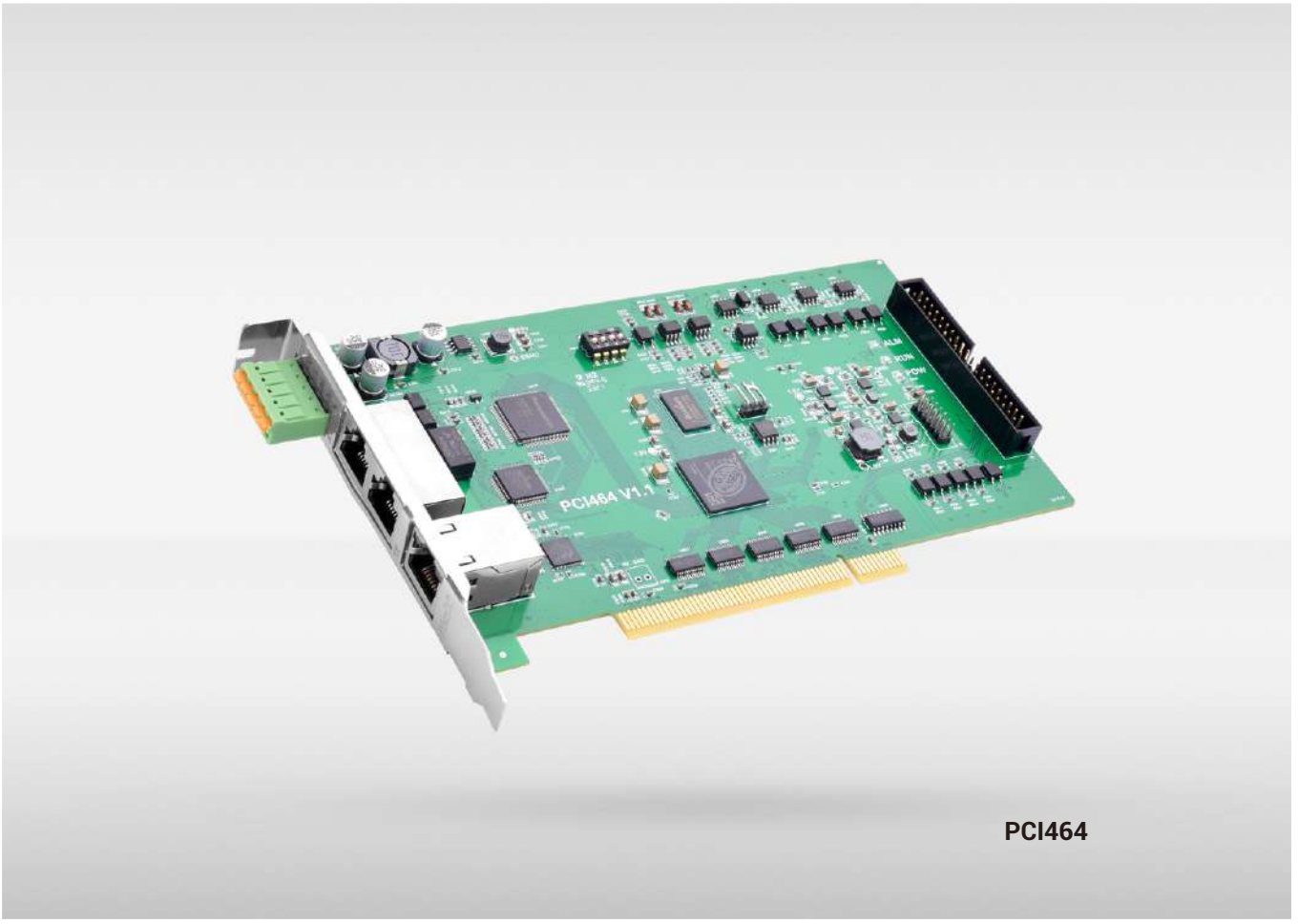
Interfaces



PCIE464 Motion Control Card Configuration Solution



Configuration	Name	Specification	Description	Image	Number
Optional Accessories for Expanding IO	Wiring Board	EXDB37M-37	DB 37 wiring board		1
	Shielded Cable	DB37-150	DB37 cable, chip male-to-male		2
	Wiring Board	ACC37-7103	16 IN & 16 OUT wiring board after changing from IDC40 to DB37		1
	Adapter Cable	ZP72-02	flat cable from 40P plug to DB37 female head		1



PCI464

PCI Bus Motion Control Card

EtherCAT RTEX Realtime Express

PCI high-performance multi-axis card is one bus type control card (EtherCAT & RTEX). Itself supports max 64 axes to realize complex continuous trajectory control, like, linear, circular, helical, elliptical interpolation.

Applications: robot (SCARA, Delta, 6-joint), electronic semiconductor equipment (detection, assembly, locking, soldering), dispensing, laser, non-standard, printing & packaging, textile & garment, stage entertainment equipment, medical equipment, assembly line, etc.

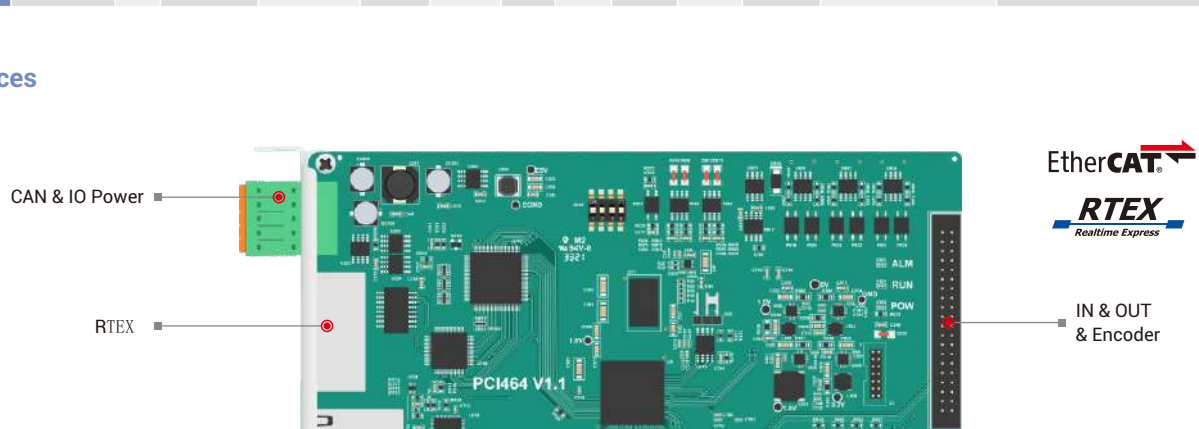
Functional Features

- Axis: 64 axes (EtherCAT), 32 axes (RTEX)
- IO: 8 INs & 8 OUTs
- Communication: PCI
- Analog: max 128 ADs & 64 DAs after ZCAN expansion
- Functions:
  - 01. support encoder input, which can be configured as handwheel mode.
  - 02. max 4096 INs & 4096 OUTs can be reached by EtherCAT / CAN.
  - 03. axis position limit, origin signal can be configured as any IN.
  - 04. max output current is 300mA, which can directly drive some solenoid valve.
  - 05. electronic cam & gear, position latch, synchronous follow, virtual axis, etc.
  - 06. support pulse closed-loop, pitch compensation.
  - 07. support multi-file & multi-task programming.
  - 08. a variety of encryption methods to protect user's program
  - 09. support power failure detection & power failure storage.
- Performance:
  - 01. 16-axis EtherCAT fastest refresh cycle is 100μs.
  - 02. support max 16 axes for linear, circular, helical, elliptical interpolation.
  - 03. support multi-machine independent continuous interpolation.
  - 04. support hybrid interpolation of EtherCAT/RTEX + pulse axes.

Models

Model	Image	Axis	Encoder	Inner IN and OUT	Axis Motion Buffer	Space	Task	Power Down Store	ECAT	RTEX	Size (mm)	Functional Description	Optional Acessories
PCI406E		6	1	8/8	512	1920k	22	8000	1	-	158*120	point, line, arc, cam, continuous interpolation, robot	adapter cable (ZP72-02) shielded cable (DB37-150) wiring board (EXDB37M-37)
PCI408E		8	1	8/8	512	1920k	22	8000	1	-	158*120	point, line, arc, cam, continuous interpolation, robot	adapter cable (ZP72-02) shielded cable (DB37-150) wiring board (EXDB37M-37)
PCI412E		12	1	8/8	512	1920k	22	8000	1	-	158*120	point, line, arc, cam, continuous interpolation, robot	adapter cable (ZP72-02) shielded cable (DB37-150) wiring board (EXDB37M-37)
PCI464-16		16	1	8/8	512	1920k	22	8000	1	1	158*120	point, line, arc, cam, continuous interpolation, robot	adapter cable (ZP72-02) shielded cable (DB37-150) wiring board (EXDB37M-37)
PCI464-32		32	1	8/8	512	1920k	22	8000	1	1	158*120	point, line, arc, cam, continuous interpolation, robot	adapter cable (ZP72-02) shielded cable (DB37-150) wiring board (EXDB37M-37)
PCI464		64	1	8/8	512	1920k	22	8000	1	1	158*120	point, line, arc, cam, continuous interpolation, robot	adapter cable (ZP72-02) shielded cable (DB37-150) wiring board (EXDB37M-37)

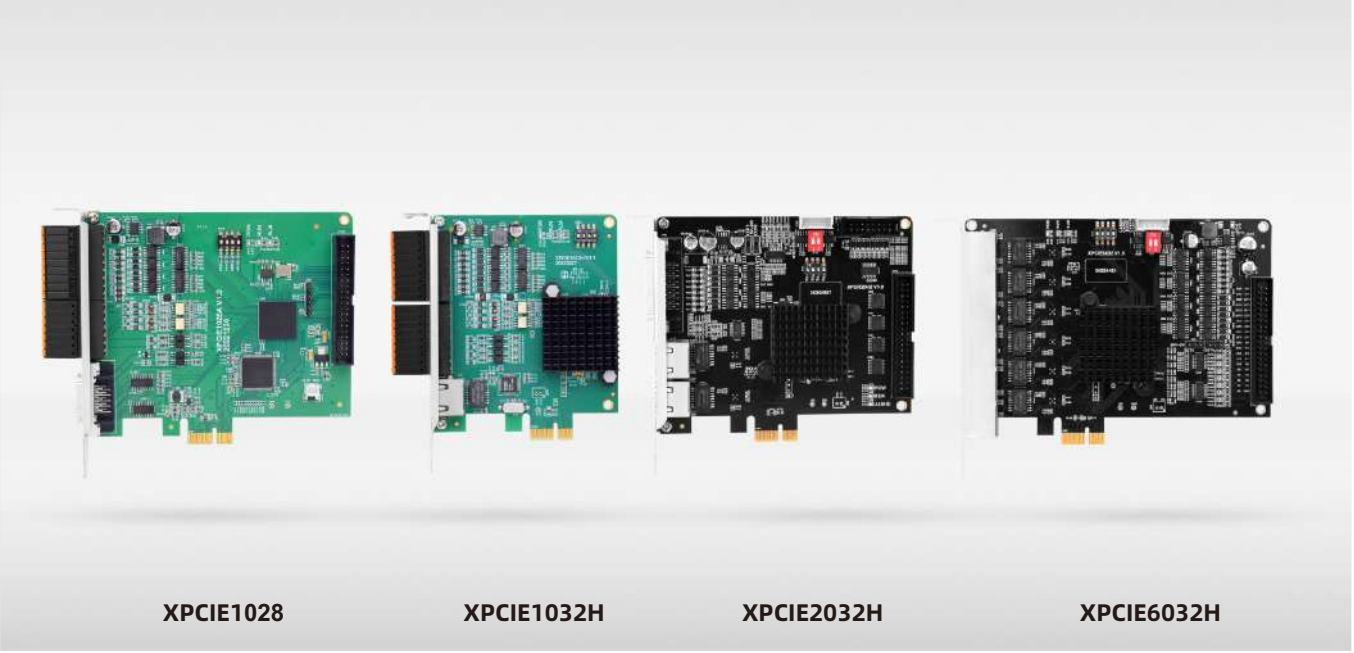
Interfaces



PCI464

PCI464 Motion Control Card Configuration Solution

Configuration	Name	Specification	Description	Image	Number
Optional Accessories for Expanding IO	Wiring Board	EXDB37M-37	Db37 wiring board		1
	Adapter Cable	ZP72-02	flat cable from 40P plug to DB37 female head		1
	Shielded Cable	DB37-150	DB37 cable, chip male-to-male		1



XPCIE Motion Control Card

XPCIE economical motion control card is one EtherCAT and pulse type card that is with PCIE interface. Itself supports 6-64 axes to achieve linear, circular, helical interpolation, electronic cam, electronic gear, synchronous follow, virtual axis, robot etc.

Applications: high-speed & high-precision -- 3C electronics, detection equipment, semiconductor equipment, SMT processing, laser, optical communication equipment, lithium & photovoltaic, non-standard automatic equipment, etc.

XPCIE1032H Function Features:

- Axis: max 64 axes (4 single-ended pulse outputs)
- IO: 16 INs / 16 OUTs
- Pulse Mode: directional + pulse
- Pulse Frequency: 500KHz
- Functions:
  - 01. EtherCAT communication, lowest synchronous period is 500us.
  - 02. max 4096 isolated inputs and 4096 isolated outputs by EtherCAT modules.
  - 03. encoder position measurement can be set as handwheel input mode.
  - 04. electronic cam, electronic gear, synchronous follow, virtual axis, etc.
  - 05. support linear, circular, helical interpolation.
  - 06. support several PC development languages, C#/C++/LabVIEW,etc.
  - 07. support multi-file & multi-task programming.
  - 08. a variety of encryption methods to protect user's program
  - 09. 1D/2D/3D PSO function for vision fly-shooting, dispensing & laser energy control.

XPCIE1028 Function Features:

- Axis: 4 axes (1 differential pulse OUT + 3 single-ended pulse OUTs)
- IO: 12+18 INs / 16+18 OUTs
- Pulse Mode: directional + pulse / dual-pulse
- Pulse Frequency: 10MHz/500KHz
- Functions:
  - 01. specialized for optical / disk screening machine.
  - 02. 16 hardware position comparison high-speed outputs for vision fly-shooting detection, screening (blowing and outputting).
  - 03. 8 high-speed latch INs to record materials' position.
  - 04. specialized axis interface is for controlling 10MHz pulse output and encoder measurement.
  - 05. support electronic cam, linear, circular, helical interpolation.

Software Part:

Ax64 - MO8 - HW - ZV - R6 - F - YYYY
① ② ③ ④ ⑤ ⑥ ⑦

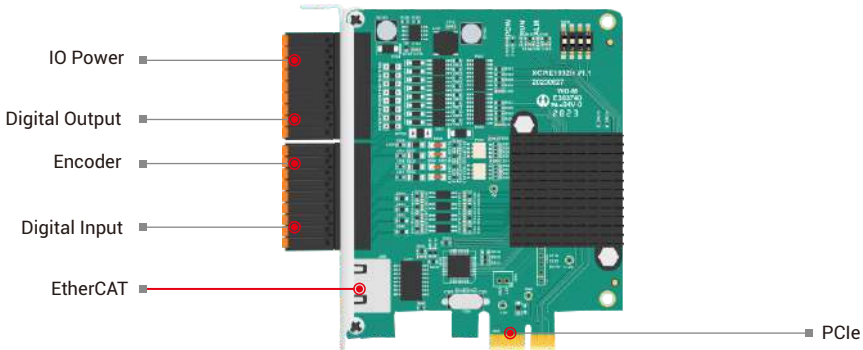
① 64-Axis (6-128 axes)
② motion control functions
③ PSO function
④ vision control functions
⑤ R1: normal manipulator
R6: 6-joint / special structure manipulator
⑥ F: control cycle of 125us / 250us
⑦ YYYY: customer special function
Ncxx function / G Godes function
CNCxxx function

Models

Model	Image	Axis	Encoder	Pulse Frequency	Inner IN and OUT	PWM	High-Speed IN	High-Speed OUT	Motion Buffer	ECAT	Size (mm)	Functional Description
XPCIE1032H		64	2	500kHz	16/16	4	8	16	128	1	90*106	point, line, arc, cam, continuous interpolation, robot
XPCIE1028		4	2	10MHz 500kHz	12+18/16+18	4	8	16	128	-	120*106	point, line, arc, cam, continuous interpolation, robot

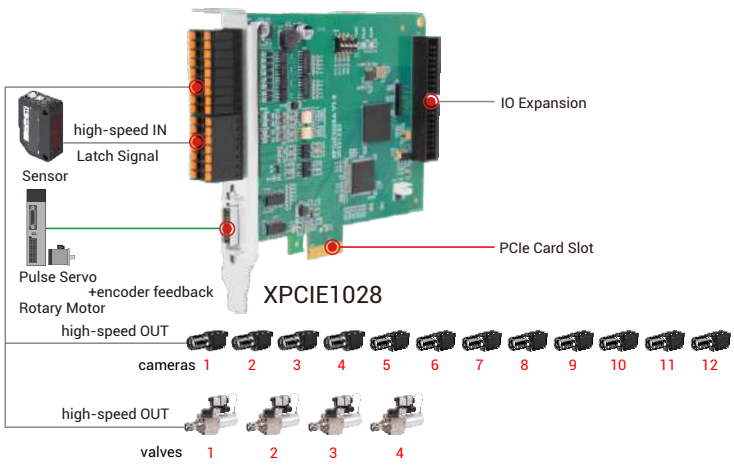
Note: above cards should be used together with MotionRT7 software. Please check manual for details.

Interfaces

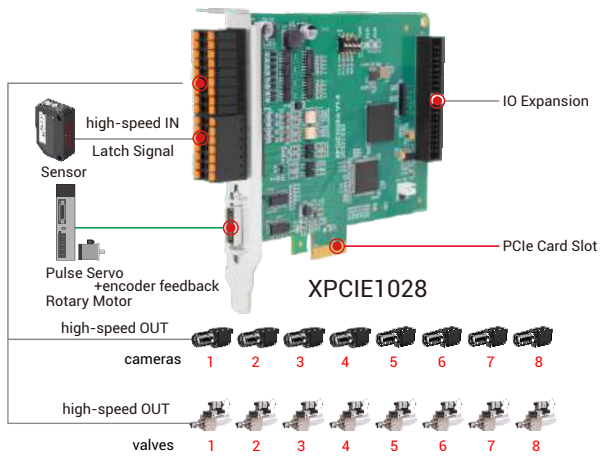


XPCIE1032H

XPCIE1028 Vision Screening Machine Solution



Solution of 12 Cameras



Solution of 8 Cameras

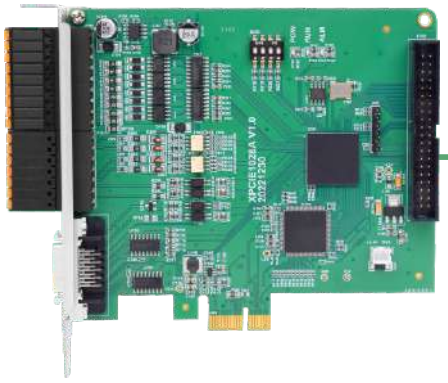
XPCIE1028 Motion Control Card Configuration Solution

Configuration	Name	Specification	Description	Image	Number
Optional Accessories for Expanding IO	Wiring Board	EXDB37M-37	Db37 wiring board		1
	Adapter Cable	ZP72-02	flat cable from 40P plug to DB37 female head		1
	Shielded Cable	DB37-150	DB37 cable, chip male-to-male		1

Provide Complete "Vision Screening Machine Motion Control Solution"

Break the Industry "Velocity" Bottleneck -- Reach 15000+pcs/min IO Triggering Detection Speed!

XPCIE1028H motion control card can be used in full-automatic CCD optical screening machine. And Zmotion provides one complete debugging software specialized for screening machine, which can reach 15000+pcs/min IO triggering detection speed. It only needs to set parameters, and uses together with camera and vision processing software, then it can realize full-automatic CCD vision screening. In this way, development period is shortened, and cost is reduced.



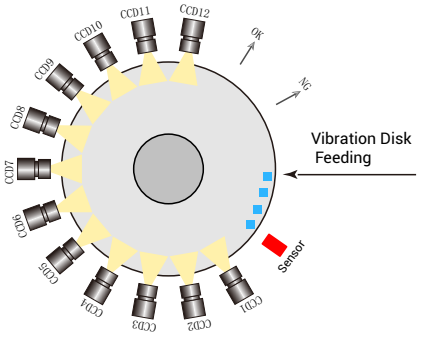
XPCIE1028

PCIE Interface, Inner Data Interaction

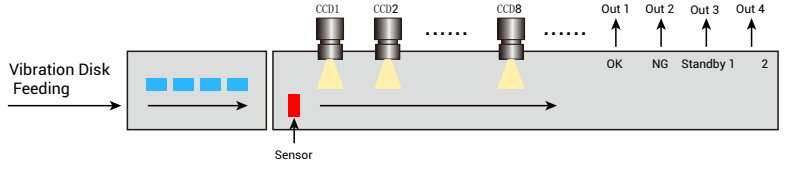
Functions Introduction

01. Channel: set how many cameras, air valves.
02. Operation Data: check how many detected & operated.
03. Communication Mode: set how to communicate with vision
04. Sample Space: set how long sample once
05. Heartbeat Detection: control vision & screening
06. Filtering Size: sense & filter materials' size
07. Camera Feedback IO & Report Actively: feedback the signal for control interaction after the signal is triggered by camera.
08. Fiber Offset Ratio: set the ratio of fiber physical distance offset
09. Debugging: manually debug -- operate turntable axis

Screening Machines



Disc High-Speed Screening



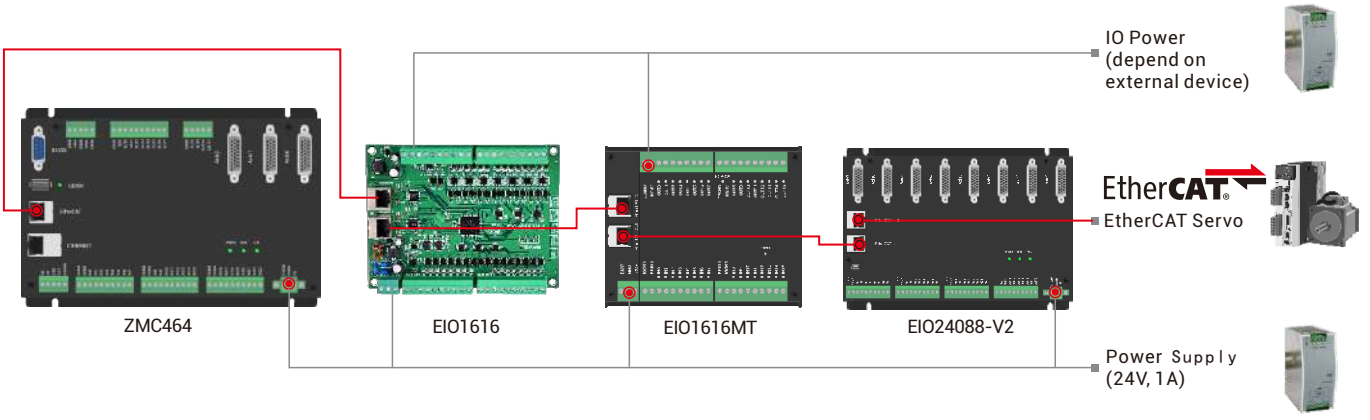
Assembly Line High-Speed Screening

IO & Pulse Expansion Module

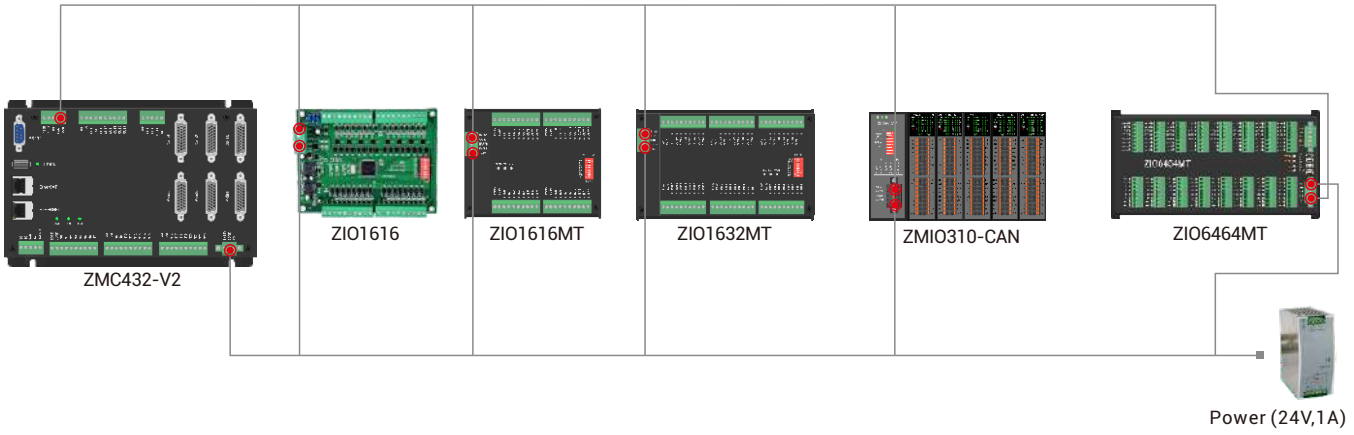
ZMC432M+ZMIO310

ZMIO310

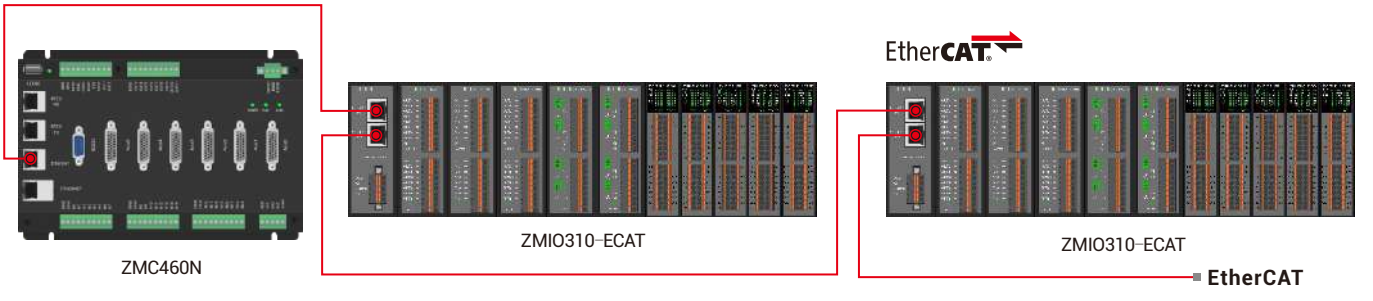
EtherCAT Expansion Module



ZCAN Expansion Module



ZMIO310 Expansion Module



EIO1616MT EIO16084

EtherCAT Expansion Module

EtherCAT expansion modules, they can expand multiple pulse axes and IO.

Functional Features

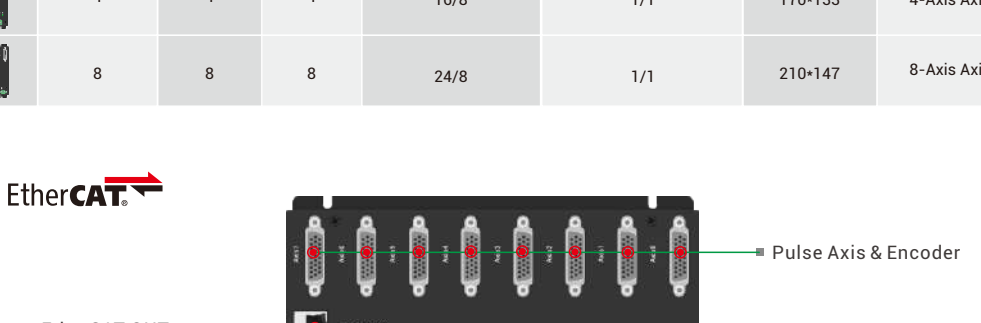
- Axis: 8 pulse axes can be expanded at most
- IO: up to 16 inputs & 16 outputs
- Performance:

  01. EtherCAT fastest refresh period is 250μs.

Models

Model	Image	Axis	Encoder	Total Axes	Inner IN and OUT	ECAT IN/ECAT OUT	Size (mm)	Functional Description
EIO1616MT		-	-	-	16/16	1/1	143*107	Module Mode: EIO1616M Module with Cover: EIO1616MT
EIO16084		4	4	4	16/8	1/1	170*133	4-Axis Axis Expansion
EIO24088-V2		8	8	8	24/8	1/1	210*147	8-Axis Axis Expansion

Interfaces



EIO24088-V2

ZCAN Expansion Module

ZCAN expansion modules, they can expand 2 pulse axes (at most) and IO.

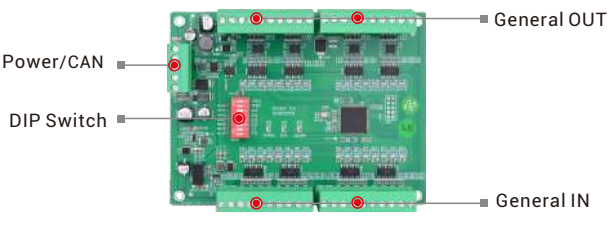
Functional Features

- Axis: 2 pulse axes can be expanded at most
- IO: 16 INs & 16 OUTs / 32 INs & 32 OUTs / 64 INs & 64 OUTs (PCB/module/cover type)

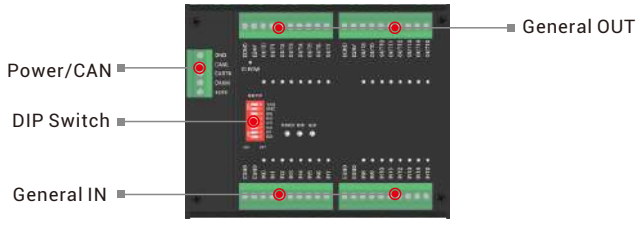
Models

Model	Image	Axis	Encoder	Total Axes	Inner IN and OUT	AD	DA	Size (mm)	Functional Description
ZIO0808		–	–	–	8/8	–	–	98*72	Module Type: ZIO0808M
ZIO0016		–	–	–	0/16	–	–	98*72	Module Type: ZIO0016M
ZIO1608		–	–	–	16/8	–	–	126*99	Module Type: ZIO1608M
ZIO1616		–	–	–	16/16	–	–	142*107	Module Type:ZIO1616M Module with Cover: ZIO1616MT
ZIO1616-PNP		–	–	–	16/16	–	–	142*107	Module Type: ZIO1616M-PNP
ZIO1632		–	–	–	16/32	–		192*107	Module Type:ZIO1632M Module with Cover: ZIO1632MT
ZIO3232MT		–	–	–	32/32	–	–	192*109	–
ZIO6464MT		–	–	–	64/64	–	–	208*100	–
ZAIO0802		–	–	–	–	8 (12bit)	2 (12bit)	120*72	Module Type: ZAIO0802M
ZIO16082		2	2	2	16/8	–	–	126*106	Module Type: ZIO16082M

Interfaces



ZIO1616



ZIO1616MT
(Module with Cover)

ZMIO310 EtherCAT Expansion Module

ZMIO310 ZCAN Expansion Module

ZMIO310 Expansion Module

ZMIO310 expansion module is one vertical module, it supports expanding IO and AIO. One coupler supports up to 16 sub-modules.

Functional Features

- IO: one single coupler supports 256 inputs / 256 outputs at most.
- AIO: one single coupler supports 32 ADs / 32 DAs at most.

Models

Model	Image	Digital IN	Digital OUT	AD	DA	Communication	Size (mm)	Functional Description
ZMIO310-CAN		–	–	–	–	ZCAN	108*32*95mm	ZCAN Expansion Module
ZMIO310-ECAT		–	–	–	–	ECAT IN/ECAT OUT	108*32*95mm	ECAT Communication Module
ZMIO310-16DI		16	–	–	–	–	108*32*95mm	Input Module NPN/PNP
ZMIO310-16DO		–	16	–	–	–	108*32*95mm	Output Module NPN
ZMIO310-16DOP		–	16	–	–	–	108*32*95mm	Output Module PNP
ZMIO310-4AD		–	–	4	–	–	108*32*95mm	AD Module 16bit
ZMIO310-4DA		–	–	–	4	–	108*32*95mm	DA Module 16bit

Interfaces

ZMIO310 EtherCAT Bus Module

HMI

ZHD500XB 24V Power

ZHD301X

ZHD400X

HMI

ZHD HMI is one open teach pendant that supports "touch screen". Develop interface program by RTBasic and RTHMI in RTSys, and it supports online debugging.

Functional Features

- Button: up to 47 for ZHD300X
- Communication: EtherNET
- Protocol: MODBUS / customized

- Functions:

  01. show controller inner program, and achieve data interaction.

  02. it is with "emergency stop" button.

  03. ZHD400 can be used together with all kinds of controllers, but ZHD300X/ZHD400X/ZHD500X only match with controllers that support RTHMI function.

Models

Models	Image	Resolution	Size (mm)	Button	Emergency Stop	Valid Protocol	Functional Description
ZHD300X		480*272	280*131	47	YES	HMI Protocol	it supports touch screen, and can be used with buttons. But the controller must support RTHMI function, and the development software ZDevelop must be above V2.70.
ZHD301X		480*272	246*129	28	NO	HMI Protocol	it supports touch screen, and can be used with buttons., power is supplied by 24V. But the controller must support RTHMI function, and the development software ZDevelop must be above V3.10.
ZHD400		800*480	230*165	18	YES	MODBUS Protocol HMI Protocol	it supports MODBUS protocol, and can be used with button and touch.
ZHD400X		800*480	230*165	18	YES	HMI Protocol	it supports touch screen, and can be used with buttons. But the controller must support RTHMI function, and the development software ZDevelop must be above V2.70.
ZHD500XB		1024*600	313*237	16	YES	HMI Protocol	it supports touch screen, and can be used with buttons., power is supplied by 24V. But the controller must support RTHMI function, and the development software ZDevelop must be above V3.10.

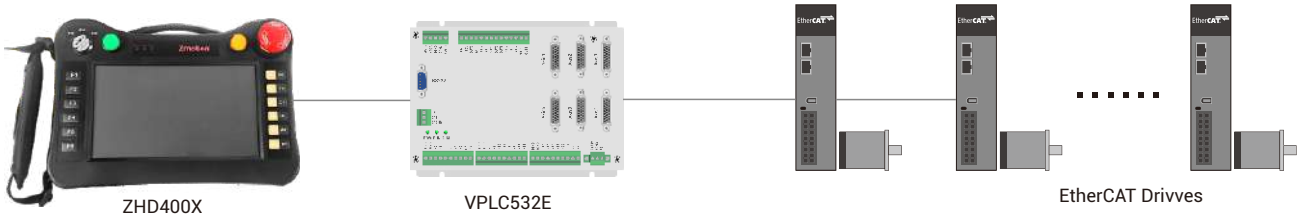
Interfaces

PIN No.	Name	Description
1	TX+	Send Data + (Tranceive Data+)
2	TX-	Send Data - (Tranceive Data-)
3	RX+	Receive Data + (Receive Data +)
4	n/c	-
5	n/c	-
6	RX-	Receive Data - (Receive Data -)
7	n/c	-
8	n/c	-
-	Red Line	24V
-	Black Line	0V
-	Yellow Line	Emergency Stop Signal

▲ Rj45 Crystal Head (ZHD300X, ZHD400, ZHD400X, ZHD500XB)

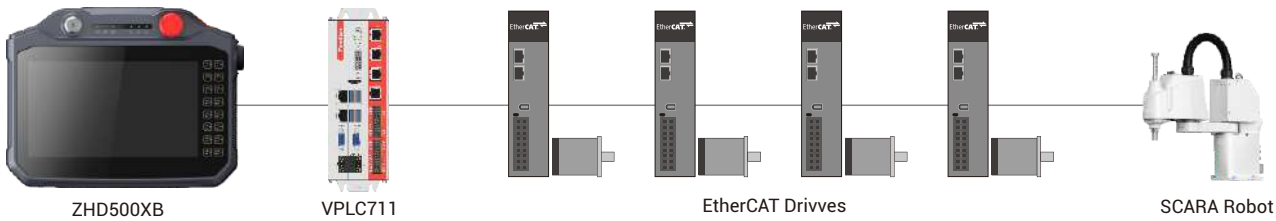
HMI Solutions

HMI Display Solution 1: Open CNC

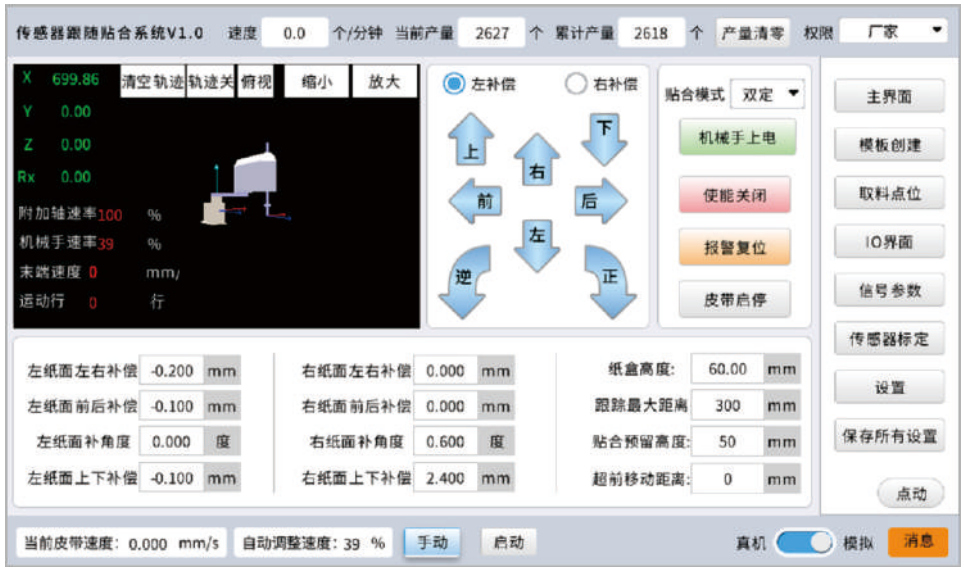


ZHD400X　　VPLC532E　　EtherCAT Drivves

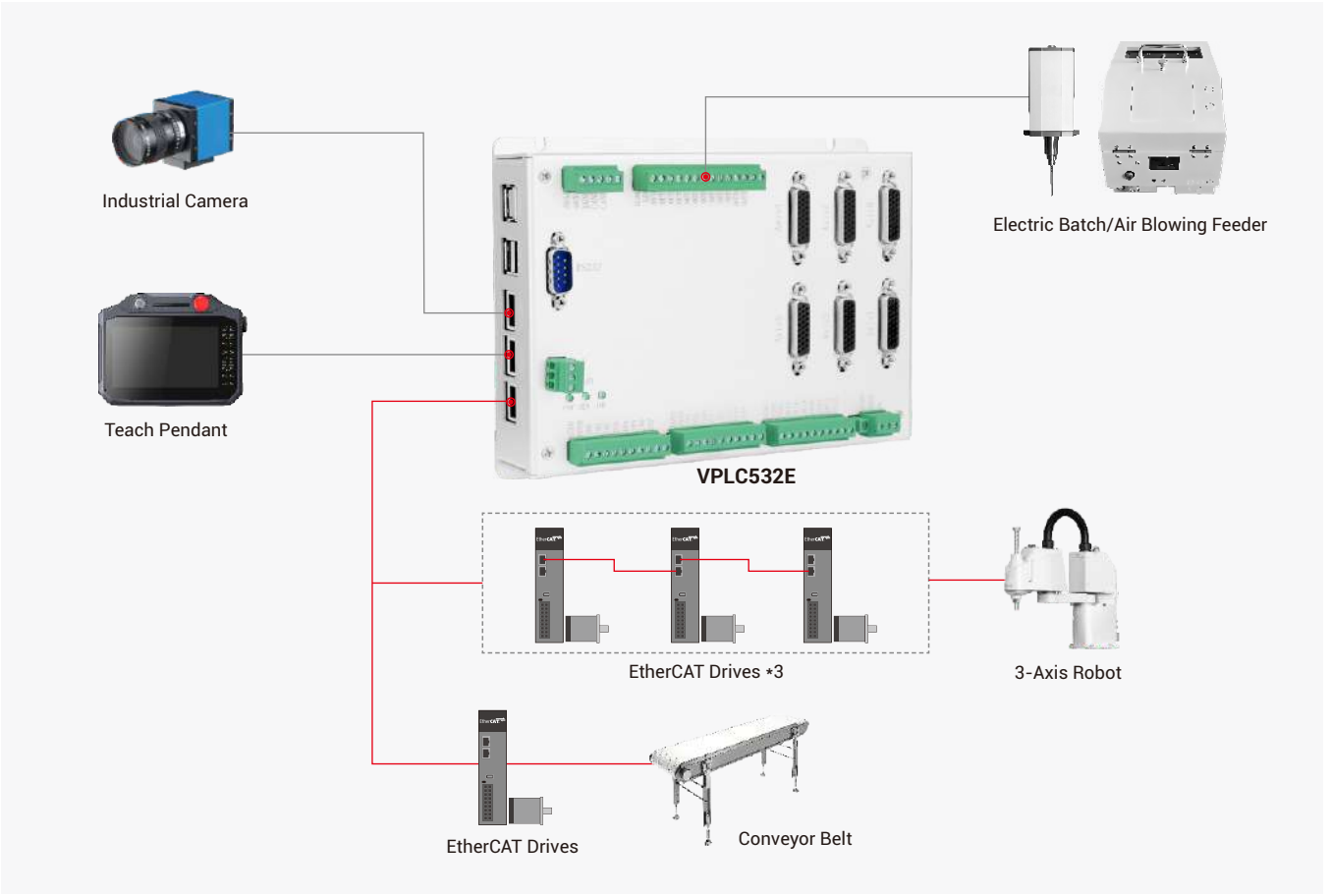
HMI Display Solution 2: Open SCARA



ZHD500XB　　VPLC711　　EtherCAT Drivves　　SCARA Robot

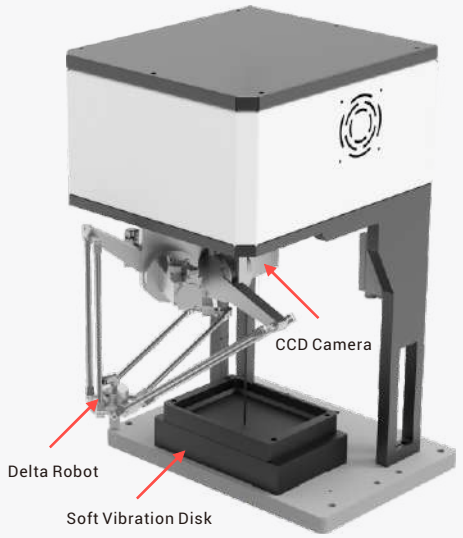


HMI Display Solution 3: 3-Axis SCARA Intelligent Locking

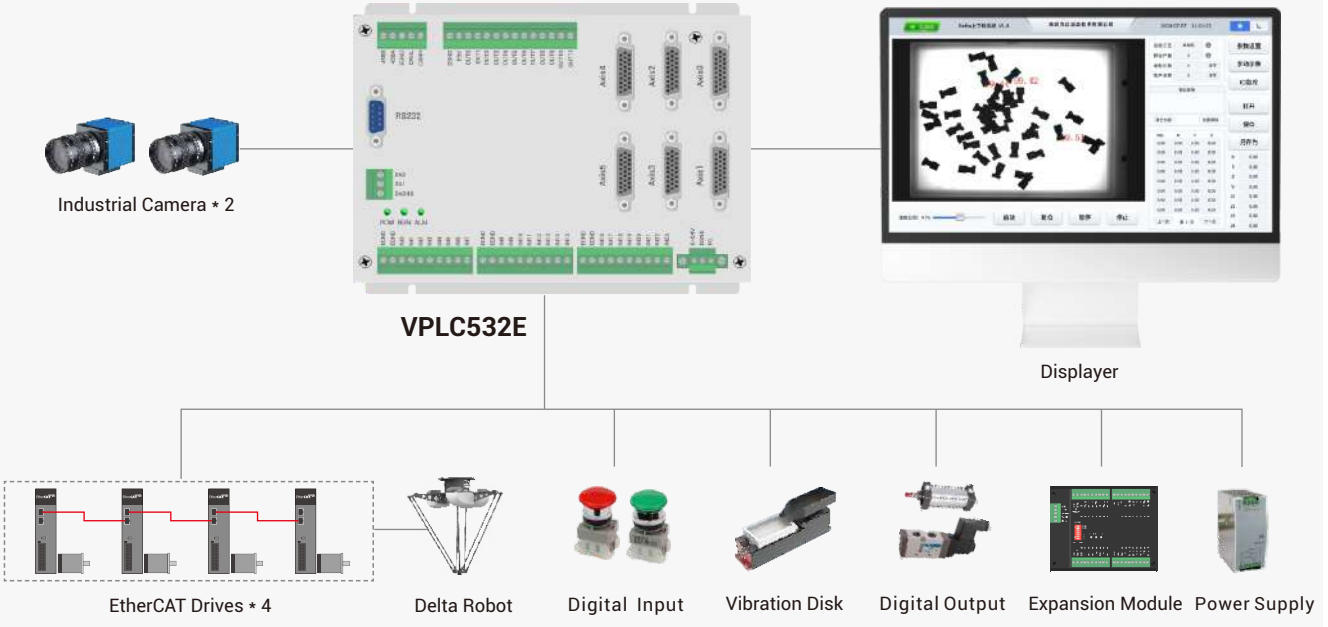


HMI Solution 4: Delta Parallel Manipulator –- Vision Flexible Loading

Delta robot is high-speed, precise, and stable, offering significant advantages in flexible vision-based feeding applications. Specifically, the parallel mechanism enables high-speed and high-accuracy for rapid pick-and-place operations. Additionally, it provides a large workspace and high flexibility, allowing it to accommodate materials of various sizes and shapes. And the integration of machine vision technology further enhances feeding accuracy and stability by enabling quick detection and recognition of materials.



Solution – Hardware Structure



Optimized Space

Highly integrated, no need extra IPC: reducing cost, saving space, shortening project period, promoting processing speed.

Fast Speed

The 3-Axis parallel robot's structure is compact, the repeat positioning precision is high. And picking speed is super-high: multi-beat per minute.

Easy Operations

Easy to understand & master interface, including tools, processes, etc., And there are expansion interfaces, you could add & modify functions by Basic.

Solution of General Vision Flexible Loading

Main Interface

Motion Trajectory Parameters Configuration

Box-Based Image Processing

Tray Parameters Configuration

Point Preset Teaching

HMI Solution 5: SCARA Serial Manipulator –- Vision Flexible Sorting

In response to market demand, Zmotion has developed the RTFuse flexible robotic loading and unloading solution based on its VPLC vision motion controller. By combining point teaching with RTFuse quick configuration, it can quick develop loading and unloading equipment, effectively shortening project cycles. That is, operators can complete material changeovers in the shortest possible time by simply adjusting vision and motion control parameters, achieving high-speed, high-precision flexible robotic loading and unloading.

Mobile Phone Parts

Antenna spring

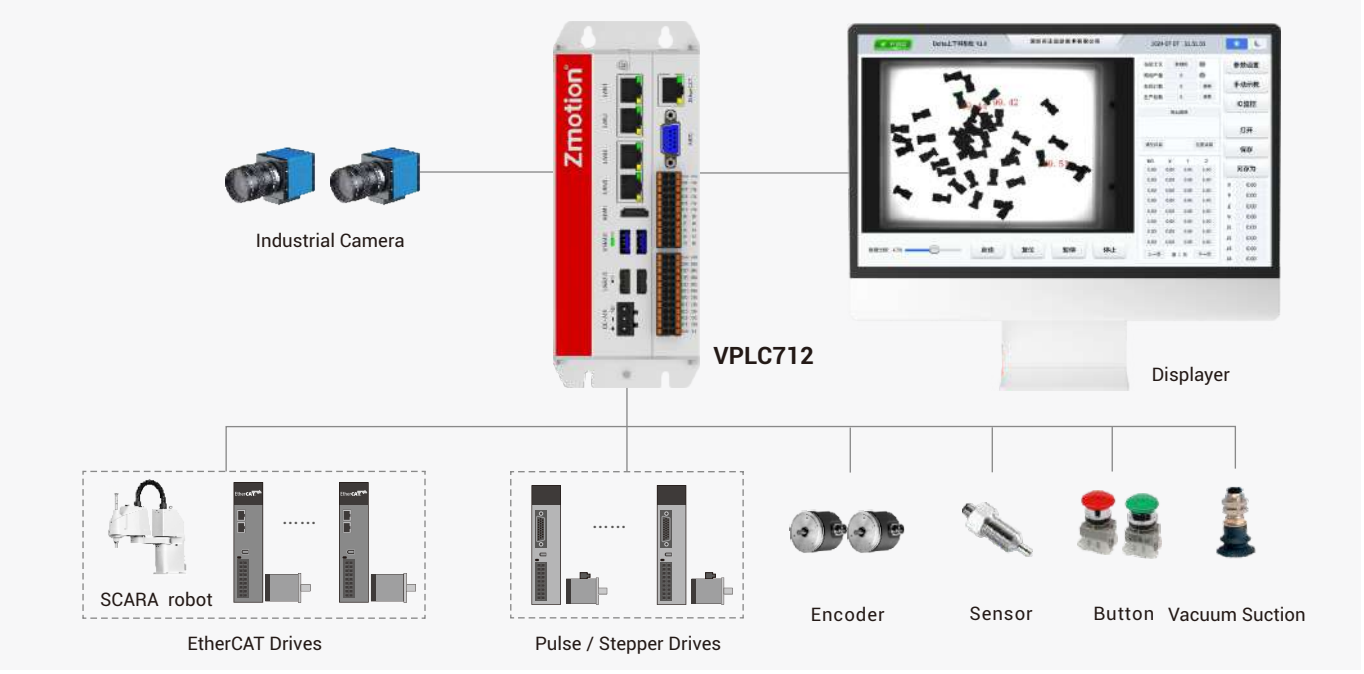
Insulating Pads

Conductive Patch

Silicone Buttons

Electronic Connectors

Solution – Hardware Structure



High-Integration

Integrate IO control, robot control, motion control, machine vision, and communication, etc., flexibly building a vibration loading and unloading solution that integrates motion and vision.

High-Flexibility

Quick to change line/material without mechanical disassembly or assembly; easy to configure parameters to adapt to production plan changes; suitable for feeding various small parts scattered in a haphazard manner.

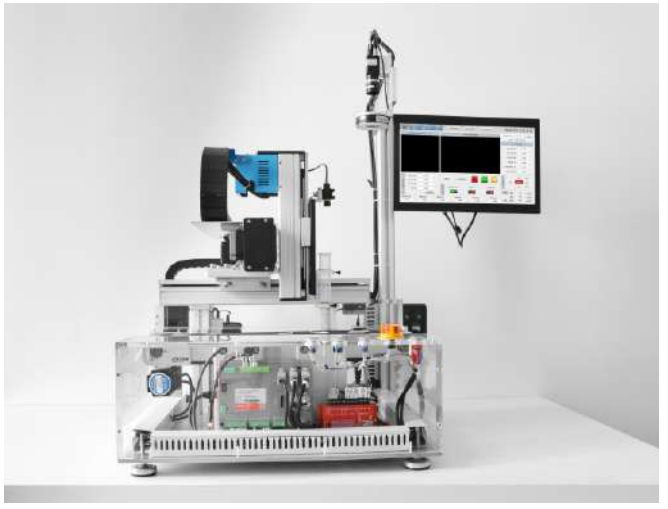
High-Precision

Recognize the material position by vision system, so no need to use fixed fixtures to specify the material feeding direction, and the material position of the vibratory feeder can be accurately located.

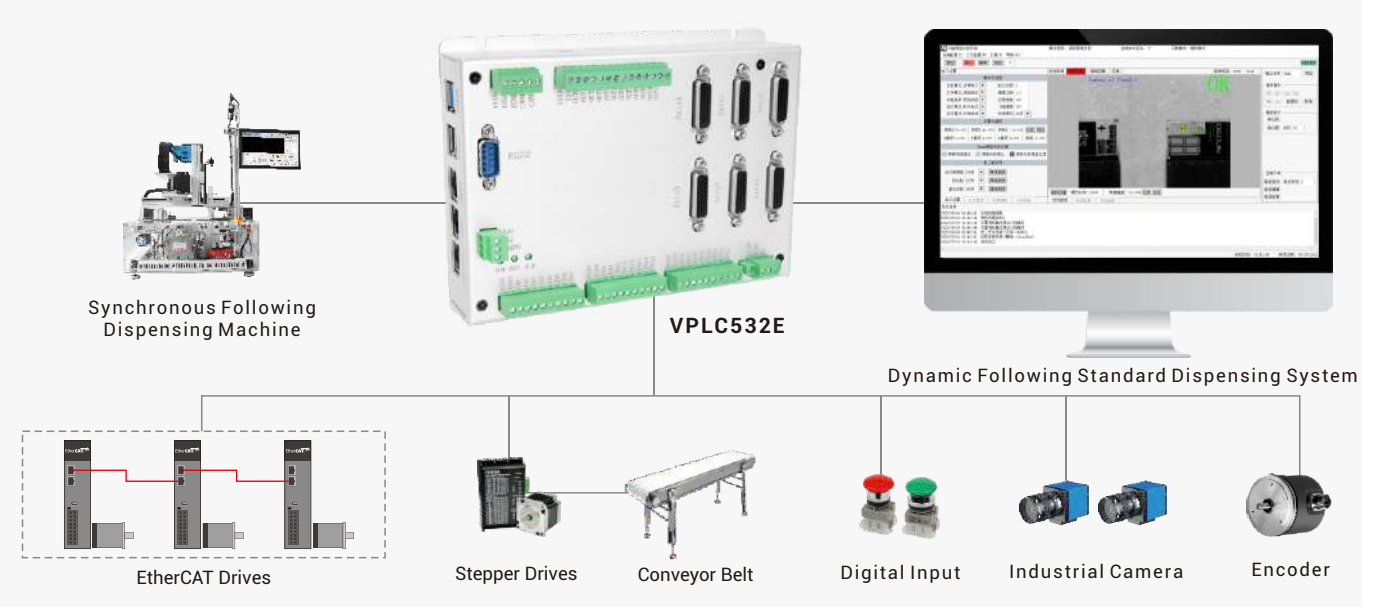
HMI Solution 6: Dispensing – Synchronous & Following

Solution Introduction

This can achieve dynamic dispensing for assembly line by dispensing path planning, workpiece position compensation, and visual inspection and recognition, which effectively solves the problem of traditional dispensing, no need to use product-specific fixtures, and manual placement.



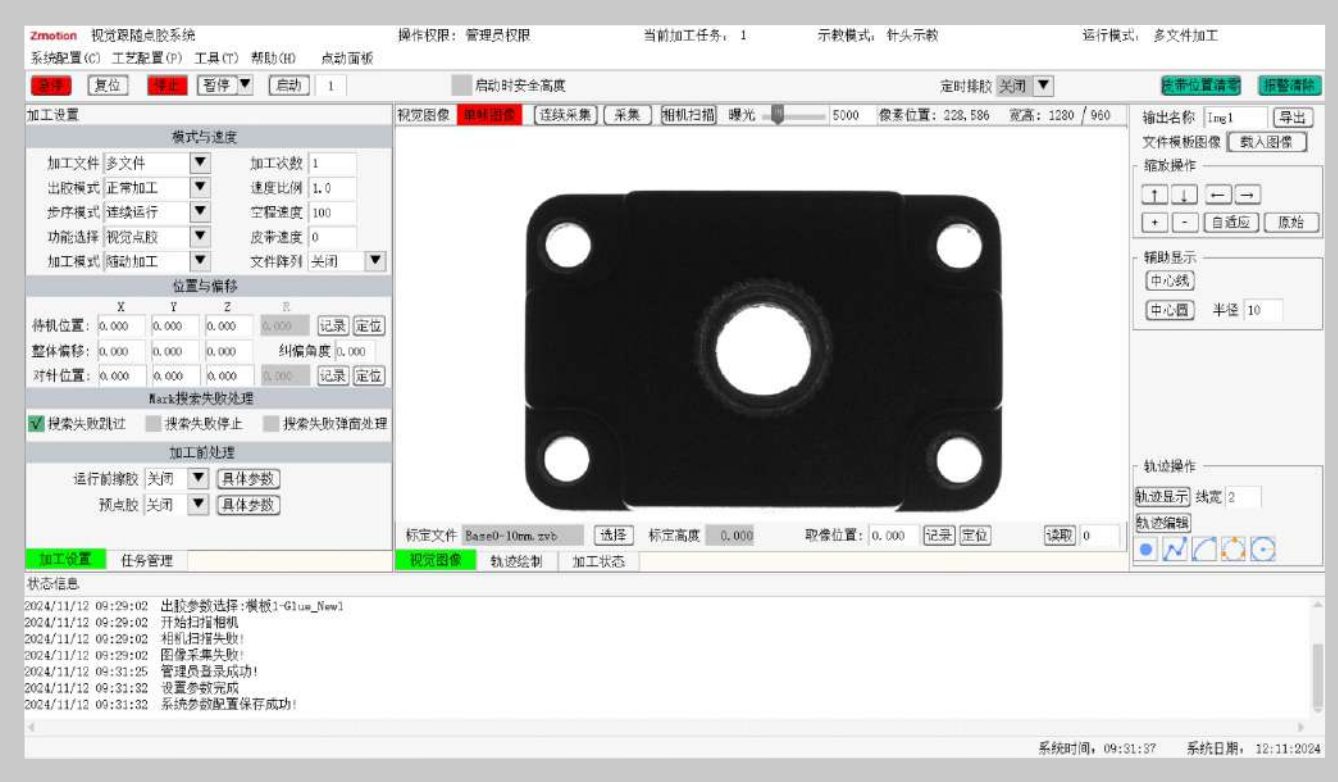
Solution – Hardware Structure



Solution Features

- Optimize Traditional Dispensing Process: pre-ON & OFF the dispensing valve, corner deceleration, PSO, ensuring accurate adhesive application, effectively reducing material waste, and cutting down the operating costs.
- Flexibility & Easy to install: the equipment is easy to install, highly-flexible, allowing for quick replacement of production lines without complicated disassembly and assembly processes.
- Improved Automation Level: automatically adjust the conveyor belt speed according to the dispensing speed to achieve multi-position, high-degree-of-freedom dispensing operations;
- Increased Production Efficiency: the conveyor belt moves continuously during dispensing process without interruption, significantly improving the overall production line efficiency.
- Large-Volume Dispensing: reducing reliance on manual operation, saving time and manpower, and it is suitable for unmanned workshops and highly automated production environments;
- Support visual positioning correction and circle detection calibration, resulting in more accurate point-to-point positioning.
- Support intelligent start/stop processing for belt conveyor, the belt stops before the rubber head reaches the limit and restarts after processing is complete, anti-collision mechanism.
- Support belt placement angle deviation, and it can automatically compensate for XYZ through calibration to achieve synchronous following.

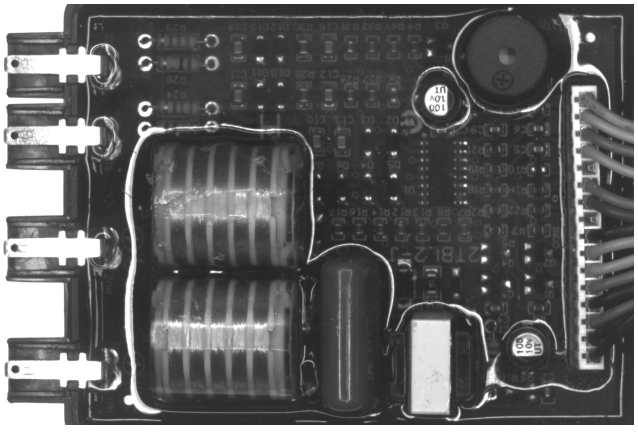
Solution – Main Interface



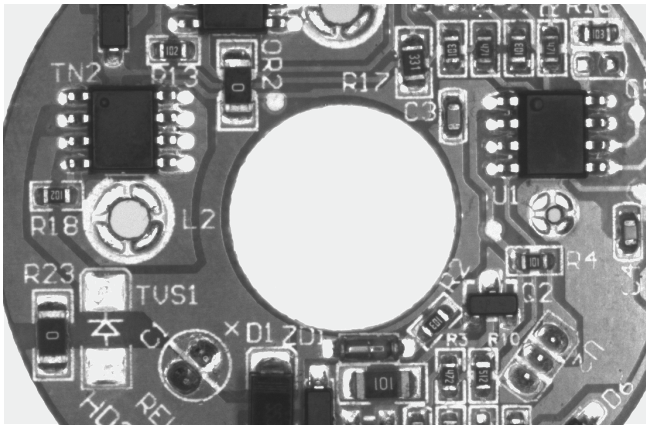
Solution – Applications

Speaker Following Dispensing

PCB Following Dispensing



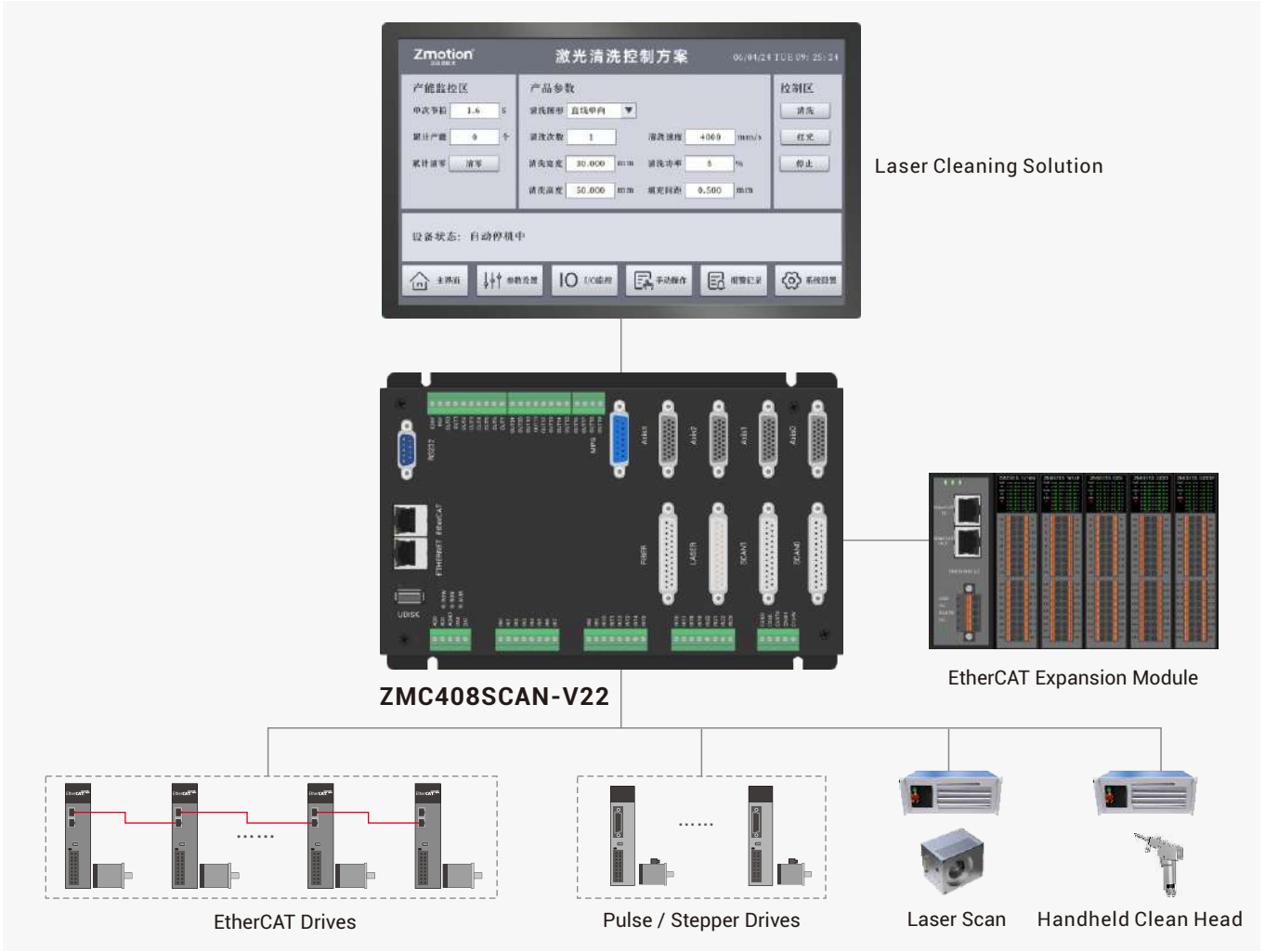
Panel Following Dispensing



Soldering Point Following Dispensing

HMI Solution 7: Laser Cleaning

Hardware Structure



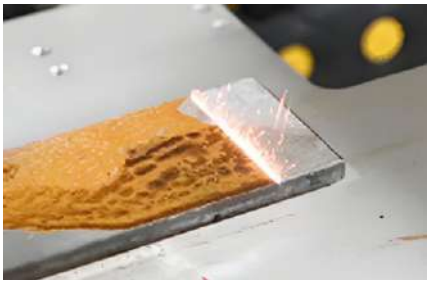
Solution Advantages

High Real-Time	Embedded offline control, with powerful real-time processing capabilities, to quickly respond to the high-precision control requirements in laser cleaning, ensuring cleaning effectiveness.
High Integration	Various hardware interfaces are integrated, then external connections are reduced, improving system reliability and stability.
High Flexibility	It supports multiple interfaces and communication protocols, making it easy to integrate with other devices, adapt to different application requirements.

Solution Applications

Paint Laser Removing

Rust Laser Removing

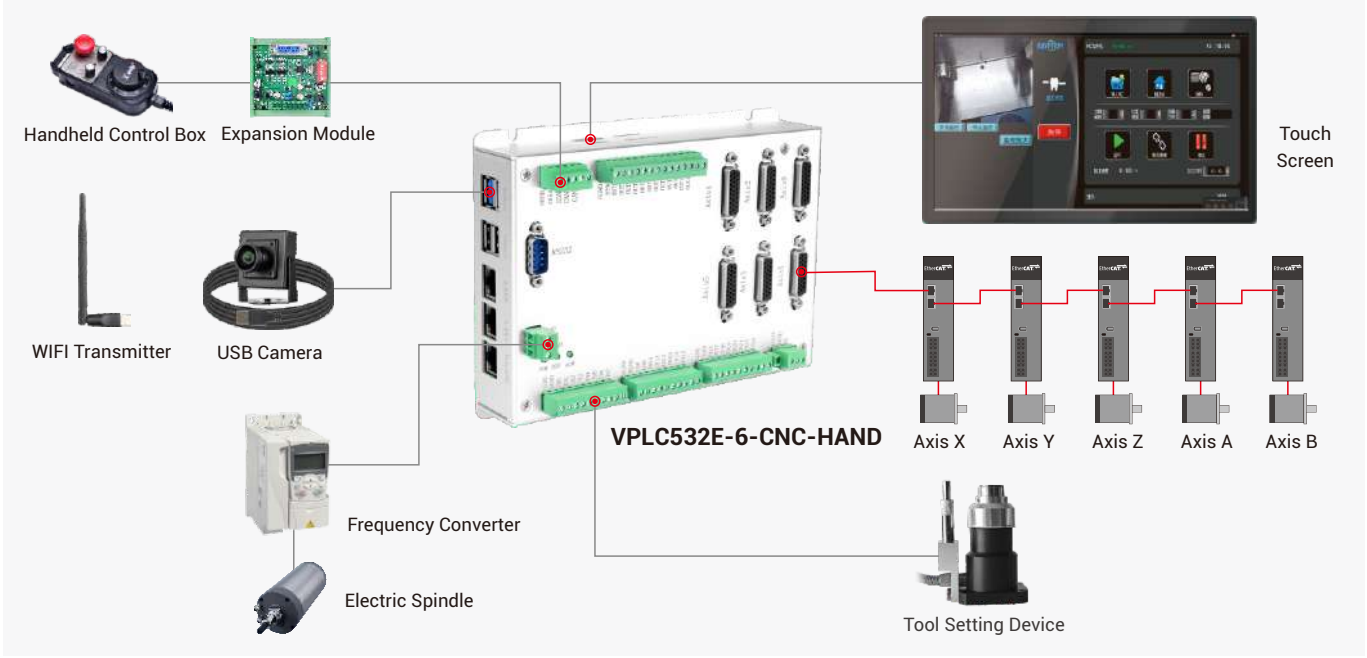


Dirty Laser Removing

HMI Solution 8: CNC Dental Machine

The dental machine system is a medical dental equipment engraving CNC system designed and built based on the Zmotionn open CNC platform.

Solution Structure



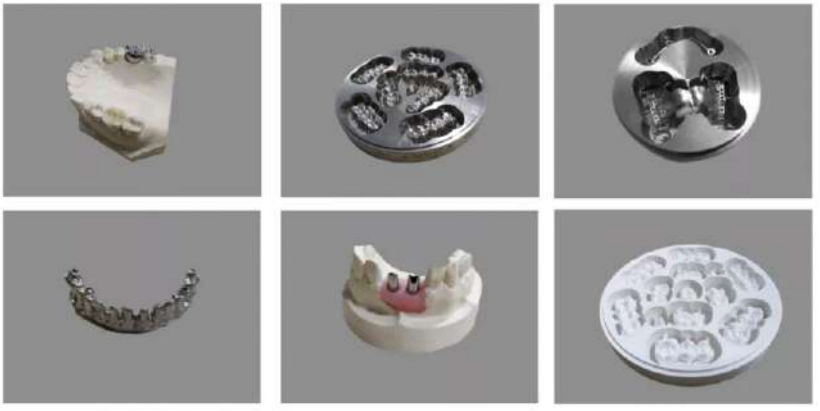
Solution Advantages

- Simple interface, easy to operate.
- Various requirements can be met.
- It can remote debug, diagnose and update -- High efficiency and low cost.
- System structure and algorithm are R&D 100% by Zmotion, which effectively avoids technology blockade, etc.
- It is open system that can be optimized continuously -- stable & reliable.

User Manual

Dental Machine Operation Interface

Dental Machine Applications



Reference and Learning Materials

PC Programming Manual

RTSys User Manual

RTBasic Programming Manual

RTHmi Programming Manual

RTPlc Programming Manual

RTVision Programming Manual

Zmotion Technical Articles

Zmotion Videos

All Resources

Shenzhen Zmotion Technology Co.，Ltd

Tel 0755-2606 6955
Fax 0755-2606 6955
Website: www.zmotionglobal.com

Phone: +86 19925228195
Marketing: zlm@zmotion.com.cn
Technical Support: huanghao@zmotion.com.cn

Address: 3-7 floor, Building A1, Sunshine Industrial Zone, Hezhou Community, Baoan, Shenzhen, Guangdong, China