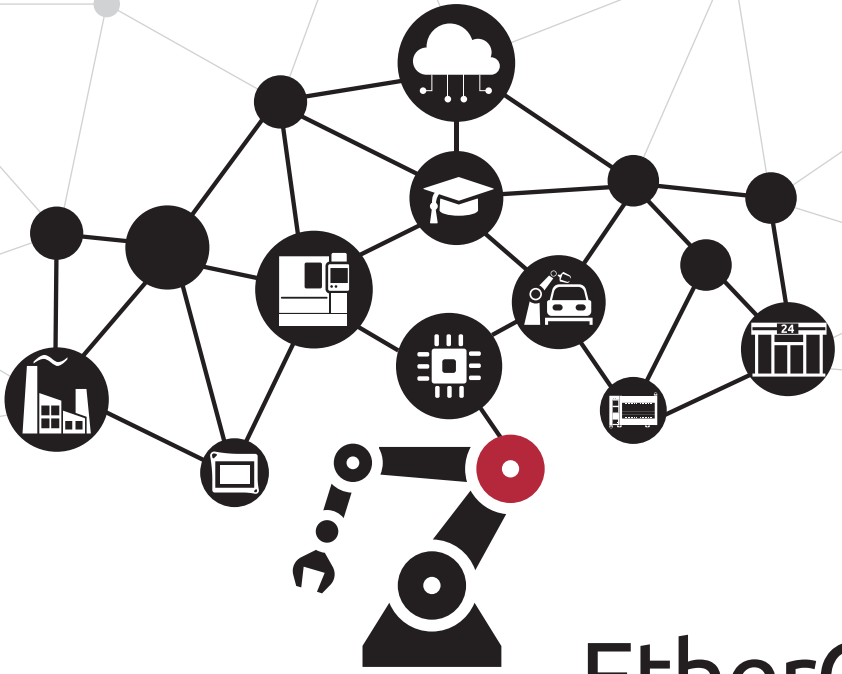
nexCOBOT

Open Robots & Machines

Robot & Motion Control Product Selection Guide

www.nexcobot.com



EtherCAT-Based Robotics & Motion Control

Contents

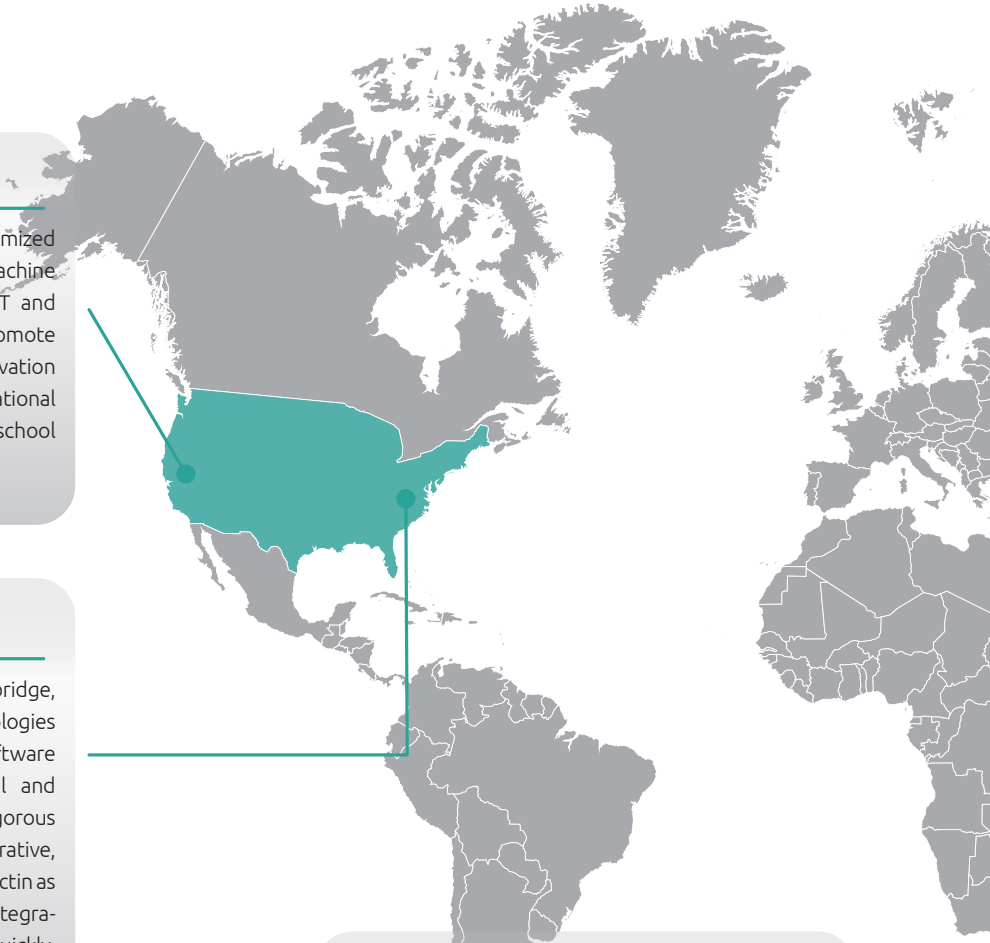
About NexCOBOT

Reliable Partner for the Intelligent Robot Control Solutions

NexCOBOT, a NEXCOM company, is committed to being your trustworthy partner in building open and modular intelligent robot control and motion control solutions. To surpass customers' expectations, NexCOBOT makes the difference by utilizing its industrial computing experience, having a strategic sales and marketing team in the US, a highly talented R&D team in both US and Taiwan, manufacturing in Taiwan and in China, and by providing exceptional levels of global customer service. With these core strengths, NexCOBOT has enabled its customers to win key projects in a diverse range of industries.

NexCOBOT provides open EtherCAT-based intelligent solution for industrial and educational robot applications. Its offerings include the modular components of a full-fledged industrial robot system, ranging from: controller platforms, robotic control and simulation software, teach pendants, control cabinets to robot bodies. As well as general robots, collaborative robots (cobots) are supported by its advanced robotic control features and software. Robot gateways can allow data transfer from robot system to SQL database or Cloud.

NexCOBOT offers several intelligent robot solutions: there is NexROBA for education which, uses several robot packages for various educational purposes making them ideal for scientific research, while the MiniBOT Robot is specially designed for college courses and vocational training centers.



nexCOBOT USA

NexCOBOT USA specializes in building customized industrial systems, and integrating robotic and machine automation solutions. Furthermore, NexCOBOT and Boise State University have partnered to promote robotic engineering in Idaho AI Robotic Innovation Space. The robots will be utilized for educational purposes ranging from graduate courses, to high school level education.

ENERGID

Established in 2001 and headquartered in Cambridge, Massachusetts, United States, Energid Technologies develops advanced real-time motion control software for robotics. Energid's general robot control and tasking framework, Actin®, is built to meet the rigorous requirements of industrial, commercial, collaborative, and consumer robotic systems. Energid licenses Actin as a cross-platform software toolkit and provides integration services to help its customers get to market quickly. NexCOBOT partners with Energid to develop Advanced Robot Controller.

NEXGOL

NEXGOL provides smart customized machines powered by NexCOBOT to improve production efficiency. NEXGOL also provides the factory automation total solution, which includes smart machines, production line design and data collection. Each project is different with optimized technologies to fulfill industries and application fields.

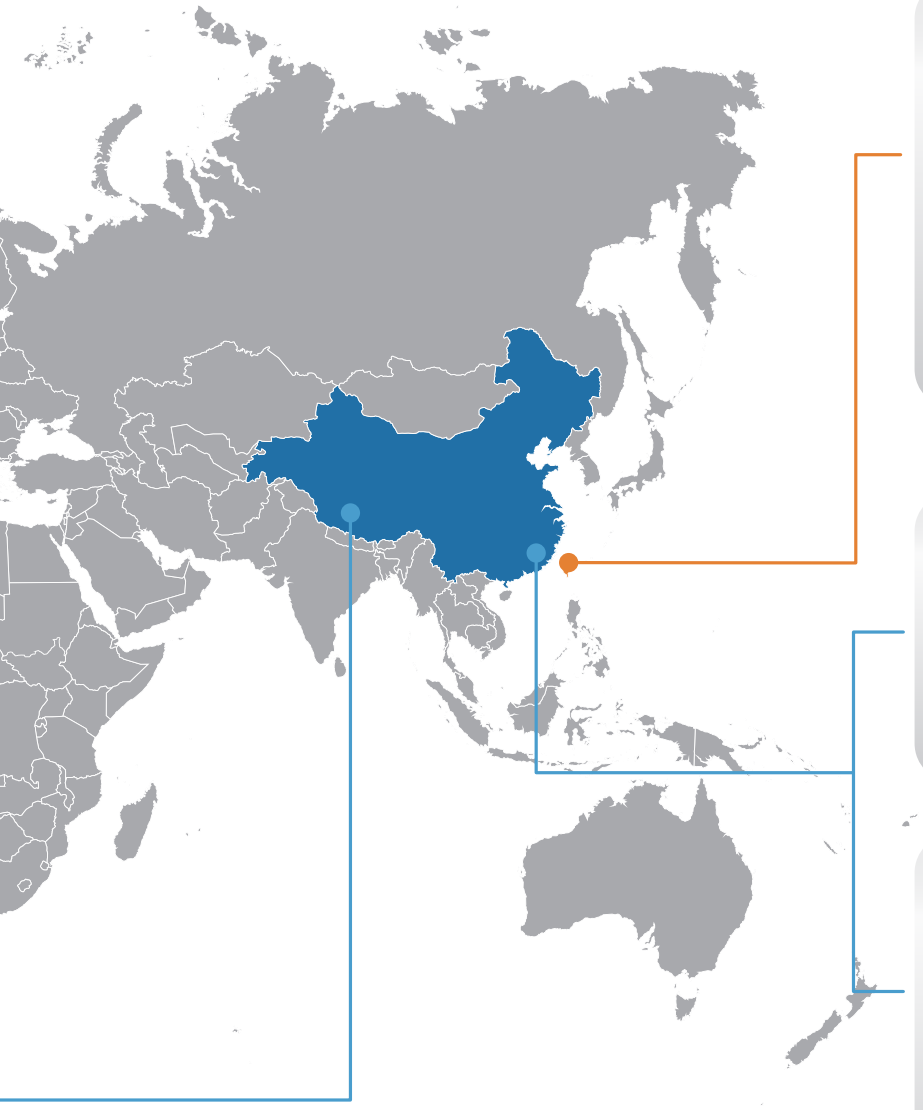
NexROBA, for industry, is an open and modular EtherCAT-based robot solution with development flexibility and expandability of the system to fit different application requirements. The solution supports a broad selection of industrial robots, such as 7-axis and 6-axis articulated robots, delta robots, SCARA robots, all of which can be enabled to operate collaboratively.

NexCOBOT's machinery solutions comprise of EtherCAT motion control, CNC controller and gateway, and EtherCAT I/O System. Each of the product series is developed with state-of-the-art technologies to satisfy the changing demands for the IIoT market.

NexCOBOT's total robot and machinery solutions integrate NexCOBOT's products and third-party solutions such as robot bodies, servo motors, control panels, machine vision, and control software with full compatibility tests.

NexCOBOT also provides quality services, such as customization, product training, direct technical support, and after-sales service to ensure the success of your projects.

In addition to the above, the design manufacturing service-to-market business model gives the NexCOBOT core competencies to build a strong world-class service network by providing customized service, global logistics, local access, and real-time support. Operating in subsidiaries, from China, Italy, Japan, Taiwan to the United States, NexCOBOT is able to better facilitate customers' requirements as well as closely work with global partners in different regions.



NEXCOBOT Taiwan

As Taiwan's leading technology provider in robotic and motion control, NexCOBOT provides customized solutions and real-time support through a world-class technical service team. NexCOBOT Taiwan's state-of-the-art research and development team operates a design manufacturing service-to-market business model to ensure the success of projects. NexCOBOT aims to penetrate global system integrators and solution providers.

NEXCOBOT China

NexCOBOT China provides integration services that combine robotic and motion controllers, machine CNC gateways, and IIoT total solution, for automotive, semiconductor, biomedical, and other industrial markets.

ORIGINAL POINT OPMT

OPMT is a leading company of the multi-axis linkage machine tool industry. The advanced and innovative technology of 5-axis high precision CNC machine is application-ready for diversified manufacturing applications such as automotive, aerospace, and healthcare. OPMT's manufacturing line leverages NexCOBOT's technology of robot and IIoT to fulfil their smart manufacturing total solutions.

Total EtherCAT Motion Solution

The future of robot and machinery solutions is a production environment where devices, machines, robots, and sensors are interoperable. To be able to do that, the adoption of standard-based fieldbus for automation devices is essential, and EtherCAT is the technology that could potentially become the key standard Ethernet fieldbus. To enable smart manufacturing, NexCOBOT's leading robot and machinery solution combines EtherCAT fieldbus, advanced motion control and robotic automation technology to bolster the capabilities of smart machines. Based on standard EtherCAT communication, the solution lineup features open and decentralized designs to meet application requirements such as CNC machines, industrial robots, general machines, and collaborative robots.

CNC Machines

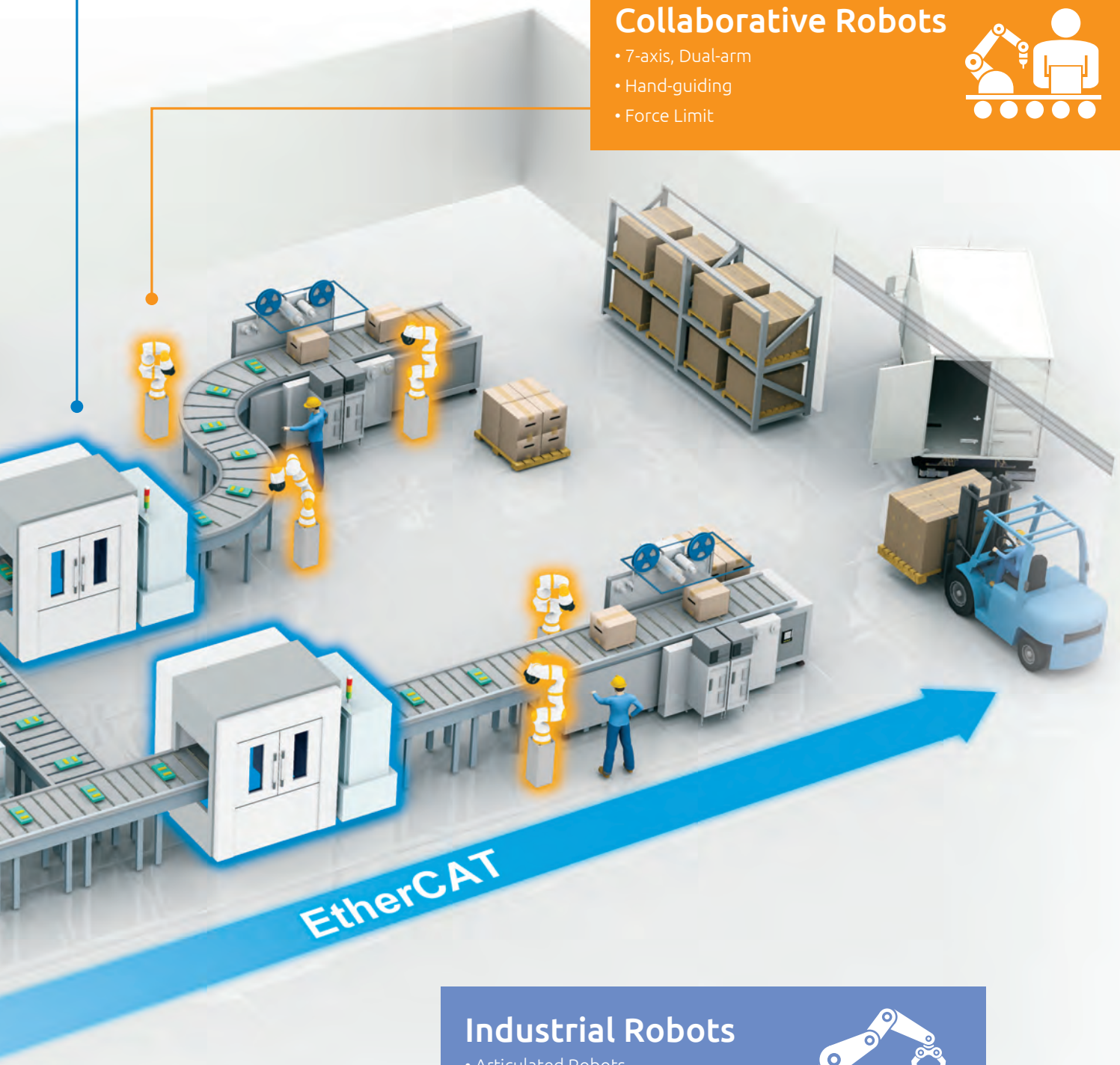
- 2.5D & 3D Machining
- CAD/CAM Conversion
- Mills, Lathes, Plasma Cutters

General Machines

- Standalone Machines
- XYZ Table
- Vision Inspection Systems

Collaborative Robots

- 7-axis, Dual-arm
- Hand-guiding
- Force Limit



Industrial Robots

- Articulated Robots
- SCARA Robots
- Delta Robots

NexROBA & NexMotion Solutions

NexCOBOT's robot and machinery solutions can be categorized into two parts: NexROBA and NexMotion.
NexROBA is an open robot solution that provides modular solution to customers, including control boards, fanless controlers, control cabinets, and teach pendants. Depending on application needs, combinations of modular products are flexibly offered to better fit customers' requirements in their robot systems. Several types of robot bodies from different vendors are proven to run with NexROBA control system. For educational users, a variety of robot development packages are even provided for science research or teaching purposes.

Education

MiniBOT
Educational Robot

MiniBOT Delta
Edu Delta. Robot

MiniBOT 7R
7-axis Edu. Robot

Delta Robot Edu
Develop. Pack

SCARA Robot Edu
Develop. Pack

6-axis Robot Edu
Edu Delta. Robot

Industry

TP100
Teach Pendant

NET-GRC Series
Robot Controller

NET-ARC Series
Advanced Robot Controller

RCB Series
Mini-ITX Board

Control System
Control Cabinet

3rd-party Robot Body
HIWIN,
Effort, Han's

NexMotion is an complete EtherCAT-based motion control solution.
NexCOBOT has developed its technology competence on EtherCAT communication, from master to slave, and has put advanced motion control based on it. Thus providing a comprehensive range of products, including EtherCAT master controllers, motion controllers, CNC controllers, EtherCAT slave modules, and even EtherCAT slave chips. Each of the product series is developed with state-of-the-art technologies to satisfy the changing demands of the robot and machinery market.

NexMotion

Controller

NET-ECM Series
EtherCAT Controller

NControl Series
CNC Controller

NET-GMC Series
Motion Controller

Slave

NEIO Series
EtherCAT I/O Slave

AXE-5904
EtherCAT Pulse Slave

EC Chip
ODM EtherCAT Slave Chip

NexROBA Solution

Open and Modular Robotics

NexCOBOT's NexROBA is an open and modular solution, based on standard EtherCAT communication. Since every set of industrial robots is a system, NexROBA offers the flexibility to provide modules in a robotic system, such as robot controllers, EtherCAT I/O, and teach pendant, depending on customer's needs. The software of this system provides robotic control functions in terms of Visual Studio DLLs, allowing customers to develop applications with their own user interfaces. NexROBA supports many standard industrial robots including: 6-axis articulated robot, 3/4-axis delta robot and 4-axis SCARA robot.

Smart Manufacturing

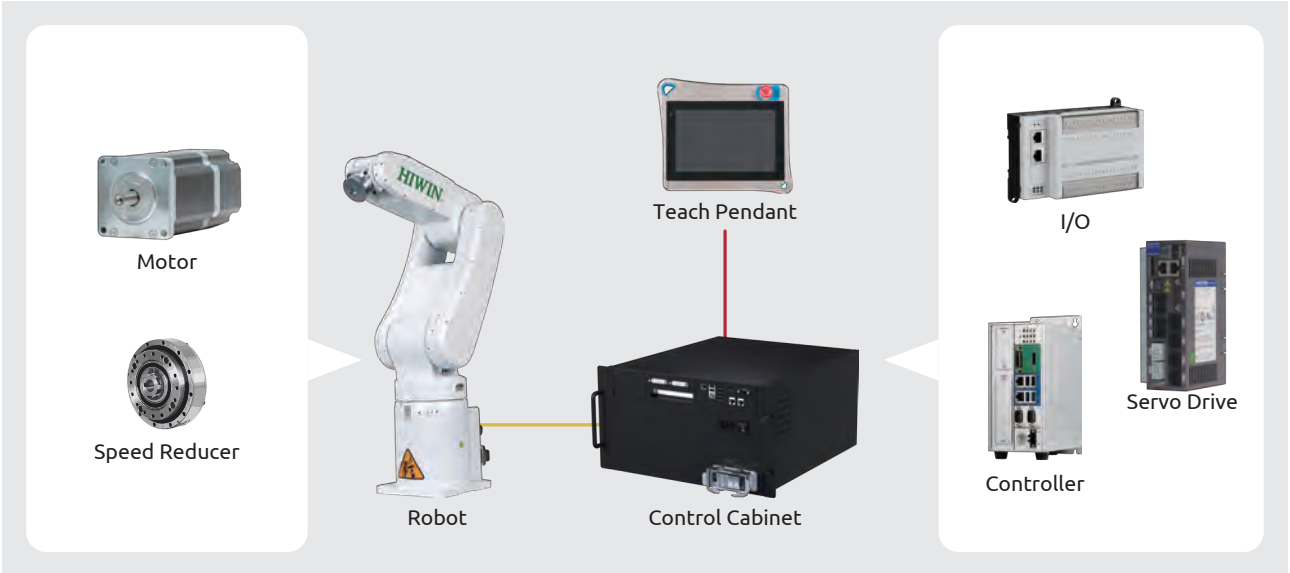
Robots are a perfect example of the move towards computerized industrial manufacturing and the smart factory vision put forward by Industry 4.0 and the Internet of Things (IoT). Almost all aspects of these next generation devices are digitized, spanning machine control, monitoring, management, and data reporting and analysis. Even operators interact with machines digitally using a human machine interface (HMI). Smart factories provide many benefits, including a reduction in operator hours and opportunities to increase throughput, boost yields, improve efficiency, and reduce downtime through insights gained from advanced data analytics.

Robotic System Components

A robotic production line involves many aspects beyond the robots, some of which can be challenging. There are actuation controls, sensing, data processing, and operational intelligence that may present issues around system integration, machine-to-machine communication, and information integration. Taken a step further, smart manufacturing based on IoT, smart robots, cyber-physical system, and big data technologies introduces additional layers of complexity.

Simplifying the Design of Robotic Systems

Robots play a major role in making manufacturing processes more productive and less labor intensive, which is especially important in some regions, where there is a labor shortage. But impeding many manufacturers is the complexity of robotic system design, which is made more difficult by the need to identify and integrate subsystems from multiple vendors. Greatly simplifying the robotic design process, NexCOBOT working closely with various solution providers, has developed open modular solutions for a range of robotic applications. With pre-integrated and pre-validated robotic control modules. NexROBA, NexCOBOT's EtherCAT robot solution, performs precise robotic control.



Open Architecture Controller to Develop Your Own Robotic Control System

NexROBA, NexCOBOT's robot solution, has an open development environment in which users can freely develop their own EtherCAT-based robotic control programs. The Windows-based environment makes it easy to integrate applications such as machine vision, simulation software, and other peripherals into the control system. It also opens the possibility for users to develop time-deterministic programs by providing accessibility to an RTX-based real-time execution kernel.

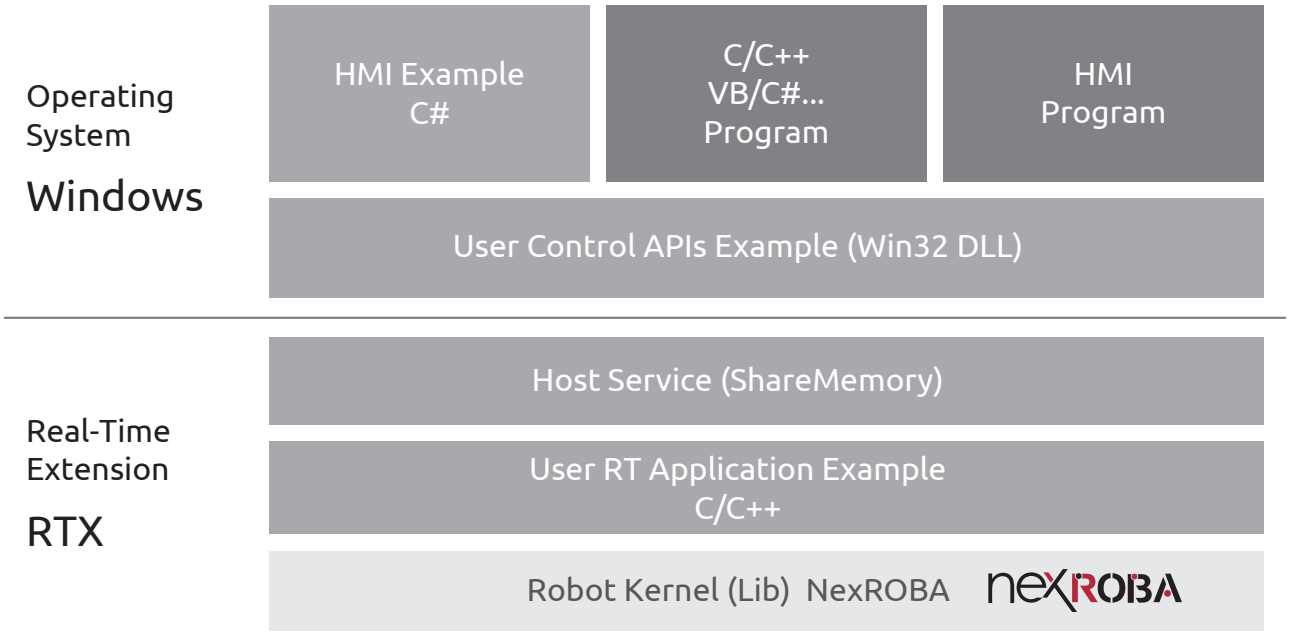
Complete Robotic Control Libraries to Fasten Development

NexROBA also provides C/C++ libraries of General Robotic Control (GRC) for basic types of industrial robots, including 6-axis articulated robots, 4-axis SCARA robots and 3/4-axis Delta robots. For those wanting to build a robotic control system, these APIs are handy to use and perform point-to-point movement, jog teaching, linear or circular movement of robots, which tremendously reduces development time. Users can leverage APIs in the Windows layer or in the RTX layer to easily build programs for their robotic applications.

- Operation System
Win 7 / WES 7
- Development Tool
Visual Studio 2010/2015
- Supported Robot Type
6-axis Articulated
4-axis SCARA
3/4-axis Delta

- Robotic Control Functions (GRC)
Jog
PTP
Linear interpolation
Circular interpolation
Blending movement
Tool

- Built-in Utility
Parameter Setting
Limit Setting
I/O Control
Axis Control
Robotic Move
Position Monitor



NexROBA Educational Solution

Industrial robot is one of the key topics of Industry 4.0 and gradually plays significant role in various manufacturing fields. Education of industrial robots, however, is far behind from what the trend has become. NexCOBOT, as a promoter of open and modular robots address this problem and presents NexROBA Educational Solution. MiniBOT Training Package and Robot Development Package are provided to meet both educational and research purposes in school.

MiniBOT Training Package



Target Scenario:

High School/College Robot Course

Vocational Training Center

Feature:

- Compact Robot
- Teaching Material

Robot Development Package


Target Scenario:

School Laboratory,

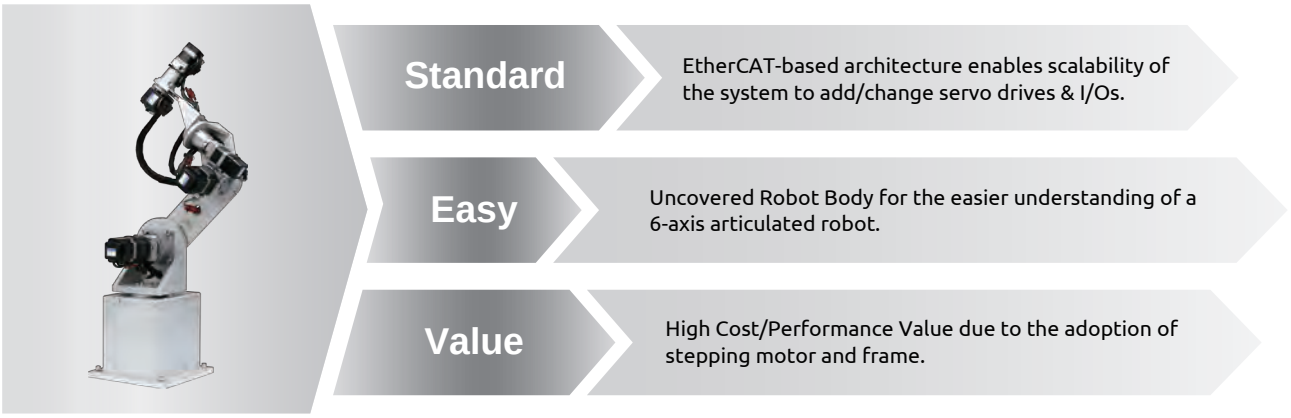
Scientific Research

Feature:

- Development Openness
- Standard Robot Arm

MiniBOT Training Package

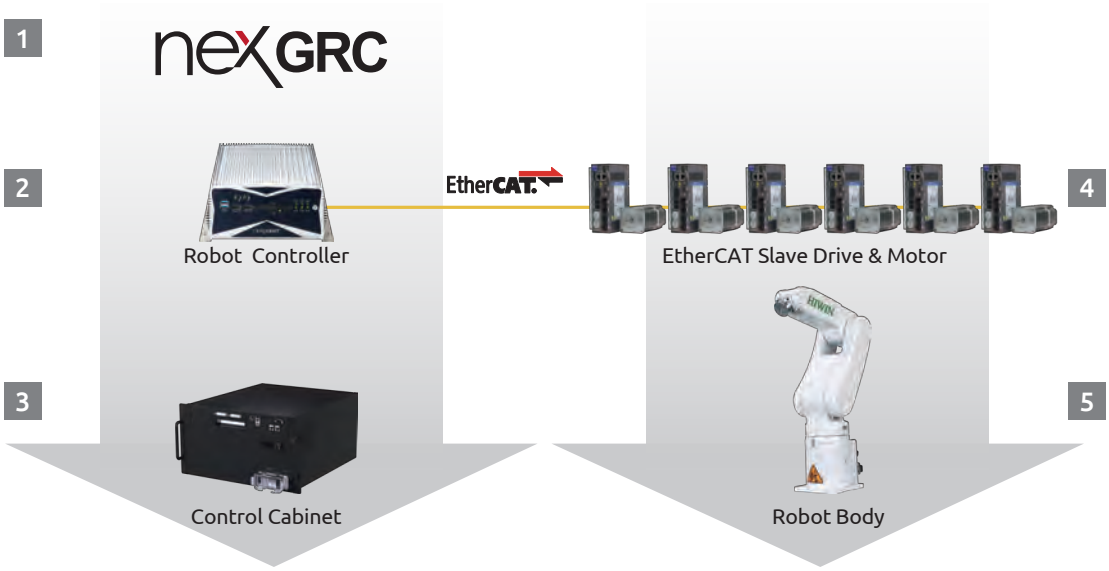
MiniBOT Training Package is an educational EtherCAT-based robot designed by NexCOBOT. It is built based on design concept of general industrial 6-axis articulated robot with useful features for educations. Academy users can leverage MiniBOT Training Package to set up course easily as it also comes with training material reference which could greatly save time and effort required for teachers .



Robot Development Package

For scientific research, NexCOBOT has released a series of Robot Development Packages that consist of an industrial robot body, NexCOBOT's open robot controller, and related circuits and wiring in a control cabinet. It is an open robot platform which allows users to save time and effort as they focus their attention on robotic application studies and robotic control development.

All the hardware installation and circuit integration of a robot, including motors, drives, speed reducers etc., are done by NexCOBOT. To further reduce development time, it also comes with C/C++ NexGRC APIs which save users' needs to create their own. The real-time environment further enables users to perform programs required for time-deterministic tasks.



1 NexGRC
Robot Control Software
PTP Example
C/C++ Programming

2 Robot Controller
NET3600E-GRC Controller
Intel Core-i5 CPU

3 Control Cabinet
Tailor-made Cabinet
622 x 470 x 315 mm
Military-grade Connector

4 Motor/Drive/Related Circuits
EtherCAT Slave Drive & Circuit Control
100 ~ 400W Motors

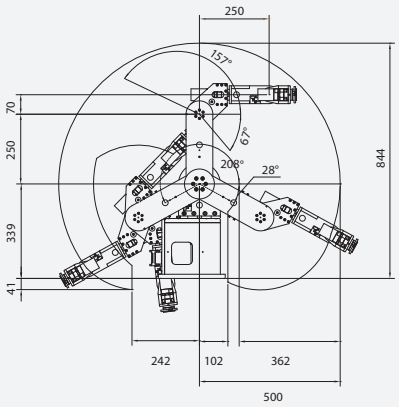
5 6R Robot Body
Articulated Robot
6-axis Operation
5 kg Load

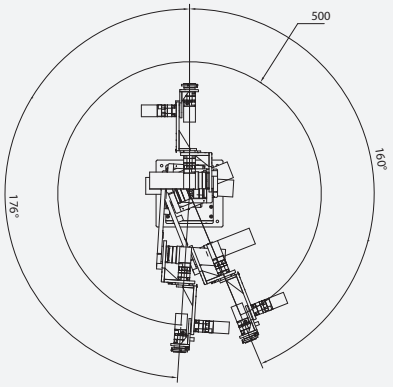
* The robot system is based on EtherCAT

* Robot stand & teach pendent are optional

MiniBOT Robot

6-axis Robot Package for Education





Unit: mm

Main Features

- EtherCAT-based
- Compact design
- Suitable for education
- Standard 6-axis articulated robot

Contents

- Control cabinet
- Robot control API
- Articulated 6-axis robot
- Open robot controller

Product Overview

EtherCAT Communication

Based on standard EtherCAT communication, MiniBOT provides an expandable distributed control system. It is also a good material for EtherCAT-related training.

Industrial Robot Design

By referring to design of general industrial 6-axis articulated robots, MiniBOT is built in the same concept. Its nude mechanical architecture makes it easy to learn the structure of an industrial robot.

Open Development Environment

MiniBOT comes with a utility tool to directly operate the robot. Robotic control APIs are also provided in Windows platform, so that users can leverage its openness to develop any kind of robot applications.

Specifications

Robot Arm

- Degree of freedom: 6
- Payload: 1kg
- Driving system: EtherCAT close-loop stepper
- Position feedback: incremental encoder
- Operation range: 595mm (maximum)
  Hardware limit:
  - J1: 336°(+176° ~ -160°)
  - J2: 236°(+208° ~ -28°)
  - J3: 224°(+157° ~ -67°)
  - J4: 319°(+184° ~ -135°)
  - J5: 257°(+129° ~ -128°)
  - J6: 720°(+360° ~ -360°)
- Repeatability: ±0.12mm
- Weight: arm 30kg
- Input voltage: single phase 100~240Vac

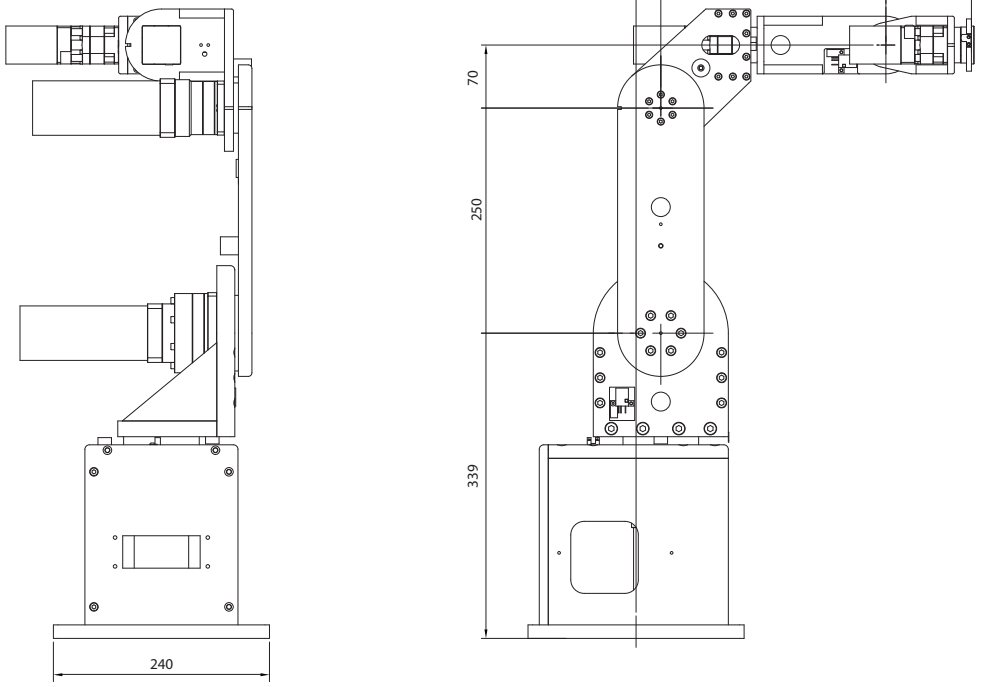
Controller

- DI/O: 15-ch DI/16-ch DO (DB37 connector)
- 1 x Intel® GbE LAN port
- 1 x VGA
- 2 x USB 2.0 (external)
- 1 x USB 3.0, 1 x USB 2.0 (inside cabinet)
- 1 x Emergency stop bottom
- Weight: control cabinet 20kg

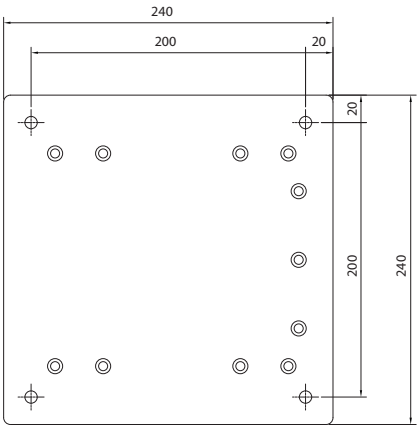
Software

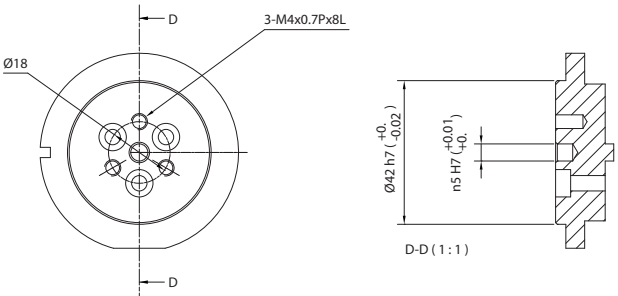
- NexGRC runtime (robot control runtime)
- NexMotion studio (configuration utility)
- Provide standard robot motion control functions
- Support C\C++, C# and VB.Net for user programming
- OS: WES7

Robot Operating Space



Installation





Ordering Information

Robot Package

- **MiniBOT robot package (P/N: 7900000179X00)**

Optional

- **Robot stand (P/N: 790000180X00)**
  70 x 70 x 78 (cm)
- **Robot stand (P/N: 7900000183X00)**
  80 x 80 x 78 (cm)
- **Gripper package (P/N: 7900000181X00)**
- **Terminal board package (P/N: 7900000182X00)**
  2m and DB-37 terminal board

Articulated Robot Solution

Open and Modular Solution
For Articulated Robot

Main Features

- Standard EtherCAT communication
- Robotic function APIs provided
- 1 ms control cycle time

Product Overview

NexROBA solution provides an open programming environment for users to develop their own robot applications. It consists of robot body and NexCOBOT's robot controller in the control cabinet. Motor drives, I/O signals and related circuits are all integrated based on EtherCAT control network. I/O and motor control can easily be expandded through EtherCAT communication. Beside general system configuration, NexROBA solution always allows the flexibility to change components in the robot system for unlimited possibilites.

Specifications

Robot

- Degree of freedon: 6
- Nominal load capacity: 5kg
- Motion range
  Maximum reach radius: 710mm (Point P)
  J1: ±165°
  J2: +85°~-125°
  J3: +185°~-55°
  J4: ±190°
  J5: ±115°
  J6: ±360°
- Position repeatability: ±0.03 mm
- Cycle time: 0.5 s
- Weight: 40 kg
- Installation: floor, ceiling, wall-mounting

Controller

- Intel® Core™ i5-3610ME processor pre-installed
- 2 x 2GB DDR3 SDRAM, pre-installed
- 500GB HDD
- 1 x EtherCAT port (Intel® 82574L)
- 1 x Intel® GbE LAN port
- 2 x DisplayPorts and 1 x VGA or 2 x DisplayPorts and 1 x DVI-D
- 4 x USB 3.0 & 2 x USB 2.0 ports
- 1 x CFast socket
- 5 x RS232 & 1 x RS232/422/485 with Auto Flow Control

Programming

- Language: visual C/C++
- Command set: positon command, velocity command, torque command
- Parameters: position, velocity, torque
- RT example (RTX project)
- User API example (win32 dll project)
- GUI example (C# project)

Ordering Information

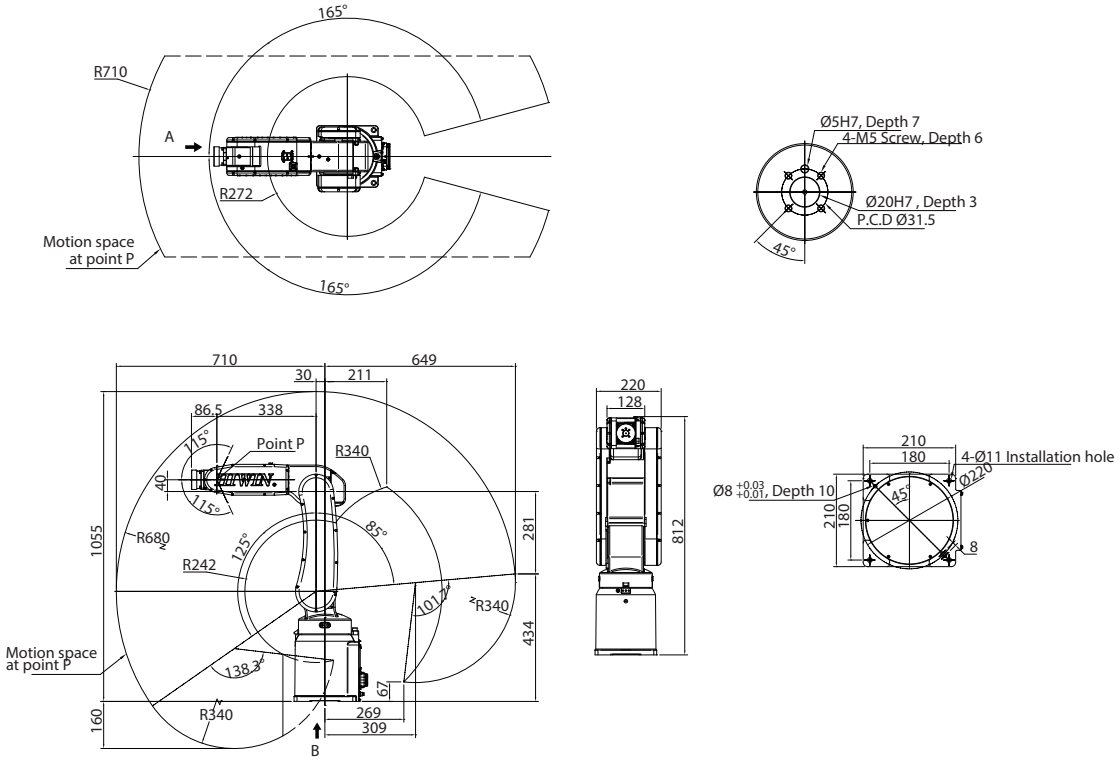
Robot Package

- **NexROBA 6R Edu package (P/N: 79J2ROBO01X00)**

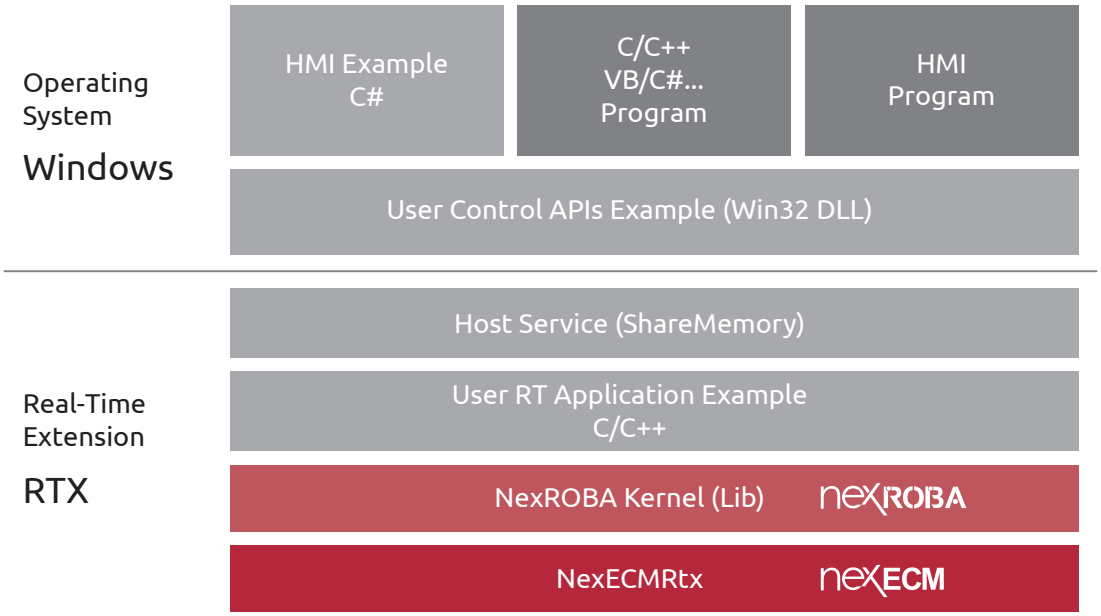
Optional

- **Robot stand (P/N: 7900000160X00)**
- **Teach pendant (P/N: 10IH0010001X0)**

Robot Operating Space



Software Architecture



Delta Robot Solution

Open and Modular Solution
For Delta Robot

Main Features

- Standard EtherCAT communication
- Robotic function APIs provided
- 1 ms control cycle time

Product Overview

NexROBA solution provides an open programming environment for users to develop their own robot applications. It consists of robot body and NexCOBOT's robot controller in the control cabinet. Motor drives, I/O signals and related circuits are all integrated based on EtherCAT control network. I/O and motor control can easily be expanded through EtherCAT communication. Beside general system configuration, NexROBA solution always allows the flexibility to change components in the robot system for unlimited possibilities.

Specifications

Robot

- Degree of freedon: 3
- Nominal load capacity: 0.5kg
- Motion range
  Horizontal stroke: 250mm
  Vertical stroke:100mm
- Position repeatability: ±0.02 mm
- Operation speed: 2m/s (unloaded)

Controller

- Intel® Atom™ processor E3826 Dual Core 1.46 GHz processor pre-installed
- 4GB DDR3 SDRAM, pre-installed
- 128GB SSD
- 1 x EtherCAT port
- 1 x Intel® GbE LAN port
- 1 x DVI display output
- 1 x VGA display output (converted from DVI-I to VGA adapter)
- 1 x USB 3.0 & 1 x USB 2.0 ports
- 1 x CFast socket
- 1 x SIM card holder
- 2 x RS232/422/485 with 2.5KV isolation protection, support Auto Flow Control

Programming

- Language: Visual C/C++
- Command set: positon command, velocity command, torque command
- Parameters: position, velocity, torque
- RT example (RTX project)
- User API example (win32 dll project)
- GUI example (C# project)

Ordering Information

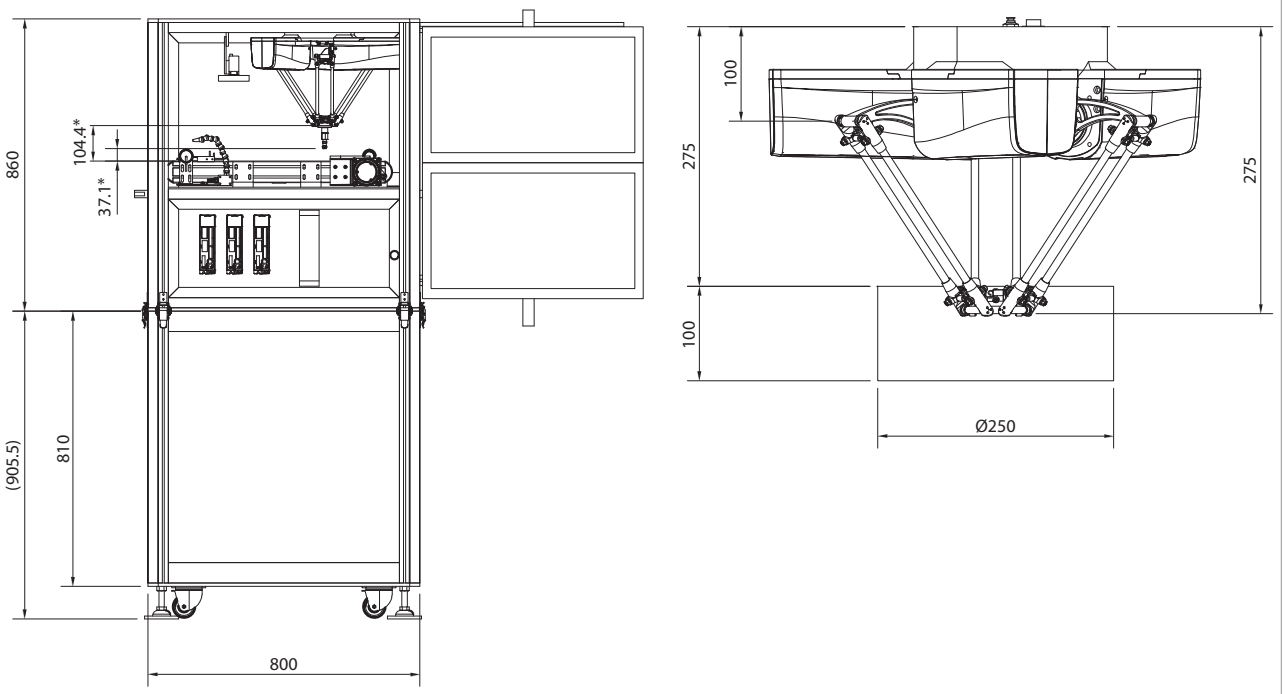
Robot Package

- **NexROBA miniDelta Edu package (P/N: TBC)**

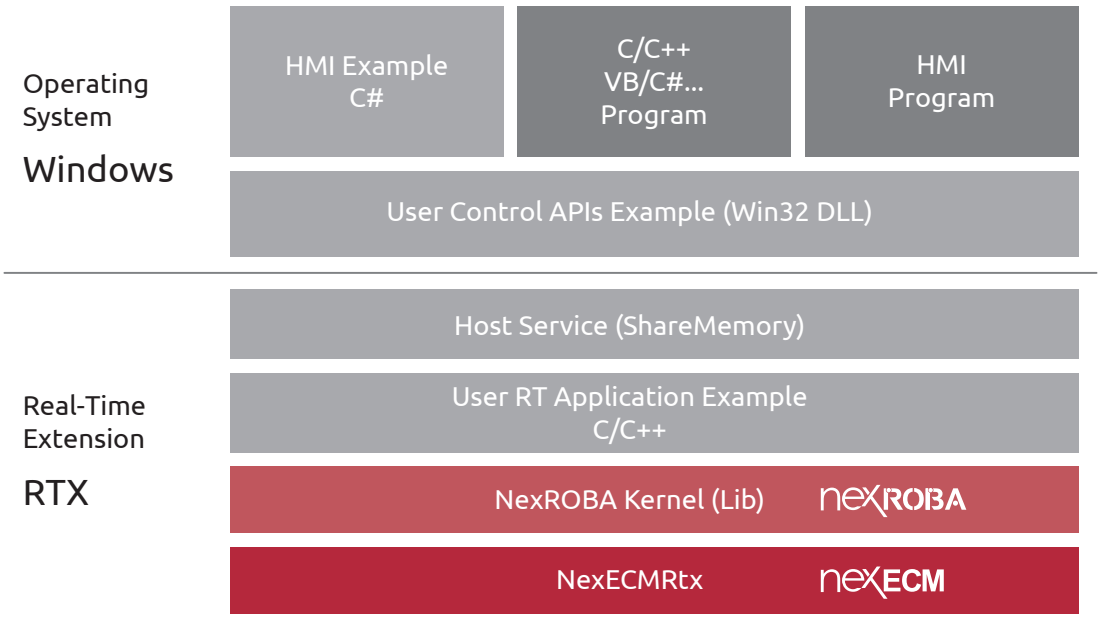
Optional

- **Conveyor system (P/N: TBC)**
- **Vision inspection system (P/N: TBC)**
- **Teach pendant (P/N: 10IH0010001X0)**

Robot Operating Space



Software Architecture



SCARA Robot Solution

Open and Modular Solution
For SCARA Robot

Main Features

- Standard EtherCAT communication
- Robotic function APIs provided
- 1 ms control cycle time

Product Overview

NexROBA solution provides an open programming environment for users to develop their own robot applications. It consists of robot body and NexCOBOT's robot controller in the control cabinet. Motor drives, I/O signals and related circuits are all integrated based on EtherCAT control network. I/O and motor control can easily be expanded through EtherCAT communication. Beside general system configuration, NexROBA solution always allows the flexibility to change components in the robot system for unlimited possibilities.

Specifications

Robot

- Degree of freedon: 4
- Nominal load capacity: 6kg
- Motion range
  Maximum reach radius: 600mm
  J1: ±130°
  J2: ±150°
  J3: 200mm
  J4: ±360°
- Position repeatability
  J1+J2: ±0.02 mm
  J3: ±0.01 mm
  J4: ±0.01 mm
- Cycle time: 0.5 s
- Weight: 20 kg
- J3 (Z-axis) push force: 100N
- Installation: floor, wall-mounting

Controller

- Intel® Core™ i5-520M processor pre-installed
- 2 x 2GB DDR3 SDRAM, pre-installed
- 500GB HDD
- 1 x EtherCAT port
- 1 x Intel® GbE LAN port
- Dual VGA or VGA/DVI independent display
- 6 x USB 2.0 ports
- 3 x RS232 and 1 x RS232/422/485 with Auto Flow Control
- 1 x PCI expansion (10W max./per slot, 169mm max. length)

Programming

- Language: visual C/C++
- Command set: positon command, velocity command, torque command
- Parameters: position, velocity, torque
- RT example (RTX project)
- User API example (win32 dll project)

Ordering Information

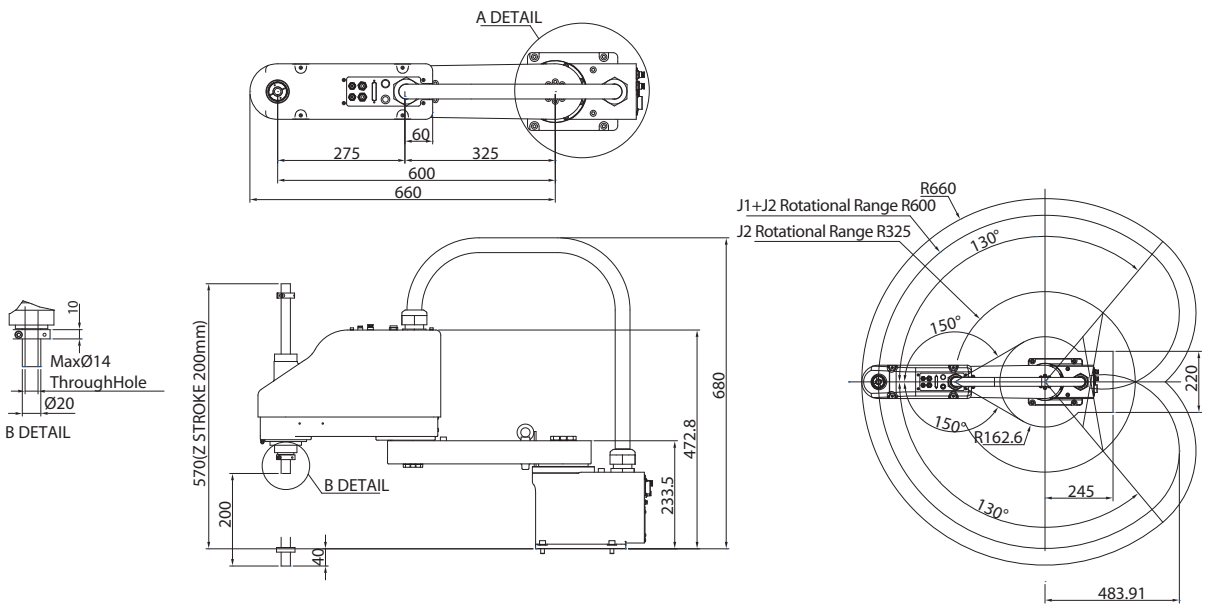
Robot Package

- **NexROBA SCARA Edu package (P/N: 7900000163X00)**

Optional

- **Robot stand (P/N: 7900000164X00)**
- **Teach pendant (P/N: 10IH0010001X0)**

Robot Operating Space



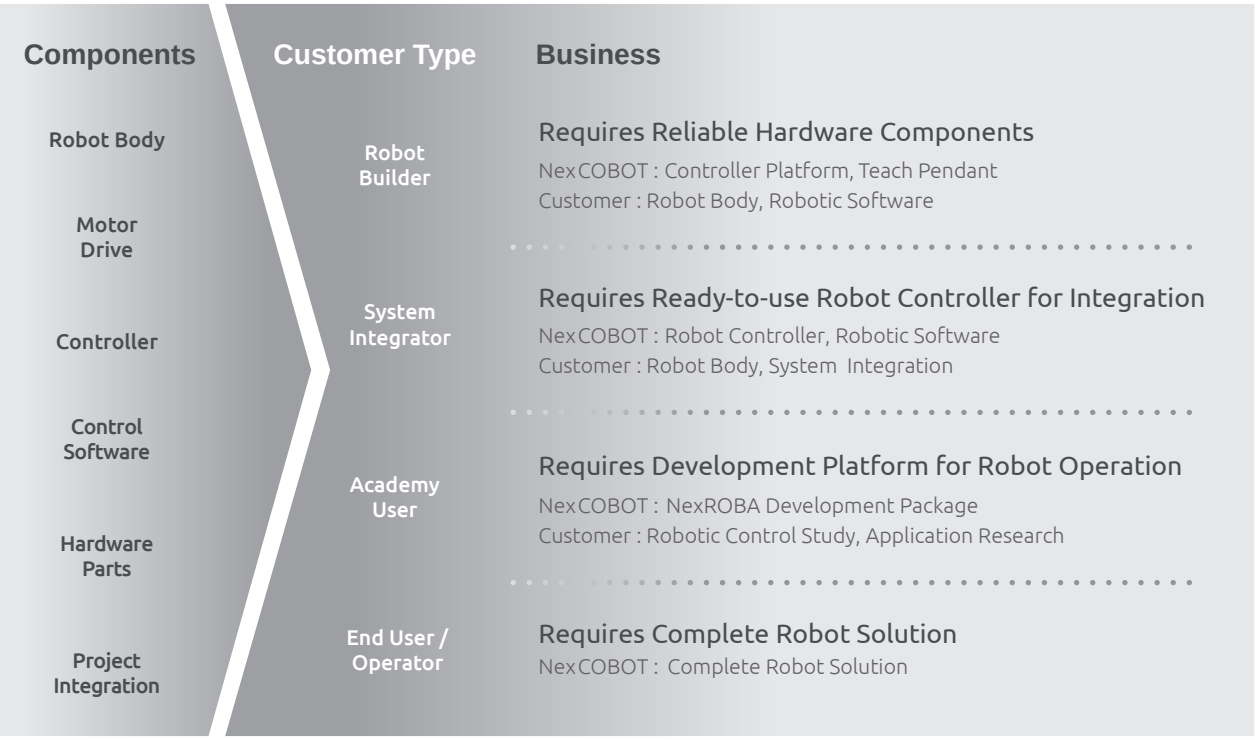
Software Architecture

Operating System Windows	HMI Example C#	C/C++ VB/C#... Program	HMI Program
	User Control APIs Example (Win32 DLL)		
Real-Time Extension RTX	Host Service (ShareMemory)		
	User RT Application Example C/C++		
	NexROBA Kernel (Lib) nexROBA		
	NexECMRtx nexECM		

NexROBA Industrial Solution

Flexible Building Blocks to Meet Various EtherCAT-based Robot Applications

As the need for industrial robots continues to rise, so do the demands for components to complete a robotic solution. However, these components may vary between customers. To address the various requirements of different users, NexROBA presents a modular solution by offering separating components. The following table illustrates how different types of robot customers can be categorized, what components they may need, and how NexROBA provides modular solution to satisfy these needs.



Robot Application Examples

Subsystem	Component	Auto Pasting Machine	Assembly Line	Industrial Robot
Domain Knowledge		Auto Giving and Paste on-the-fly	Picking and Placing	Robotic
Robot Body		HIWIN RD403	HIWIN RA605	Third-party
Robotic Control	Controller	NexCOBOT NET101	NexCOBOT NET3600E	NexCOBOT NISE 104/105
	Algorithm	NexCOBOT	NexCOBOT	Customer's
	Communications	EtherCAT	EtherCAT	Third-party
Device and Equipment	Application	Conveying System and ME Partner	Conveying System and Air Compressor	N/A
	HMI	NexCOBOT IPPC 1632P	NexCOBOT	Teach Pendant
	Remote I/O	NexCOBOT AXE-9200	VIPA SLIO	N/A

NexROBA Offering

CPU Board

RCB Series
Mini-ITX Board

Control System

RCS Series
Control Cabinet

Controller

NET101-GRC
Robot Controller for 3/4-axis Delta Robot

NET200-GRC
Robot Controller for 4-axis SCARA Robot

NET300-GRC
Robot Controller for 6-axis Articulated Robot

I/O Module

NEIO Series
EtherCAT I/O Modules

AXE-5904
EtherCAT 4-ch Pulse Output Module

Teach Pendant

TP100
10.1" Multi-touch Teach Pendant

Servo Drive

3rd-party EtherCAT Drives
Tested Device: SanyoDenki, Panasonic, Yaskawa, Shihlin

Control Software

NexROBA Simulator
Robot Simulation Software

NexGRC
Robot Control Software

Comprehensive Modular Solution

NexCOBOT robot solution breaks robot systems into discrete modules to liberate system integrators and robotics engineers from specifications lockdown. NexCOBOT offers a broad selections of modular solution that are essential in the control system of an industial robot. Its offerings include industrial-grade CPU boards, EtherCAT-based robot controller, control cabinet, EtherCAT slave I/O modules, teach pendant, 3rd-party EtherCAT drives, and robotic control software. Engineers could choose ones that best fit an application's needs from these products. Building, expanding, and reconfiguring robots with desired functions are now viable and simple thanks to the modular design.

Powerful Robotic Control Software

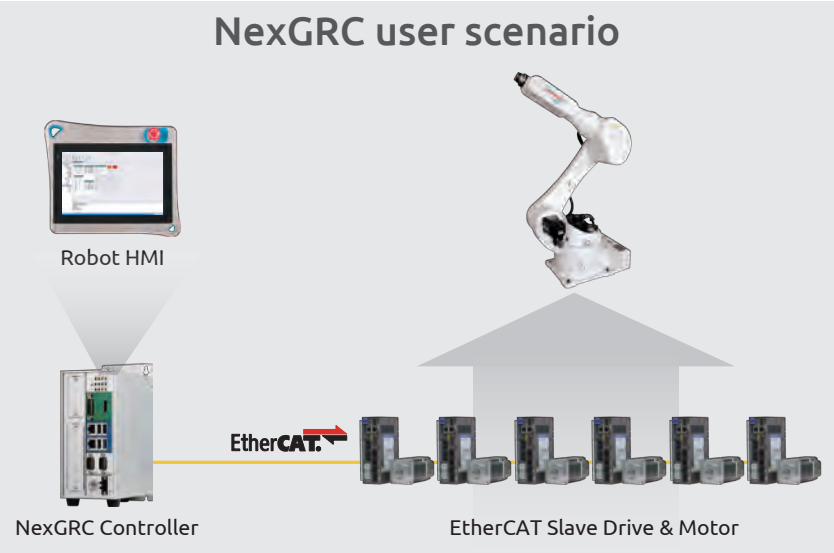
The flexibility of robot system is further enhanced with NexGRC—a robot control software.As EtherCAT communication is leveraged for robotic control, NexGRC provides pre-validated compatibility and smooth communication between robot controllers and EtherCAT slave modules from different brands. More importantly, control algorithms are pre-written and APIs re-embedded to accelerate the planning and control of industrial robots of 6-axis articulated robots, delta robots, and SCARA robots. With unprecedented flexibility from the bottom to the top of the robot development, manufacturers can create robot applications in-house, retaining industry expertise and hands-on knowledge inside the organization.

Control software is a key for robot and machinery, and NexCOBOT provides solutions with different layers of control software. All based on stnadard EtherCAT communication, NexCOBOT develops NexECM, NexGMC, NexGRC, and NexARC for specific purposes.

NexARC	Advanced Robotics	Advanced Robot Builder (6+N, 7 axis, Dual-Arm)
NexGRC	General Robotics	General Robot Builder (6-Axis, Delta, SCARA)
NexGMC	Motion Control	System Integrator/ Machine Builder
NexECM	EtherCAT Master	Controller Maker

NexGRC

NexGRC is the control software for general robots, such as 6 axis articulated robots, Delta robots (parallel robot) and SCARA robots. NexGRC provides Microsoft Windows APIs for users to develop their own robot applications. Users can even develop their own robot control interface. NexGRC also includes a powerful integrated development environment "NexMotion Studio", which can be used to easily configure EtherCAT slave and robot parameters.



NexARC

Based on GRC, an ARC (Advanced Robotic Controller) can provide more advanced robot functions for advanced robot makers to build more specialist types of industrial robot, such as a collaborative robot or a 7-axis articulated robot.
Supports non-generic industrial robots:

1

7-Axis Robot

2

Dual-Arm Robot

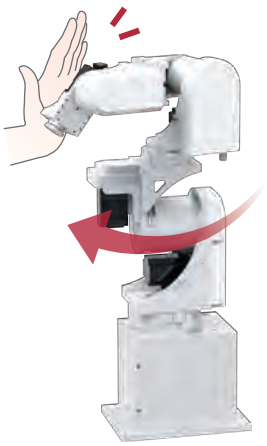
3

6+N Robot

NexARC provides kinematics for special robots, and at the same time some advanced features that are necessary for collaborative robots. These includes hand-guiding robot to teach, and force limit to stop robot operations.

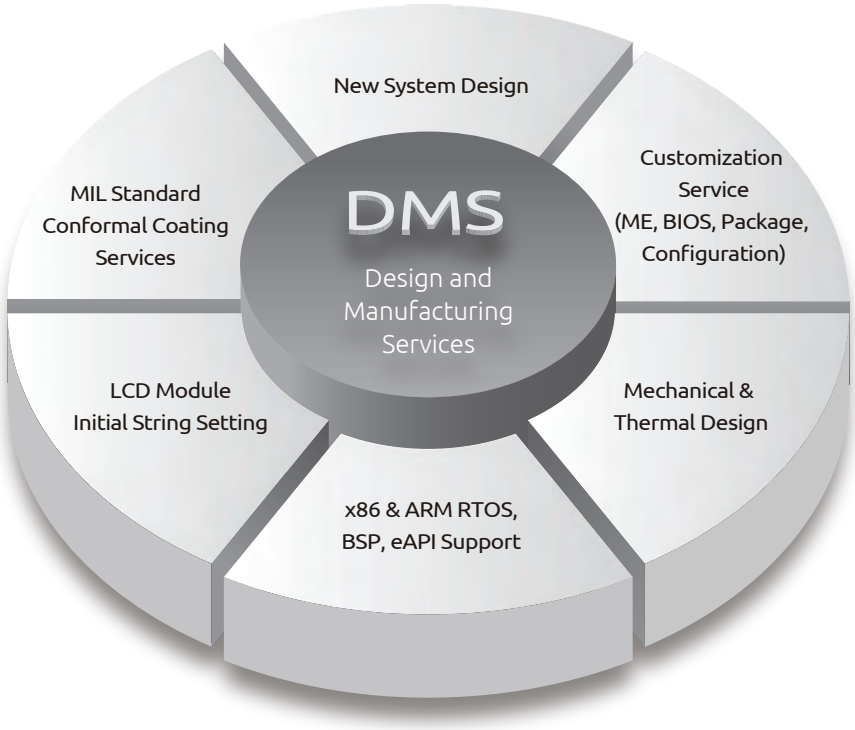
- Sensor-less Direct Hand-guide Teaching Function
  Users can move the robot with their hands

- Sensor-less Touch-stop Function
  The robot will immediately stop when detecting a collision



DMS Service Scope

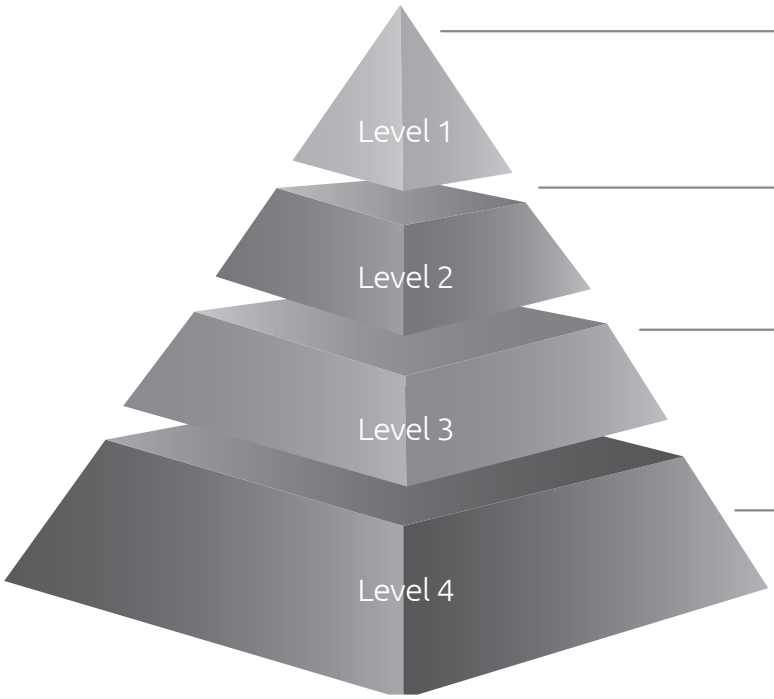
Original Design Manufacturing Service (ODMS) NexCOBOT offers a complete ODM Service starting from the brand new product design right through to the finished product. We can design products based on the customer's unique specifications and application requirements. Customization to Order Service (CTOS) NexCOBOT also provides CTOS, which is a quick-to-market solution by modifying the existing products to fit your business requirements, such as BIOS setting, component change by using current PCM layout, chassis color change, and packing accessories etc.



- Electronic Design
- PCB Layout Design
- BIOS porting
- EC/ MCU porting
- Driver/ eAPI Porting
- Industrial Design
- Mechanical Design
- Thermal Design
- System Integration Design
- System Validation

Design & Manufacturing Service Levels

With decades of industrial computing experience, NexCOBOT has the capability to provide different levels of customized service to manufacture innovative products with exceptional high quality. We can assist you to differentiate from competitors, and save significant time and efforts.



New Project

The design of new board & system is available. NRE and quantity commitment are required.

Manufacturing Service

Contract manufacturing: The service includes system assembly & burn-in, software loading & testing. MOQ and manufacturing service charge are required.

Customized Build

Customers can change the membrane and chassis color to re-brand the packing. NexCOBOT can offer dedicated part numbers and BOM. MOQ and service charge are required.

Logo Re-brand

We provide the service to change the membrane to re-brand the company logo on the front panel. Customers need to provide membrane drawing with all color pantone number. There is service charge involved.

General Robot Controller

Built-in General
Robotic Control Software

Main Features

- Support robot type: articulated (6 axis)/SCARA/Delta
- Robot control command: PTP/linear/3D arc
- Support extension axis control: PTP/jog/halt/stop
- Support C\C++,C# and VB.Net for user programming
- Provide robot GUI with TP100 (optional)

Product Overview

NET-GRC series presents intelligent PC-based robotic controller for robot automation. It integrates NexCOBOT's general robotic control software, NexGRC, to perform real-time motion control and supports several standard robot like articulated robot (6 axis), SCARA robot and Delta robot. NET-GRC not only provides standard GUI with TP100 for users directly control their own robot hardware, but also provides windows APIs for users developing their own robot control GUI or application. Besides, NET-GRC also adapts an integrated development environment called NexMotion studio to speed up development time for users.

Specifications

NexGRC Runtime

- Support robot type: articulated (6 axis)/SCARA/Delta
- Robot control command: PTP/linear/3D arc
- Robot blending motion: aborting/buffered/blending
- Extension single axis no.: up to 8 axes
- Single axis control functions: PTP/jog/halt/stop
- Single axis blending motion: aborting/buffered/blending
- Single axis override functions: position/velocity/acceleration/deceleration
- NexCOBOT EtherCAT master, CoE and DC supported
- Support standard EtherCAT slave devices

NexMotion Studio

- EtherCAT devices offline edit and online scan
- EtherCAT master configuration
- PDO mapping edit
- Online SDO edit
- Export ENI
- CiA402 device operation: PP/PV/PT/CSP
- Single axis edit and operation
- Robot edit and operation
- I/O mapping edit and operation
- Provide simulation operation mode

User Programming

- Provide windows APIs for user programming
- Support programming language: C\C++, C#, VB.Net

Pre-Installed Software Package

- Operating system: Windows Embedded Standard 7
- NexARC runtime
- NexMotion studio

Platform Selection Guide

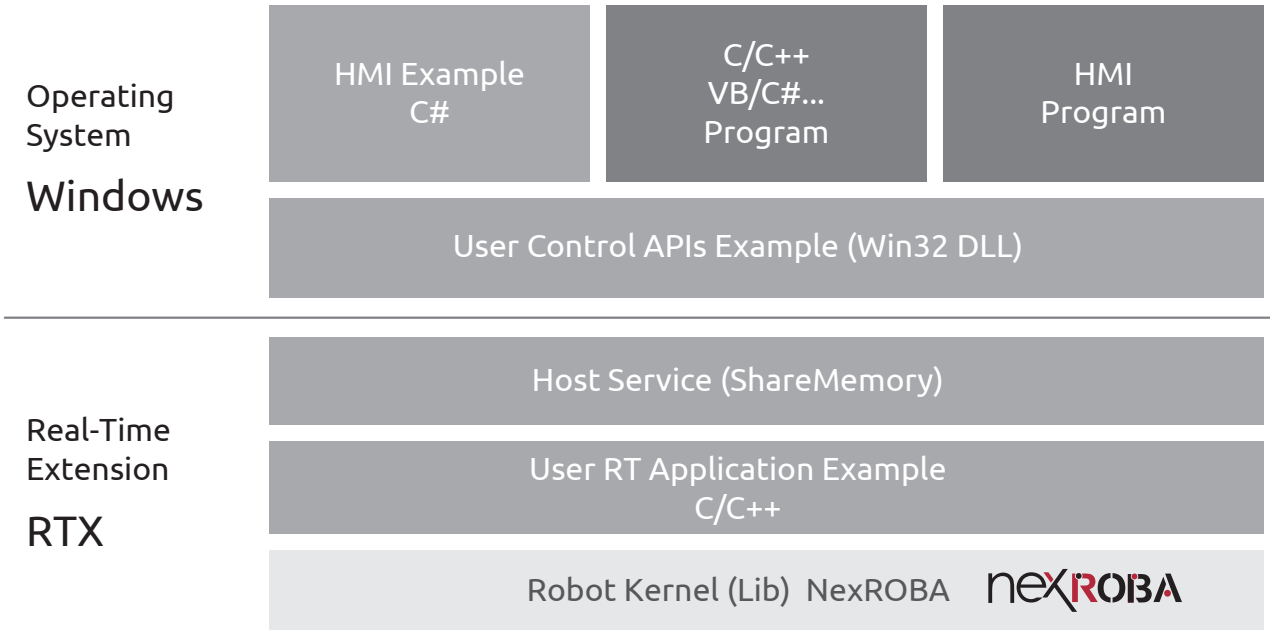
NET 200-GRC (P/N:A0J10020003X0)
Front-access compact general robotic controller

- CPU: Intel® Celeron® J1900 Quad Core 2.0GHz
- Chipset: Intel® NM10
- Memory: 4GB DDR3L
- Storage: 500GB HDD
- Display: 1 x DVI-I, 1 x DP
- USB: 3 x USB 2.0, 1 x USB 3.0
- LAN ports: 2 (1 x Ethernet,1 x EtherCAT)

NET 300-GRC (P/N:A0J10030000X0)
Front-access high-performance robotic motion controller

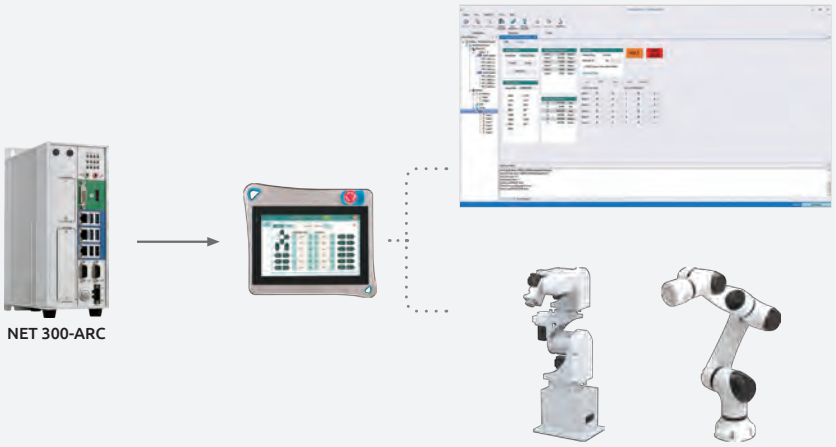
- CPU: Intel® Core™ i5-6500TE Quad Core 2.3GHz
- Chipset: Intel® Q170
- Memory: 4GB DDR4
- Storage: 256GB SSD
- Display: 1 x DVI-D, 1 x HDMI
- USB: 2 x USB 2.0, 4 x USB 3.0
- LAN ports: 3 (2 x Ethernet,1 x EtherCAT)

Software Architecture



Advanced Robot Controller

Built-in Advanced
Robotic Control Software



Main Features

- Support robot type: articulated (6 & 7 axis)
- Robot control command: PTP/linear/3D arc
- Ramp profile: T curve/S curve
- Optimize path planning: joint limit/self-collision avoidance
- Co-Robot function: hand-guide/collision detect stop

Product Overview

NET-ARC series presents intelligent PC-based advanced robotic controller for robot automation. It integrates NexCOBOT's general robotic control software, NexGRC, and Actin runtime kernel from Energid Technologies, to perform real-time motion control and supports redundant robot like articulated 7 axis robot, or provide Co-Robot functions to standard articulated 6 axis robot. Energid Technologies locate at United State and Energid Technologies develops advanced software and robotic systems for the aerospace, agriculture, manufacturing, transportation, defense, and medical industries. NET-ARC provides standard GUI with TP100 for users directly control their own robot hardware, and adapts an integrated development environment called NexMotion studio to speed up development time for users.

Specifications

NexARC Runtime

- Support robot type: articulated (6 & 7 Axis)
- Robot control command: PTP/linear/3D arc
- Robot blending motion: aborting/ buffered/ blending
- Ramp profile: T curve/S curve
- Optimize path planning: joint limit/self-collision avoidance
- Co-Robot function: hand-guide/collision detect stop
- NexCOBOT EtherCAT Master, CoE and DC supported
- Support EtherCAT slave devices

NexMotion Studio

- EtherCAT devices offline edit and online scan
- EtherCAT master configuration
- PDO mapping edit
- Online SDO edit
- Export ENI
- CiA402 device operation: PP/PV/PT/CSP
- Single axis edit and operation
- Robot edit and operation
- I/O mapping edit and operation
- Provide simulation operation mode

Pre-Installed Software Package

- Operating system: Windows Embedded Standard 7
- NexARC runtime
- NexMotion studio

Platform Selection Guide

NET 300-ARC (P/N:A0J10030000X0)
Front-access high-performance robotic motion controller

- CPU: Intel® Core™ i5-6500TE Quad Core 2.3GHz
- Chipset: Intel® Q170
- Memory: 4GB DDR4
- Storage: 256GB SSD
- Display: 1 x DVI-D, 1 x HDMI
- USB: 2 x USB 2.0, 4 x USB 3.0
- LAN ports: 3 (2 x Ethernet,1 x EtherCAT)

Supported Robot Types

1

7-Axis Robot

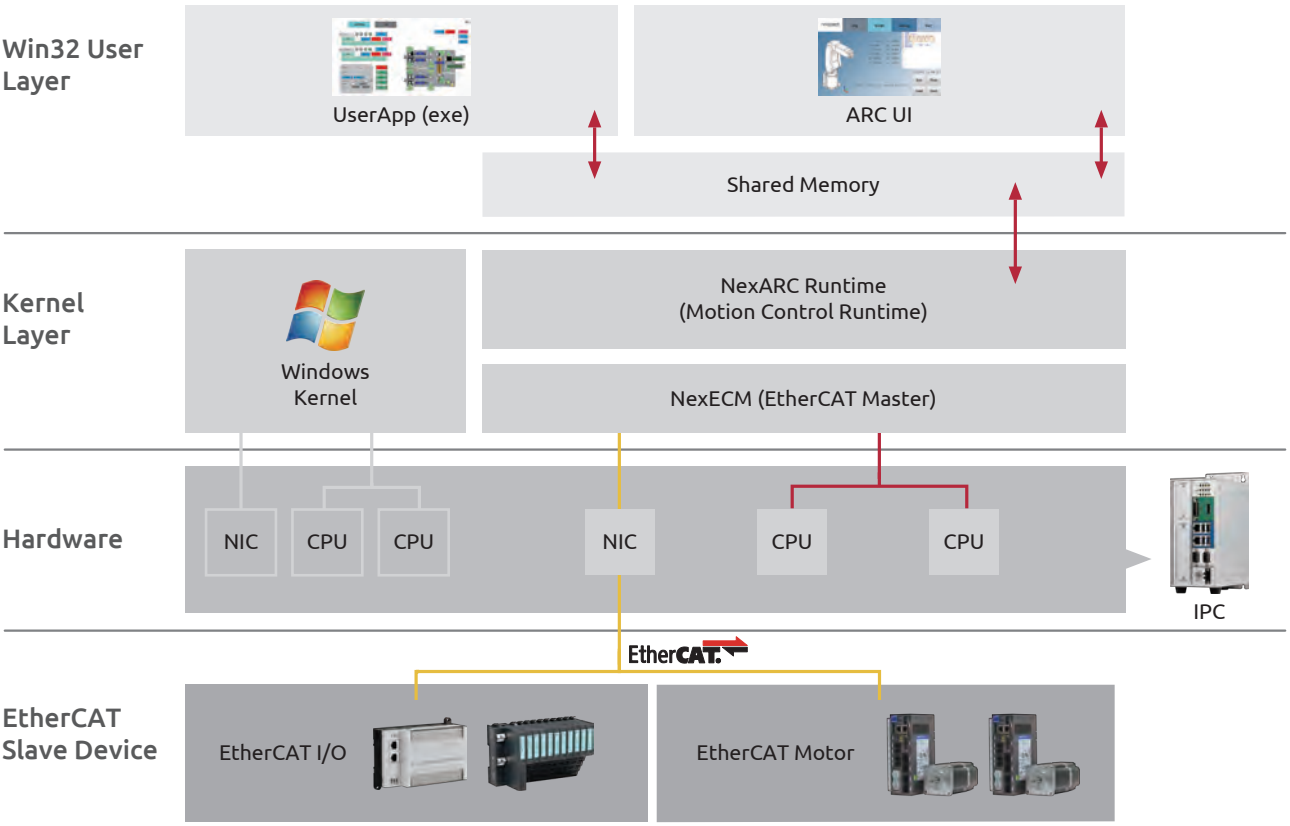
2

Dual-Arm Robot

3

6+N Robot

Software Architecture



TP-100-VGA

10.1" 16:10 WXGA P-Cap Multi-Touch Teach Pendant, VGA Input

Main Features

- Modern, ergonomic, user-friendly and operated comfortably
- Multi channels deadman switch and E-Stop button
- Full IP65 protectione
- 10.1" WXGA 1280 x 800 500 nits LED panel
- 5 points projected capacitive touch with Full IP65 protection
- Two external USB 2.0 for data backup
- An emergency-stop button is available as further safety element
- Anti-vibration/shock IEC/EN 61131-2 compliance
- EMC (IEC/EN 61000-6-2/4, IEC/EN 61131-2) compliance
- System frame ground protection (GPE) design

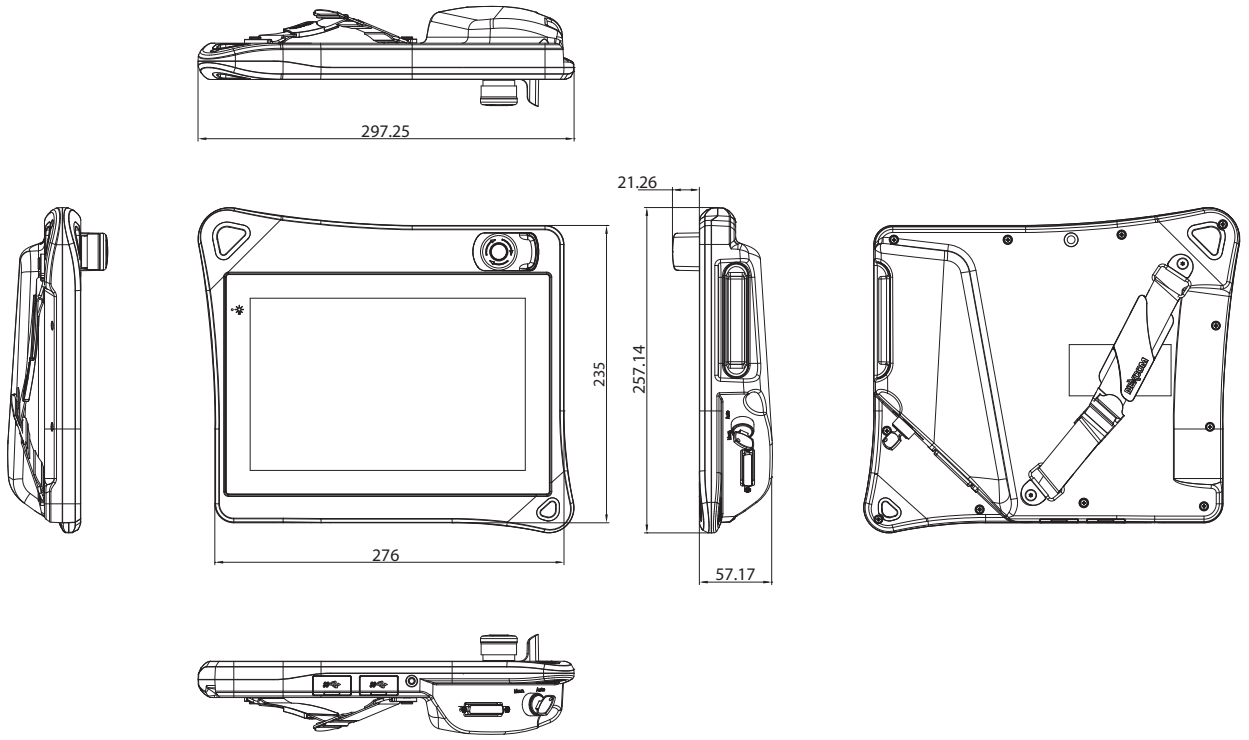
Product Overview

TP-100-VGA is handheld operating teach pendent features an ergonomic housing with a safety elements, 10.1" WXGA resolution Panel and Multi-Touch P-Cap. The handheld control unit is greatest comfortable to used and also support left-hander with optional shoulder Strap.

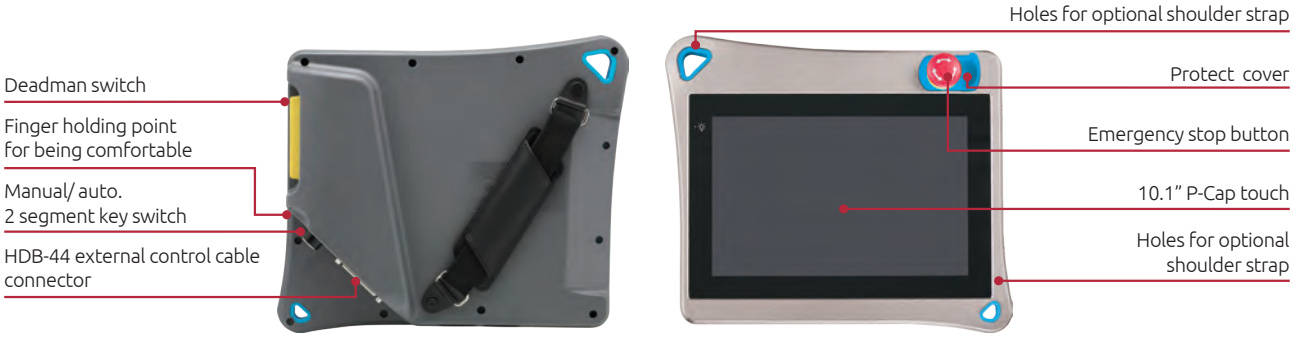
Specifications

Technical Data	TP-100-VGA	Technical Data	TP-100-VGA
Panel	- 10.1", 16:10, WXGA, 1280 x 800 - Luminance: 500 cd/m^2 - Contrast ratio: 800:1 - LCD color: 16.7M - Viewing angle: 85 (U), 85 (D), 85 (L), 85 (R) - Backlight: LED	Interface	- Data back-up: 2 x USB 2.0 - Controle connector: HDB-44 female › Removable HDB-44 control cable (optional) › Including power, E-stop buttons, deadman switch, key switch, USB 2.0 and VGA signals
Touch	- Touch: 5 points P-Cap - Touch light transmission: 87% - Touch interface: USB - Anti-scratch surface: 7H hardness	Ratings	- Power supply voltage: 24 Vdc (19.2 to 28.8 Vdc) - Current consumption: › TP-100-VGA 0.625A at 24Vdc (max.)
Safety Elements	- Emergency stop button (2 NC channels, B10d=130,000) › Contact function: latching › Reset: by rotating - 3-position Deadman switch (3 channels 2 NO &1 NC, B10d=100,000)	Mechanical	- Dimension: 297.3 x 257.2 x 57.2 mm (78.5mm including E-stop button) - Weight (without external control cable): › TP100-VGA 1.5Kg - Front bezel: aluminum magnesium alloy; color: Pantone 8424C - Back cover: ABS+PC; color: Pantone 432C - IP protection class: Full IP65
Operating Elements	- 2-position key switch (2 channels)	Environment	- Operatng temperature: 0°C to 50°C - Storage temperature: -20°C to 75°C - Operating humidity: 5%~90% relative humidity, non-condensing - Vibration resistance/shock-proof/free-fall according to EN 61131-2
System	- TP-100-VGA: VGA input - USB2.0 upstream	Certifications	- CE (Emission EN61000-6-4; Immunity EN61000-6-2 for installation in industrial environments) - FCC Class A

Dimension Drawing



Function and Ergonomic Design



HDB-44 Pin Definition

44-Pin	Function	44-Pin	Function	44-Pin	Function	44-Pin	Function
1	Shielding	12	DS_NO_2-A	23	VGA_BLUE_GND	34	Shielding
2	DC Power+	13	DS_NO_2-B	24	VGA_VSYNC	35	VGA_RED
3	DC Power-	14	DS_NC_3-A	25	VGA_DDCDAT	36	VGA_GREEN
4	ES_NC_1-A	15	DS_NC_3-B	26	VGA_5V	37	VGA_BLUE
5	ES_NC_1-B	16	KS_NC_1-A	27	USB_5V	38	VGA_HSYNC
6	ES_NC_2-A	17	KS_NC_1-B	28	USB-	39	VGA_DDCCLK
7	ES_NC_2-B	18	KS_NC_2-A	29	USB3_RXN	40	VGA_GND
8	RESERVED	19	KS_NC_2-B	30	USB3_TXN	41	USB_GND
9	RESERVED	20	RESERVED	31	RESERVED	42	USB+
10	DS_NO_1-A	21	VGA_RED_GND	32	RESERVED	43	USB3_RXP
11	DS_NO_1-B	22	VGA_GREEN_GND	33	Shielding	44	USB3_TXP

Ordering Information

Barebone

- **TP-100-VGA (P/N: 10IH0010001X0)**
  10.1" 16:10 WXGA P-Cap multi-touch teach pendant display, VGA input

Robot Controller System

Compact Solutions for
Small Payload Robot

Main Features

- Compact size
- Suitable for small payload robot
- Wide range motor supported
- Provide PoE for machine vision application
- Integrated with NexCOBOT robotic controller: NexGRC/NexARC

Product Overview

NexCOBOT Robot Control System (RCS) ensures simple and powerful robotic automation. RCS adapt NexCOBOT intelligent PC-based robotic controller and integrates with NexCOBOT's robotic control software, NexGRC/NexARC, is an efficient and flexible robotic control system. RCS is designed for small payload robot such as articulated robot (6 axis & 7 axis), SCARA robot and Delta robot. RCS support several different brand motor which allows user have more flexibility for their own robot solution. RCS also provide EtherCAT port and PoE port for user to connect to EtherCAT slaves and machine vision devices, let the robot system easily to extend axis control and integrate with machine visioin application.

Specifications

RCS

- Integrated with NexCOBOT robotic controller: NexGRC/NexARC
- Integrated with NexCOBOT teach pedant: TP100
- Provide PoE for machine vision application: 1 x PoE, IEEE 802.3af compliant
- Provide EtherCAT extension port for connecting more EtherCAT slaves
- Integrated with NexCOBOT safety controller and provide safety I/O
- Provide extension digital I/O: 16in/16out

Including Additional Hardware

- TP100

Pre-Installed Software Package

- Operating system: Windows Embedded Standard 7
- NexGRC/NexARC runtime
- NexMotion studio

NexGRC Runtime

- Support robot type: articulated (6 axis)/SCARA/Delta
- Robot control command: PTP/linear/3D arc
- Robot blending motion: aborting/buffered/blending
- Extension single axis no.: up to 8 axes
- Single axis control functions: PTP/jog/halt/stop
- Single axis blending motion: aborting/buffered/blending
- Single axis override functions: position/velocity/acceleration/deceleration
- NexCOBOT EtherCAT master, CoE and DC supported
- Support standard EtherCAT slave devices

NexARC Runtime

- Support robot type: articulated (6 & 7 Axis)
- Robot control command: PTP/linear/3D arc
- Robot blending motion: aborting/ buffered/ blending
- Ramp profile: T curve/S curve
- Optimize path planning: joint limit/self-collision avoidance
- Co-Robot function: hand-guide/collision detect stop
- NexCOBOT EtherCAT Master, CoE and DC supported
- Support EtherCAT slave devices

RCB100

RCB 100 robot controller provides robot control functionalities integrated with NexGRC, and rich I/Os such as 2 x I210 LAN port for EtherCAT communication, 1 x VGA port to connect to teach pendant, and 2 x USB 2.0 for software license dongle. RCB100 also comes with isolated digital I/O for multiple usages and PoE port to connect to Industrial cameras.

- Mini-ITX Form Factor(17 × 17 cm)
- 6th Gen Core i7 / i5 / i3 LGA1151 socket
- Intel® H110 chipset
- 2x DDR4 SO-DIMM, support up to 16GB
- 1 x SATA port
- Edge I/O
  - 1 x RS232/422/485 with Auto flow control
  - 1 x HDMI (4096x2160 @24Hz, 24 bpp)
  - 2 x USB 3.0, 4 x USB 2.0
  - 2 x I211AT GbE LAN
  - 1 x PoE, IEEE 802.3af compliant
- Internal I/O
  - 1 x RS232/422/485 with Auto flow control
  - 2 x I210-AT GbE LAN
  - 2 x USB 2.0
  - 1 x VGA (1920 x 1200@60Hz)
  - Isolated 12 DI (NPN/PNP), 4 DO (PNP)
- Expansion
  - 1 x PCIex16 (Gen3.0)
  - 1 x mPCIe
- Support AT/ATX mode
- Environment
  - Operation temperature: 0~60°C with CPU fan and system fan
  - Operation temperature: -20~80°C
  - Relative humidity: 90%, non-condensing

Platform Selection Guide

Item	RCS 100	RCS 200
Dimensions (W x H x D)	300 x 270 x 300 mm	480 x 270 x 460 mm
Processor	6th Gen Celeron G3900	6th Gen Celeron G3900
Number of axes	7 axis (200W*3+100W*2+50W*2)	6 axis (Max 750 W*6) 7 axis (option) (Max 750 W*7) 8 axis (option) (Max 750 W*8)
Supported motors	Sanyo Denki 48 V_{DC} servo	Tamagawa AC servo Sanyo Denki AC servo (option)
Supported Encoder		Tamagawa Nikon
Rated supply voltage	120V to 240V AC	240V AC
Protection rating	IP20	IP20

RCB100

Robot Control Main Board

Main Features

- Mini-ITX Form Factor
- 6th Gen Core™ i7/i5/i3 and Intel® Celeron
- Internal USB for software license dongle
- Optional digital isolated I/O
- PoE for machine vision application
- Internal VGA for teach pendant

Product Overview

RCB100 is designed for robotic control application. RCB100 equips with rich I/Os for robot control application, including 2 x I210 LAN port for EtherCAT communication, 1 x VGA port to connect to teach pendant, and 2 x USB 2.0 for software license dongle. RCB100 also comes with isolated digital I/O for multiple usages and PoE port to connect to industrial camera.

Specifications

CPU
- Socket LGA1151, Intel® 6th and next generation Core™ i7/i5/i3 processor and Intel® Celeron® processors, 14nm process

RAM
- Dual DDR4/SO-DIMMs, up to 32GB

Chipset
- Intel® H110 PCH

On Board Interface
- 2 x I210-AT GbE LAN
- 2 x USB 2.0
- 1 x VGA (1920 x 1200@60Hz)
- 1 x RS232/422/485 with auto flow control
- 12in(NPN/ PNP type), 4out(NPN type) (need optional board)

Display
- 1 x HDMI
  (4096x2160 @24Hz, 24 bpp)

Extension slot
- 1 x PCIex16 Gen3
- 1 x miniPCIe
- 1 x SATA

Edge I/O interface
- 1 x RS232/422/485 with Auto flow control (default RI)
- 2 x USB 3.0, 4 x USB 2.0
- 2 x I211AT GbE LAN (one port can be PoE port, IEEE 802.3af compliant, need optional PSE board)

Audio
- Not support

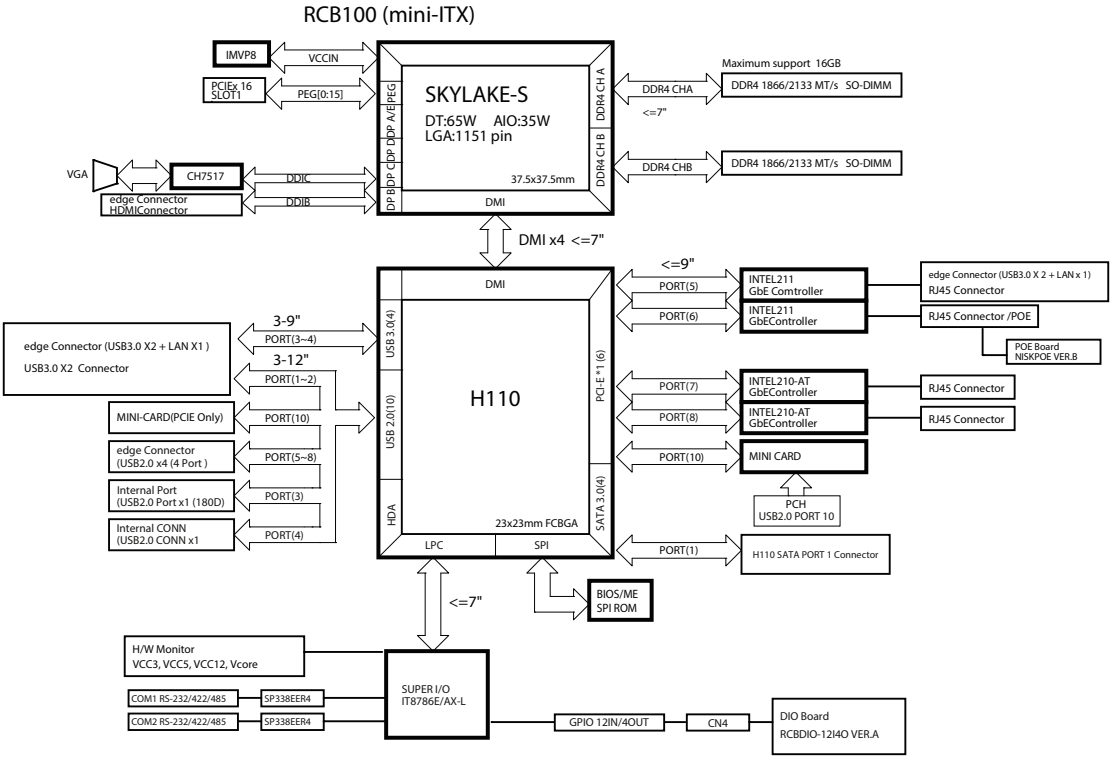
Power input
- Support At/ ATX mode
- ATX 4-pin connector for 24V ± 10%

Form Factor
- Dimensions: Mini-ITX (6.7-in x 6.7-in)

Environment
- Operating temperatures: 0°C to 60°C with CPU fan and system fan
- Storage temperature: -20°C to 80°C
- Relative humidity: 90%

Certifications
- CE
- FCC Class A
- EN61000-6-4 / EN61000-6-2

Dimension Drawing



Ordering Information

- **RCB100 (P/N: 10J200RCB00X0)**
  MiniITX Intel® 6th-Gen Core™ i7/i5/i3/Celeron board
- **RCBDIO12I4O (P/N: TBD)**
  Isolated 12in, 4out digital I/O board
- **NISKPoE (P/N: TBD)**
  PoE PSE Module

Robot Gateway

Main Features

- Support Mainstream Industrial Robots
- Robot Status Monitoring
- Robot Failure Detection
- Transfer Data to SQL Database
- Compact Design (Din-rail or Screw Mount)

Product Overview

Robot gateway provides an important role of connecting industrial robots to the control system, enabling independent robots to upload operation information. The gateway will transfer robot data to data base so that cloud application, such as factory dashboard, can easily access the data and integrate the information together with other system in the production line.

Specifications

Robot Connectivity

- Supported Protocol: TCP, Modbus/TCP, Fanuc interface
- Data Update cycle: < 100ms for 20 robots
- Robot Data
  - Operation mode
  - Robot status
  - Axis angles
  - Position
  - Velocity
  - I/O Information
  - User-defined data (depending on robots)

SQL Database

- Built-in SQL database in gateway
- Robot information directly stored in SQL format
- Data of multiple robots

Hardware Specifications

- Onboard Intel® Atom™ processor E3826 Dual Core 1.46GHz
- 1 x Micro HDMI DisplayPort (type D)
- Onboard 16GB eMMC
- 2 x Intel® I210AT GbE LAN ports
- 1 x USB 3.0 and 1x USB 2.0
- 1 x RS232/485 with auto flow control

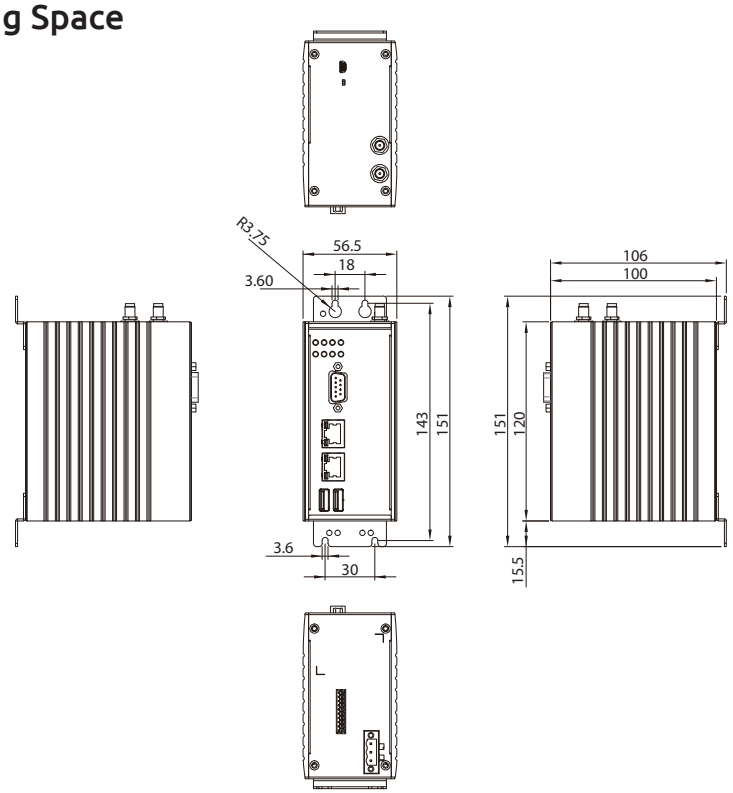
Environment

- Operating temperature:
- Ambient with air flow: -5°C to 55°C
  (according to IEC60068-2-1, IEC60068-2-2, IEC60068-2-14)
  1 x Micro HDMI DisplayPort (type D)
- Storage temperature: -20°C to 75°C
- Relative humidity: 10% to 93% (non-condensing)
- Shock protection:
  - mSATA/eMMC: 50G, half sine, 11ms, IEC60068-27
- Vibration protection w/ mSATA or eMMC condition:
- Random: 2Grms @ 5~500 Hz, IEC60068-2-64

Certifications

- CE Approval
  - EN61000-6-2
  - EN61000-6-4
- FCC Class A

Robot Operating Space



Ordering Information

- **RG103 (P/N: TBD)**
  Compact Robot Gateway

NexMotion Solutions

EtherCAT Motion Control

EtherCAT - The Real-time Ethernet Fieldbus

EtherCAT (Ethernet for Control Automation Technology) is a high-performance fieldbus protocol which allows automation equipment such as servo drives, intelligent sensors and I/O devices to be connected using Ethernet. Because it offers higher accuracy and throughput at a lower cost, EtherCAT has been widely adopted in the automation industry as the mainstream real-time Ethernet protocol for robot and machinery.

NexMotion - Comprehensive EtherCAT Solution

NexCOBOT has been investing R&D resources in developing its own EtherCAT master core architecture. Leveraging industrial grade Ethernet technology, NexMotion, NexCOBOT's EtherCAT Solution, offers a complete solution, ranging from EtherCAT master platforms to a series of EtherCAT slave modules.

Compared to legacy pulse and voltage commands, EtherCAT commands are digitized to improve its immunity from electrical noise in robot and machinery environments. Furthermore, the Ethernet-based wiring design allows NexMotion products to add greater flexibility and expandability to control systems.

EtherCAT Comprehensive EtherCAT Solution

Master Controller	Control Software	Slave Module	Slave Chip
 **NET-ECM Series** EtherCAT Master Controller	**NexECM** EtherCAT Master Stack	 **NEIO Series** High-density I/O Module	 **NexECM Chip** Multi-function EtherCAT Slave Chip
 **NET-GMC Series** EtherCAT Motion Controller	**NexGMC** General Motion Control	 **AXE-5904** 4-ch Pulse Output Module	

Pre - Verified EtherCAT Slaves

EtherCAT, as a high-speed fieldbus protocol, is supported by many vendors to provide related slave module products. NexCOBOT's EtherCAT controller, NET Series controllers, has performed strict tests with a number of EtherCAT slaves. Users can ensure compatibility between NET Series controllers and EtherCAT slaves by choosing from the verified slave list to construct an EtherCAT system with guaranteed performance.

EtherCAT Validation Test

- Up to 64 Servo Drives
- Within 250 μs
- Multi-task

* Up to 64 EtherCAT Servo Drives

Drive

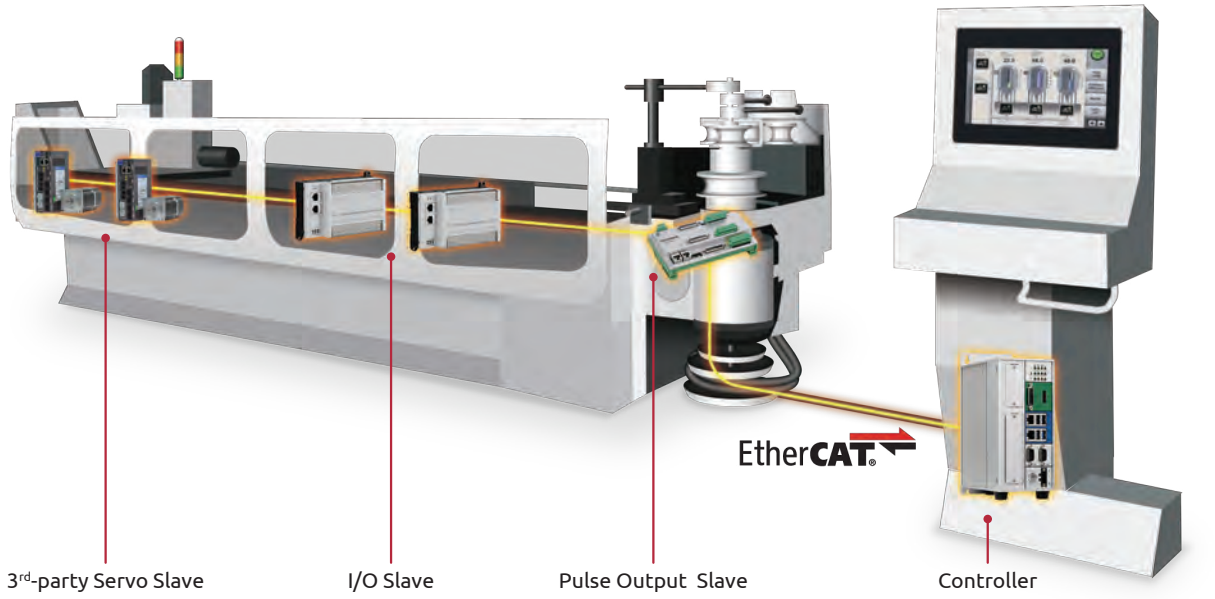
- Yaskawa Sigma 5/7
- Hiwin D2, D1
- Omron R88D
- Delta A2E
- Servotronix CDHD
- Sanyo PB4D, R Series
- Panasonic MINAS A5B
- Mitsubishi MR J3-T04
- Schneider LXM32
- MiControl mcDSA-E65
- Maxon MAXPOS

I/O

- NexCOBOT NEIO Series, AXE-5904, AXE-9801
- Prima C1, E1, E2 Series
- VIPA SLIO Series
- Beckhoff EL1, EL2, EL4, EL30, EK1100
- SYN-TEK ESC5500, ESC6022
- WAGO 750 Series

Guaranteed Performance

Based on Microsoft's Windows OS and well-known real-time extensions, NexCOBOT's EtherCAT master software, NexECM, executes high-performance EtherCAT. It supports a maximum of 64 slaves and has as communication cycle time of up to 250 μs. The performance of NexECM has been tested in NexCOBOT's laboratory where more than one hundred EtherCAT slaves are configured for function validation of NexCOBOT's EtherCAT master. The CiA 402 standard protocol is also supported by NexECM which makes it easy to control EtherCAT slave drives.



NexMotion - Advanced EtherCAT Master &

For users who wants to configure EtherCAT slaves, NexECM also provides a powerful EtherCAT configuration tool called NexECM Configuration Tool. NexECM Configuration Tool help users scan EtherCAT slaves and create ENI (EtherCAT Network Information) files. For servo motor applications and digital I/O applications, NexECM Configuration Tool also provides a friendly user interface to directly control digital I/O, and servo motors based on the CiA402 standard.

ECM (EtherCAT Master)

- Microsoft Windows API
- Real-Time API (RTX)
- EtherCAT Config. Tool
- CIA 402 Motion Library

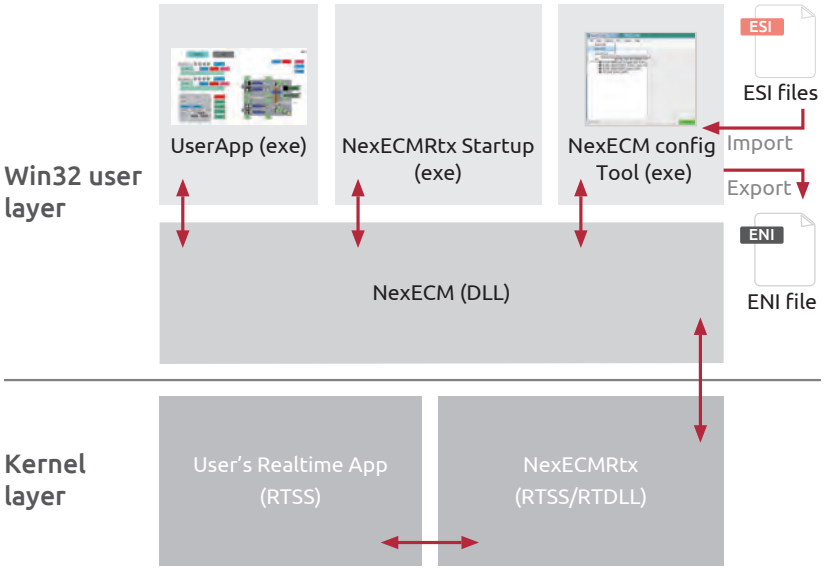
GMC (General Motion Control)

- Microsoft Windows API
- Powerful Utility
  - EtherCAT configuration
  - Motion builder
- Advanced Motion Control
  - Group motion
  - Interpolation (Line, Circle)
  - Contouring
  - E-Gear, E-CAM

NexECM

NexECM is a NexCOBOT developed software EtherCAT master stack, NexECM runs on an RTOS platform and provides precise communication cyclic frame from EtherCAT master to EtherCAT slave. NexECM provides all the basic EtherCAT communication functions which allows users to directly access standard EtherCAT slaves, such as process data access, mail box data access and support CoE (CANOpen over EtherCAT).

► NexECM Software Architecture



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► NexECM Configuration Tool

1

Import ESI file, and export ENI file

2

PDO mapping

3

Motor control

4

DI/O control

5

Network quality monitor

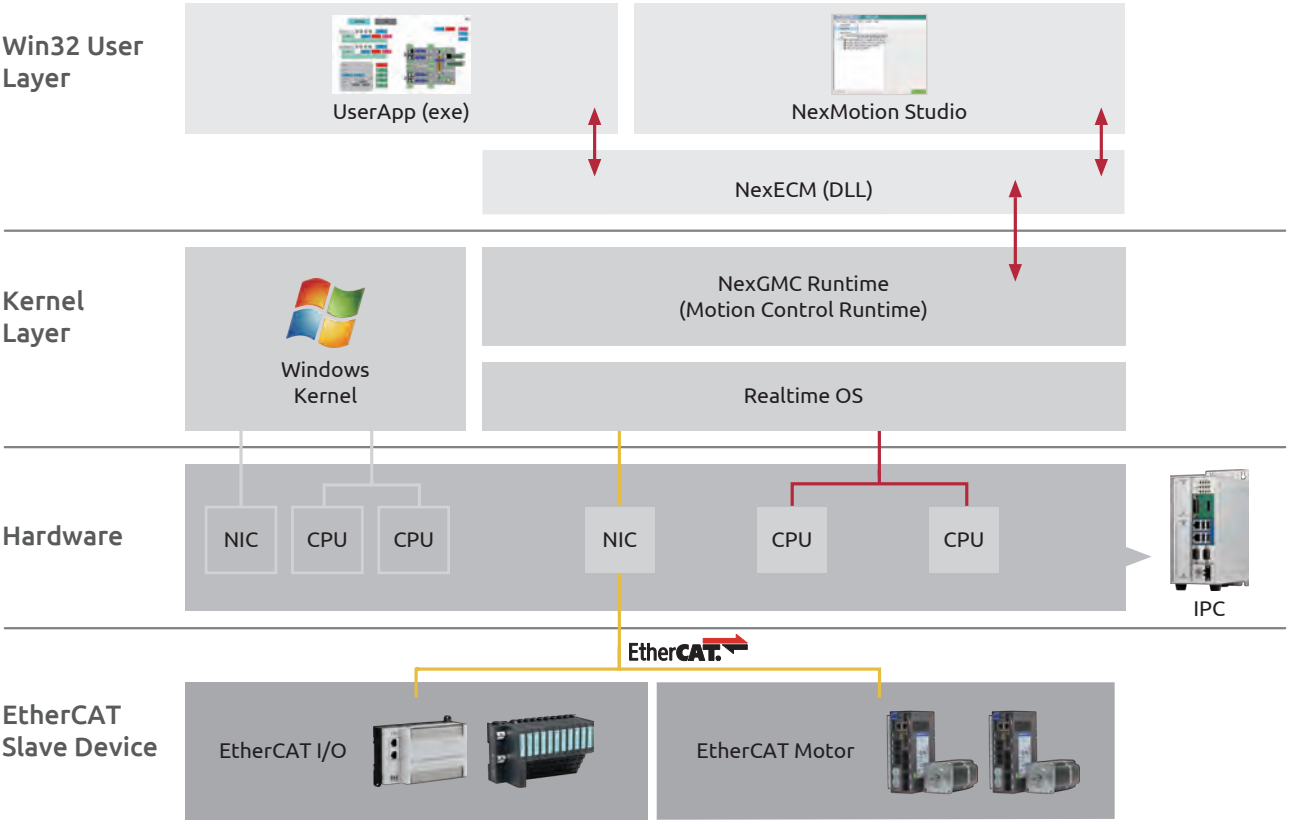
Motion Control

NexGMC

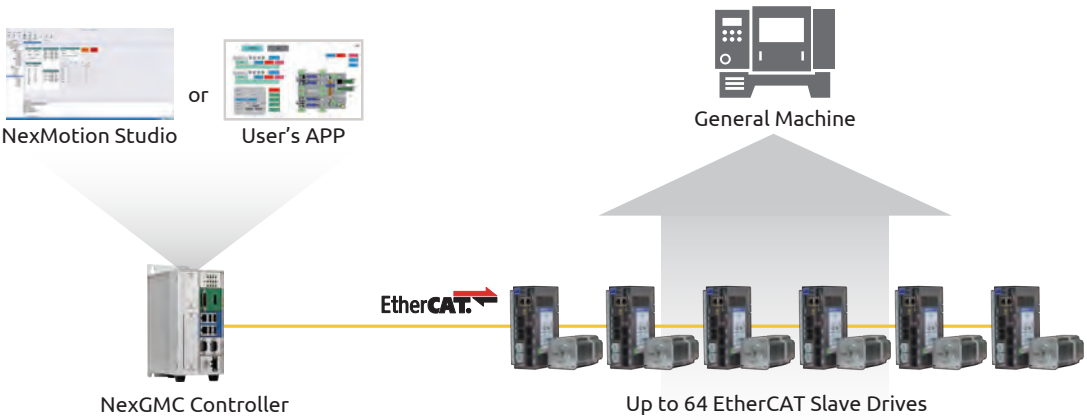
NexGMC (General Motion Control) is developed by NexCOBOT as a powerful motion control software which integrates NexECM and motion control kernels. It can be used for any general machines that are EtherCAT-based motor driven.

The NexGMC provides Microsoft Windows APIs for users to develop their own motion control applications and HMI. NexGMC also provides a powerful integrated development environment "NexMotion Studio", which users can use to easily configure EtherCAT slaves and motion axes or group axes (ex: XY table) parameters.

► NexGMC Architecture



► NexGRC user scenario

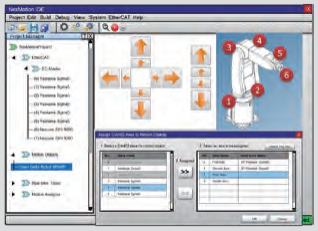
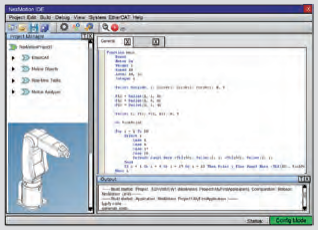
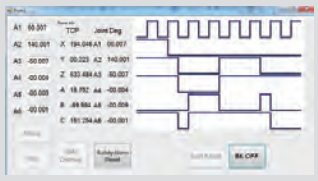


NexMotion Studio - Utility for NexGMC

NexMotion Studio is a powerful utility designed to shorten the development time of motion and robot applications. NexMotion Studio is a Microsoft Windows based application which can run in both 32bit and 64bit environments.

It offers useful operations including:

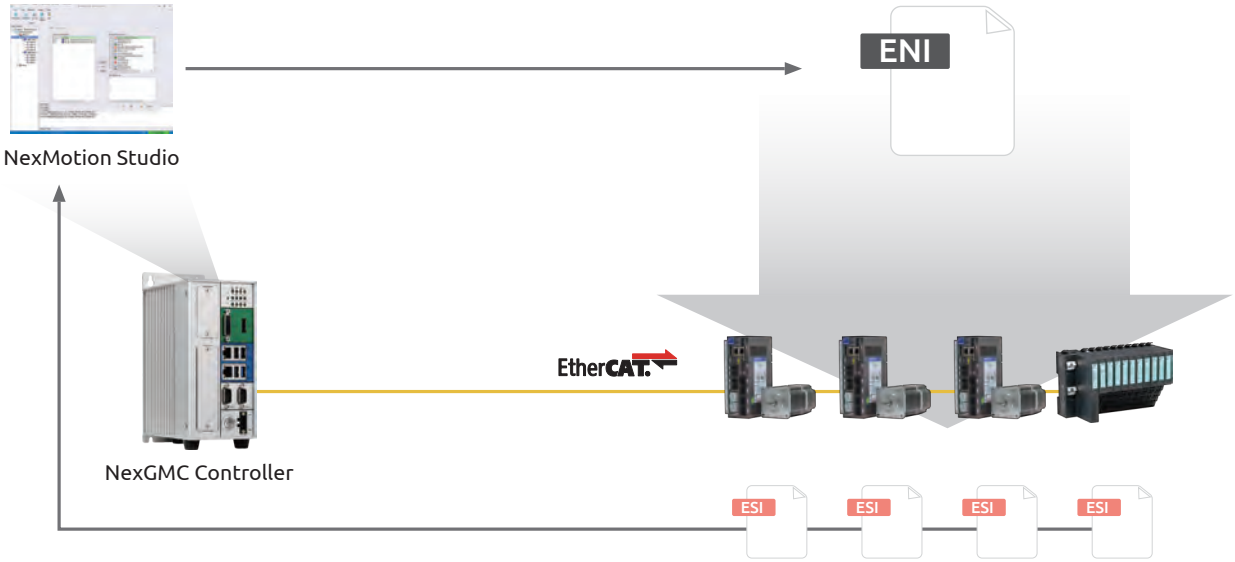
- EtherCAT Configurator
- Motion Configurator
- Real-Time Programing
- 3D Simulation

Set up / Test of EtherCAT System		**EtherCAT Configurator**
Set up / Test of Motion System		**Motion Group Configurator**
Real-Time Program Development		**Motion Builder**
Data Analysis		**Motion Analyzer**

EtherCAT Configuration

Following NexECM, NexGMC is compatible with standard EtherCAT slaves and NexMotion Studio provides the functionality for users to scan, configure, and test standard EtherCAT slave modules. An ENI file for the EtherCAT system can also be generated with NexMotion Studio.

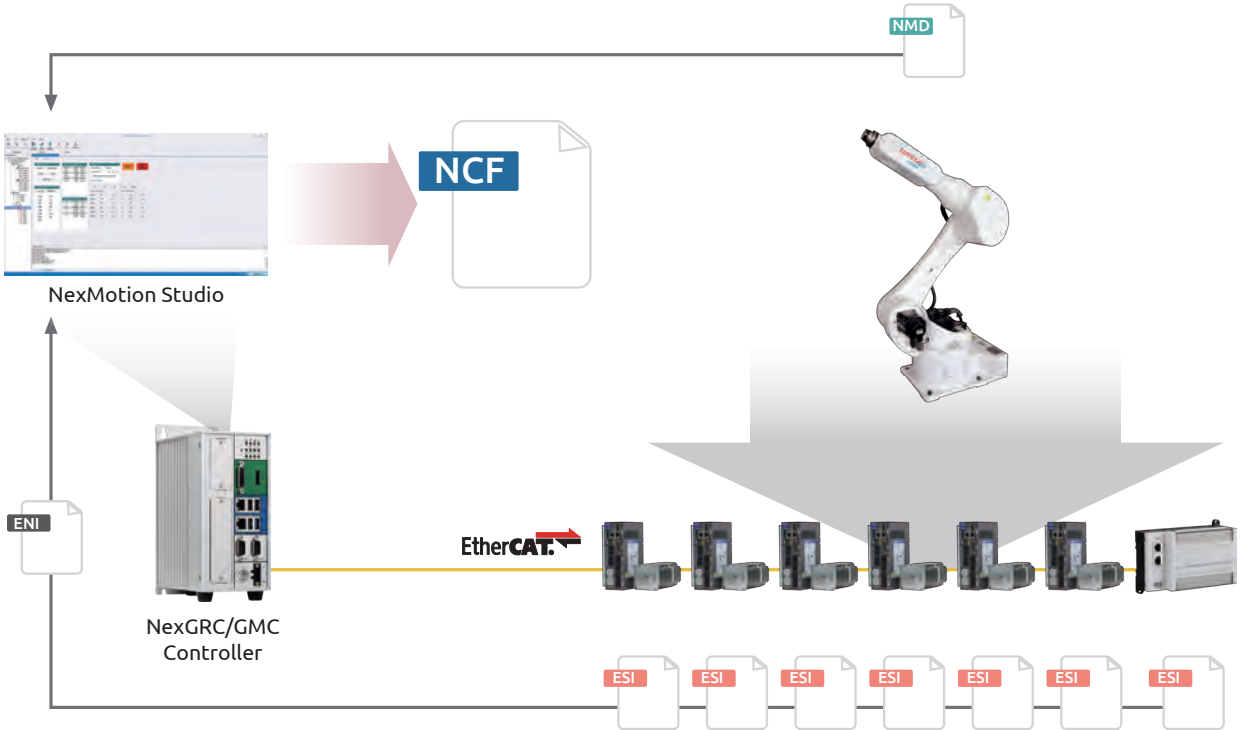
► NexGRC user scenario



NexMotion Studio - Motion Configuration

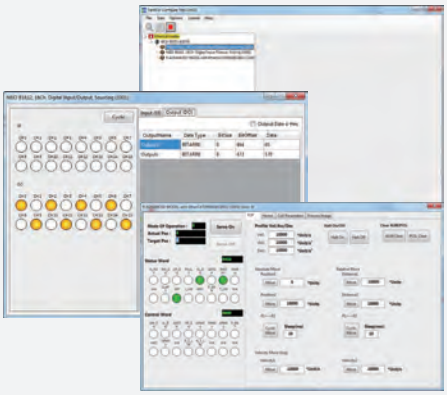
Besides EtherCAT operation, NexMotion Studio is a tool for users to build, configure, and test a motion group, which are combination of single motion axes with mechanical designs. Users can configure all mechanical parameter of the machine in NexMotion Studio, and users will use the configuration directly when develop their control program with the Windows API NexGMC provides.

► NexGRC user scenario



EtherCAT Master Controller

Built-in NexECM EtherCAT Master Software



Main Features

- Slave module no.: up to 64
- Cycle time: up to 250 μs
- Synchronization error: ±50ns
- Support CiA 402 standard protocol

Product Overview

NET-ECM series is based on high-performance industrial fanless computer, and integrates NexCOBOT's EtherCAT Master solutions, Nex-ECM, and runs with RTX extension system to perform real-time communication. NexCOBOT offers integrated APIs for CiA 402, so that users can use these libraries to communicate with EtherCAT slaves. In addition, NET-ECM series also provides an user-friendly utility-NexECM EtherCAT configuration tool. Its functions are listed below:

- Scan EtherCAT slave devices
- Import ESI file, and export ENI file
- Configure EtherCAT slave devices
- Monitor EtherCAT communication quality
- Test functions for EtherCAT slave devices

With these functions, users can easily communicate between master and slave devices.

Specifications

NexECM Function List

Feature Name	Short Description
Basic Features	
Service Commands	Support of all commands
IRQ Field in Datagram	Use IRQ information from slave in datagram header
Slaves with Device Emulation	Support slaves with and without application controller
EtherCAT State Machine	Support of ESM special behavior
Error Handling	Checking of network or slave errors, e.g. working counter
Process Data Exchange	
Cyclic PDO	Cyclic process data exchange
Network Configuration	
Reading ENI	Network configuration taken from ENI file
Compare Network Configuration	Compare configured and existing network configuration during boot-up
Explicit Device Identification	Identification used for Hot Connect and prevention against cable swapping
Station Alias Addressing	Support configured station alias in slave, i.e. enable 2nd address and use it
Access to EEPROM	Support functions to access EEPROM via ESC register
Mailbox Support	
Support Mailbox	Main functionality for mailbox transfer
Mailbox Polling	Polling mailbox state in slaves
CAN Application Layer Over EtherCAT (CoE)	
SDO Up/ Download	Normal and expedited transfer
Complete Access	Transfer the entire object (with all sub-indices) at Once
SDO Info Service	Services to read object dictionary
Emergency Message	Receive emergency messages
Distributed Clocks	
DC	Support of distributed clock

Pre-Installed Software Package

- Operating system: Windows Embedded Standard 7
- Real-time extension
  - RTX 2012/RTX 2016 for 32-bit OS
  - RTX 2014/RTX 64 3.0 for 64-bit OS
- EtherCAT Master: NexECMRtx
- EtherCAT configurator

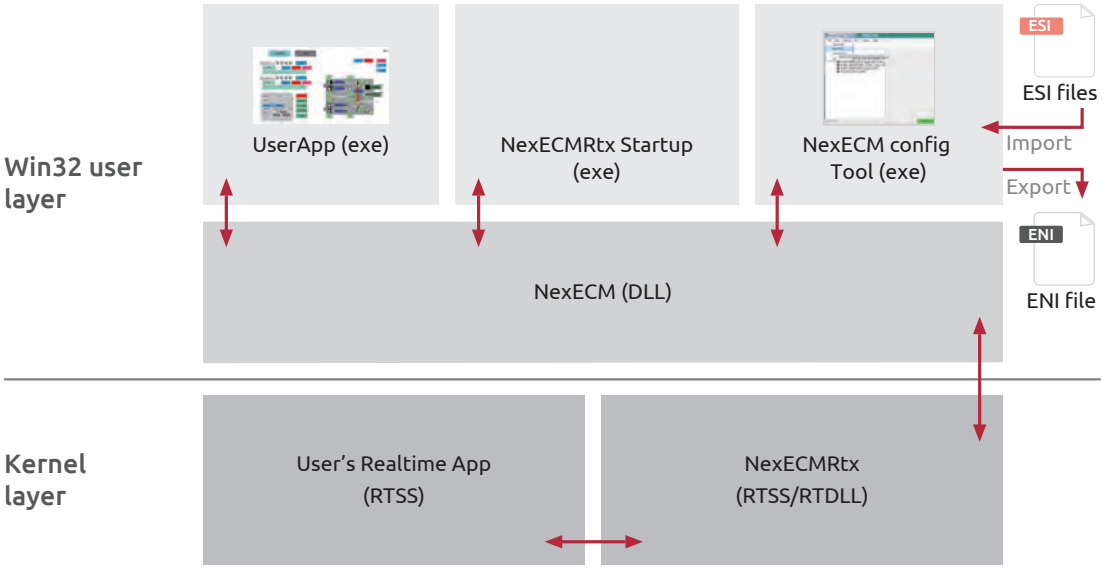
Platform Selection Guide

NET 101-ECM (P/N:A0J10010101X0)
Front-access compact EtherCAT controller
- CPU: Intel Atom® processor E3826 Dual Core 1.46GHz
- Chipset: Intel® Bay Trail-I
- Memory: 4GB DDR3L
- Storage: 128GB SSD
- Display: 1 x DVI-I
- USB: 1 x USB 2.0, 1 x USB 3.0
- LAN ports: 2 (1 x Ethernet,1 x EtherCAT)

NET 200-ECM (P/N:A0J10020003X0)
Front-access compact EtherCAT controller
- CPU: Intel® Celeron® J1900 Quad Core 2.0GHz
- Chipset: Intel® NM10
- Memory: 4GB DDR3L
- Storage: 500GB HDD
- Display: 1 x DVI-I, 1 x DP
- USB: 3 x USB 2.0, 1 x USB 3.0
- LAN ports : 2 (1 x Ethernet,1 x EtherCAT)

NET 300-ECM (P/N:A0J10030000X0)
Front-access high-performance EtherCAT controller
- CPU: Intel® Core™ i5-6500TE Quad Core 2.3GHz
- Chipset: Intel® Q170
- Memory: 4GB DDR4
- Storage: 256GB SSD
- Display: 1 x DVI-D, 1 x HDMI
- USB: 2 x USB 2.0, 4 x USB 3.0
- LAN ports: 3 (2 x Ethernet,1 x EtherCAT)

Software Architecture



General Motion Controller

Built-in General
Motion Control Software

Main Features

- Motion control up to 32 axes
- Single axis control: PTP/jog/halt/stop
- Axes group control: PTP/linear/3D arc
- Support C\C++, C# and VB.Net for user programming

Product Overview

NET-GMC series presents intelligent PC-based motion controller for robot and machinery. It integrates NexCOBOT's general motion control software, NexGMC, to perform real-time motion control and supports standard EtherCAT slaves. NET-GMC also provides windows APIs for general motion control application and an integrated development environment called NexMotion studio to speed up development time for automation users.

Specifications

NexGMC Runtime

- Single axis no.: up to 32 axes
- Single axis control functions: PTP/jog/halt/stop
- Single axis blending motion: aborting/buffered/blending
- Single axis override functions: position/velocity/acceleration/deceleration
- Support axes group type: Cartesian coordinated
- Axes group control functions: PTP/linear/2D arc/3D arc
- Axes blending motion: aborting/buffered/blending
- NexCOBOT EtherCAT master, CoE and DC supported
- Support standard EtherCAT slave devices

NexMotion Studio

- EtherCAT devices offline edit and online scan
- EtherCAT master configuration
- PDO mapping edit
- Online SDO edit
- Export ENI
- CiA402 device operation: PP/PV/PT/CSP
- Single axis edit and operation
- Group axes edit and operation
- I/O mapping edit and operation
- Provide simulation operation mode

User Programming

- Provide windows APIs for user programming
- Support programming language: C\C++, C#, VB.Net

Pre-Installed Software Package

- Operating system: Windows Embedded Standard 7
- NexGMC runtime
- NexMotion studio

Platform Selection Guide

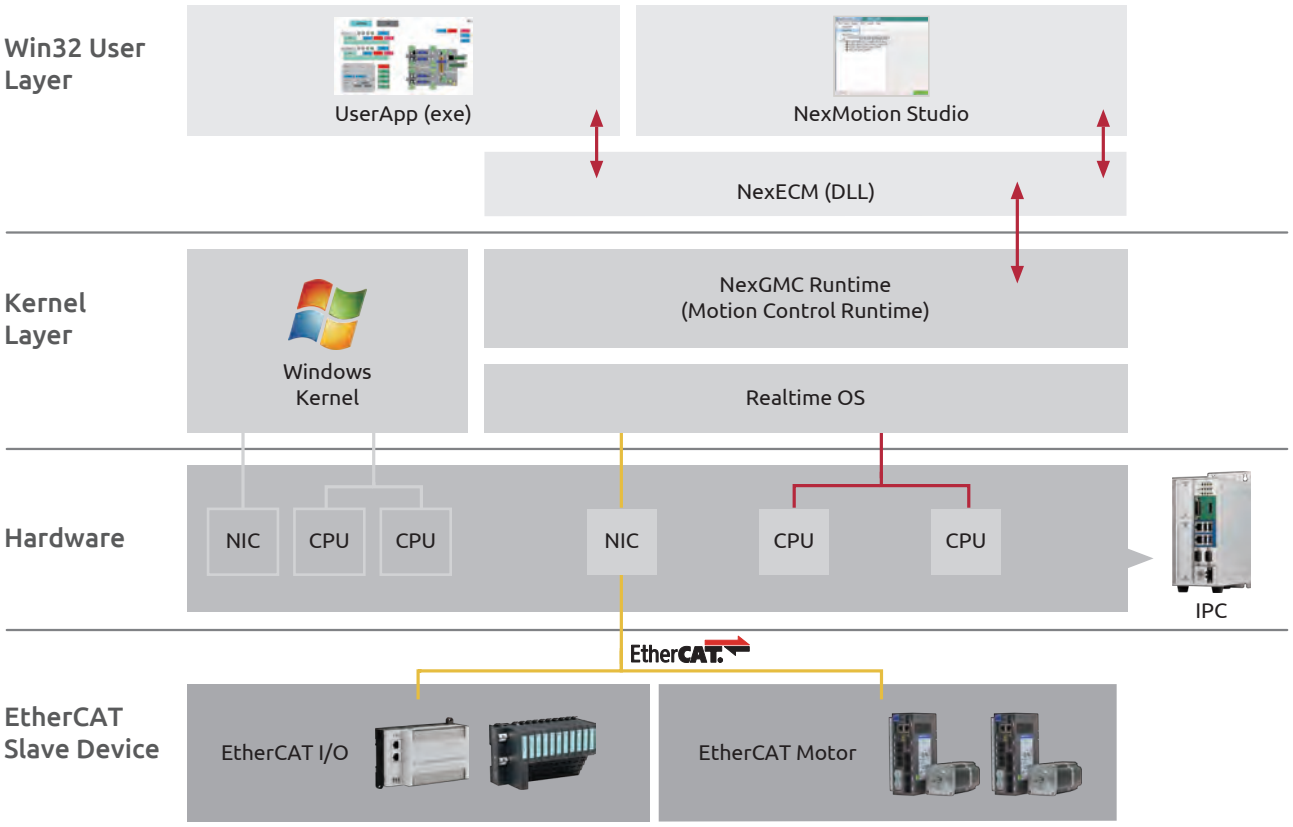
NET 200-GMC (P/N:A0J10020003X0)
Front-access compact general motion controller

- CPU: Intel® Celeron® J1900 Quad Core 2.0GHz
- Chipset: Intel® NM10
- Memory: 4GB DDR3L
- Storage: 500GB HDD
- Display: 1 x DVI-I, 1 x DP
- USB: 3 x USB 2.0, 1 x USB 3.0
- LAN ports: 2 (1 x Ethernet,1 x EtherCAT)

NET 300-GMC (P/N:A0J10030000X0)
Front-access high-performance general motion controller

- CPU: Intel® Core™ i5-6500TE Quad Core 2.3GHz
- Chipset: Intel® Q170
- Memory: 4GB DDR4
- Storage: 256GB SSD
- Display: 1 x DVI-D, 1 x HDMI
- USB: 2 x USB 2.0, 4 x USB 3.0
- LAN ports: 3 (2 x Ethernet,1 x EtherCAT)

Software Architecture

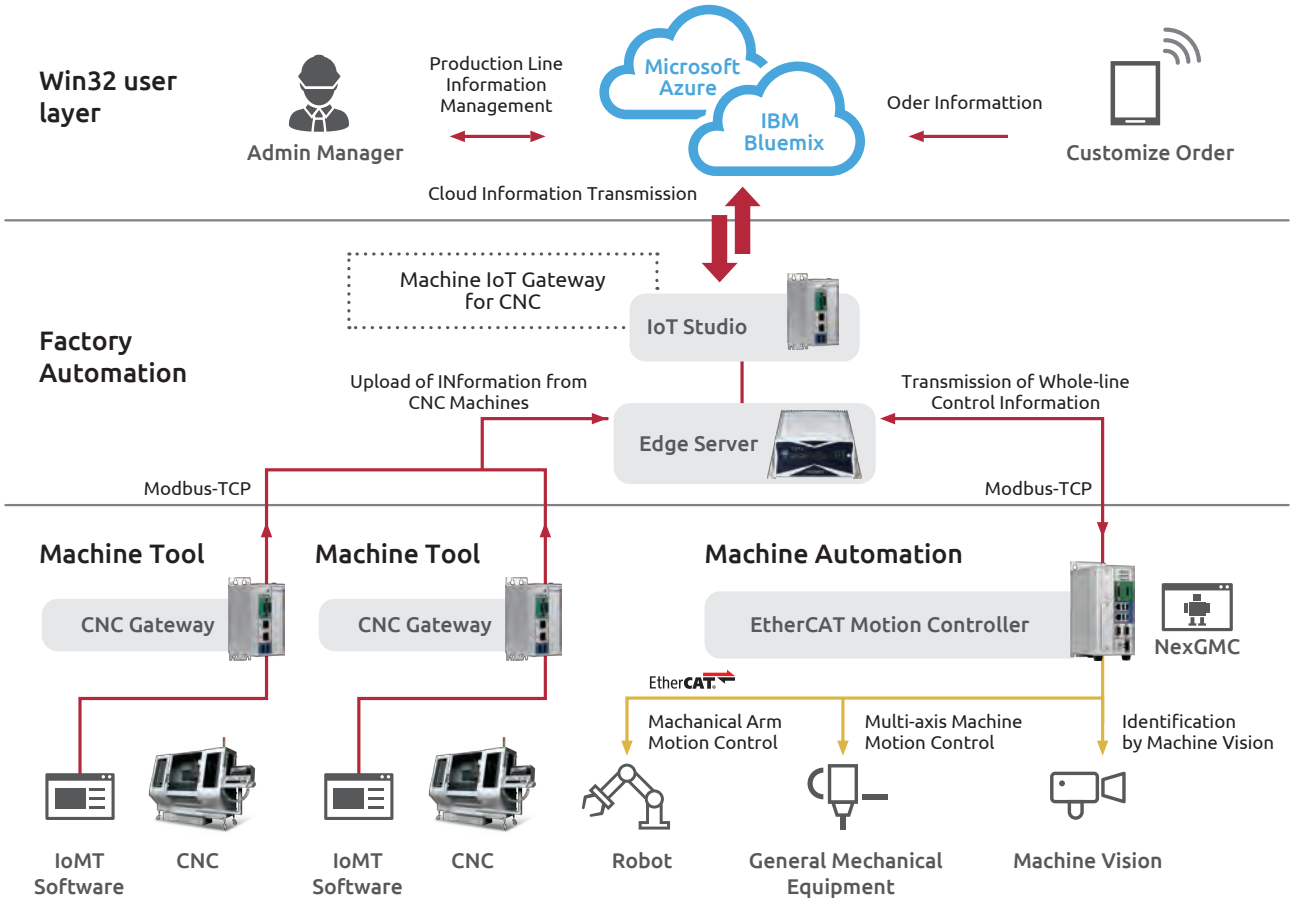


Machinery Solution

The Smart Machinery

One of the benefits of adopting the Industry 4.0 framework is the establishment of smart processes extending from receipt of orders to production. Production lines can automatically adjust their operating approaches based on information concerning orders and raw materials, etc., reducing manpower, time, and materials costs, while also boosting flexibility and customization capabilities. This can not only resolve many of the problems that manufacturers currently face, but also enhance product quality, gear factories toward customers' needs, and make production line operation more competitive.

NexCOBOT is relying on its core competence of industrial PC to propose smart machinery solutions facilitating the end-to-end linkage of manufacturing processes. NexCOBOT's PC-based CNC controller leverages EtherCAT communication and open development structure to simplify the architecture of production lines. Addressing sealed machine tool from othervendors, NexCOBOT's Machine IoT Gateway for CNC supports multiple types of communication protocols, and allows CNC machines to connect to the network.



Machine IoT Gateway for CNC

While CNC machines play pivotal roles in manufacturing production processes, because of the sealed design of their built-in controllers, unlike most industrial equipment, they cannot communicate or be integrated with external devices, and it is difficult to access their production data.

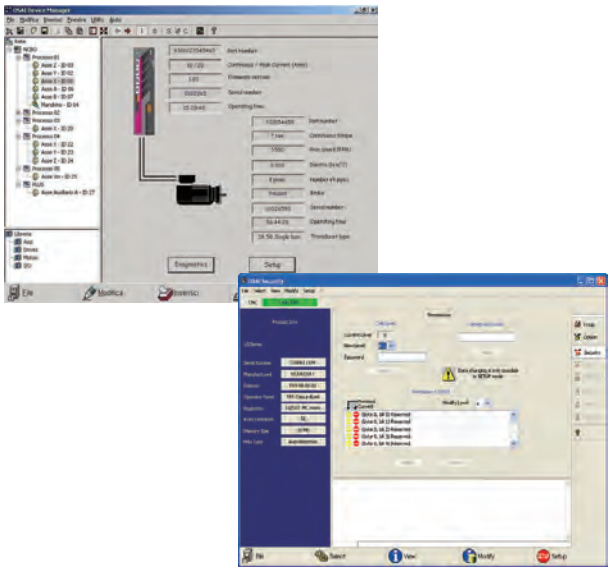
NexCOBOT's Machine IoT Gateway for CNC provides the specialized "IoMT" (Internet of Machine Tool) CNC machine tool communications software, and supports all mainstream CNC machine communication protocols, including the protocols. It can also implement data exchange with a higher-level controller via the Modbus serial communications protocol. This gateway can resolve CNC machine tools' problem of sealed systems, and achieve the goal of networking by enabling independent CNC machines to upload production information.

NControl

Comprehensive CNC Solutions for 2D/3D Machining

Open Yet Robust

The open software architecture of the NControl series allows flexible programming of various CNC functions, such as enabling CNC machine makers to customize the HMI screen using the built-in editor or Windows-based programming tools.



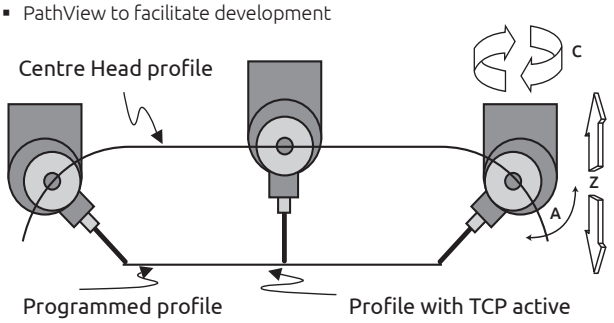
Specifications

		
Motion Control	NControl 20	NControl 30
Number of Interpolated Axes	3	5
PLC Axes	10	14
Control Spindle	1	1
TCP Function	N/A	Yes
Calculation Resolution	0.1um	0.01um
Number of Control Channel	1	
Block Ahead	1024	
Constant Jerk Control	Yes	
Corner Deceleration	Yes	
Smooth Surface Function	Yes	
Control Cycle Time	1ms	
CPU	Intel Core 2 Duo P8400	
Storage	SSD 32G	
LCD Size	N/A	
Operating System	Win CE 6.0	
LAN Port	2	
Dimension of Controller	219x268x107(mm)	

Premium CNC Features

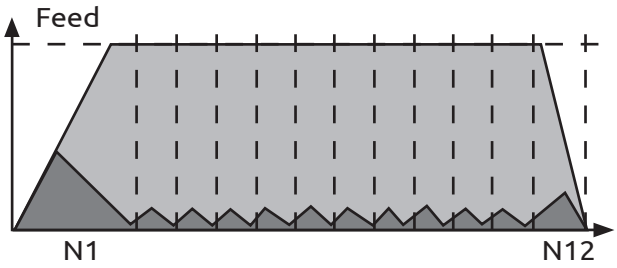
3D Axes Motion

- Circular 3D interpolation
- Tool Centre Point (TCP)
- TCP for double twist and prismatic heads with 2 or 3 rotary axes
- TCP for non standard kinematics
- Tool direction axis movement
- TCP on rotated planes
- PathView to facilitate development



High-speed Machining

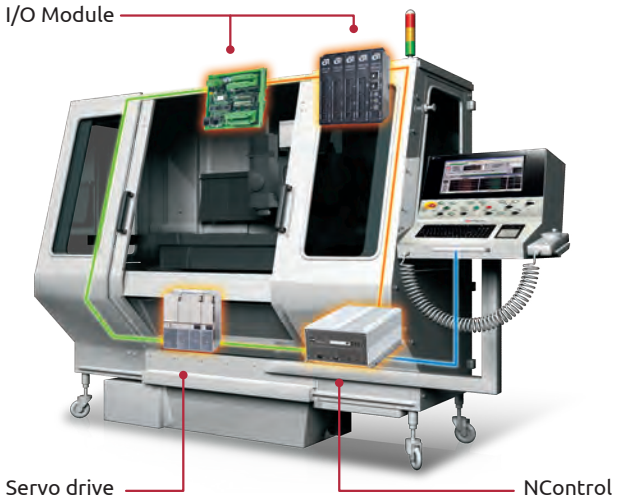
- Look ahead speed planning
- 5-degree polynomial trajectory planning
- TCP with 5-degree polynomial trajectory planning



Multi-channel of Machining

- 2 channels of machining work simultaneously
- Up to 24 channels can be customized

System Architecture



NControl Series

The Comprehensive CNC Solution
for 2D/3D Special Machining

Main Features

- Support 2D½ & 3D CNC machining
- Support EtherCAT and Mechatrolink III protocols
- G/M code supported
- Tool center point (TCP) support
- Look ahead speed planning (up to 1024 blocks)
- High speed machining with polynomial interpolation
- TCP with high speed machining
- Multiple CNC channels supported
- Up to 24 channels can be customized

Product Overview

NControl series provides a comprehensive CNC solution to 2D and 3D machining. Providing high level CNC functionalities, such as TCP for 5-axis machining and high speed machining with look ahead and polynomial, NControl series ensures high machining precision with high speed. Derived from NexMotion cloud and open feature, NControl series can upgrade its function without changing any hardware and can easily integrate with 3rd party hardware and software.

Specifications

System

- Intel® Core™ 2 Duo P8400 processor pre-installed
- 2GB DDR3 SDRAM, pre-installed
- 32GB SSD pre-installed
- Windows CE 6.0 pre-installed
- VGA/DVI-I independent display
- 2 x Intel® GbE LAN ports (support WoL & LAN teaming)
- 1 x DB44 serial port for 4 x RS232
  (COM2: RS232/422/485 with auto flow control)
- 6 x USB 2.0 ports
- 1 x PS2 connector supporting KB/MS
- Fast I/O: 4 digital in/4 digital out
- Analog I/O: 1 in (16-bit)/1 out (16-bit)
- Encoder: 1 in (A/B/Z phase)

CNC Control

- Axes management
  - Circular 3D interpolation
  - Rollover axes
  - Gantry axes
  - Dynamic follower axes
- Canned cycles
  - Spot-facing (G82)
  - Deep drilling with chip take out (G83)
  - Tapping (G84)
  - Reaming or tapping by Tapmatic (G85)
  - Boring with spot facing (G89)
- Motion control types
  - G code ISO 6983 programming
  - M, S, T functions programming
  - Look ahead (up to 1024 blocks)
  - Velocity feed forward (VFF)
- Tool center point (TCP)
  - TCP for double twist and prismatic heads with 2 or 3 rotary axes
  - TCP for non-standard kinematics
- Special feature
  - Bidirectional pitch compensation

Optional Remote I/O

- Modular type
  - Coupler: C-101
  - Digital I/O module: E-101/E-201/E-202
  - Analog I/O module: E-501
- Terminal type
  - Digital I/O module: AXE-9200

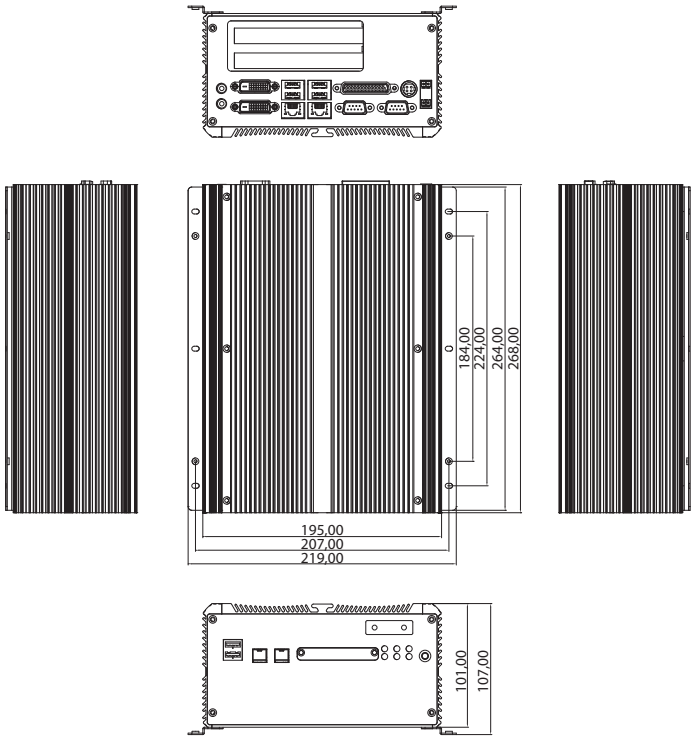
Power Requirements

- DC input range: +16 to 30 V_{DC} input ATX power mode
  (optional AC/DC 120W power adapter)

Environment

- Operating temperature:
  Ambient with air flow: -5°C to 55°C
  (according to IEC60068-2-1, IEC60068-2-2, IEC60068-2-14)
- Storage temperature: -20°C to 80°C

Dimension Drawing



- Relative humidity: 10% to 93% (non-condensing)
- Shock protection:
  - HDD: 20G, half sine, 11ms, IEC60068-2-27
  - CF: 50G, half sine, 11ms, IEC60068-2-27
- Vibration protection w/ HDD condition
  - Random: 0.5Grms @ 5~500 Hz according to IEC60068-2-64
  - Sinusoidal: 0.5Grms @ 5~500 Hz according to IEC60068-2-6

Certifications

- CE
- FCC Class A

Ordering Information

CNC Controller

- **NControl20 (P/N:10J10002000X0)**
  2D½ CNC controller for machining and turning center with Win CE 6.0
- **NControl20D (P/N:10J10002001X0)**
  2D½ CNC controller for machining and turning center with Win CE 6.0 and WE2009
- **NControl30 (P/N:10J10003000X0)**
  3D CNC controller for machining and turning center with Win CE 6.0
- **NControl30D (P/N:10J10003001X0)**
  3D CNC controller for machining and turning center with Win CE 6.0 and WE2009
- **19V, 120W AC/DC power adapter w/o power cord (P/N: 7410120002X00)**

IoT - Machine Gateway Solutions

Main Features

- Plug-and-play CNC gateway to integrate controllers to the industrial internet of machines
- Support one-click connection to mainstream CNC Controllers such as Fanuc, Mitsubishi, Heindenhain, Siemens
- Collect important machine information including position, coordinate offsets, alarm, etc.
- Connecting max. 10 CNC controllers via TCP/IP.
- Connect to on-demand combination of controllers with one CNC gateway
- Transfer data to iAT2000 SCADA or MySQL/SQLite database
- Provide dashboard interface to monitor machine status

Product Overview

iAT2000 CNC Gateway provides a convenient interface to integrate major CNC controllers into NexCOBOT I4.0 Solution Network. The NexCOBOT developed software contains APIs to gather data from the non-open CNC systems, and then use SQL software to actively transfer data to Database. The Gateway is a once-for-all solution for all different CNC Controllers in the market, which greatly reduce the effort required for System Integrators to develop various connection interfaces by their own. With the crucial device, SI can focus more on monitoring and analysis development; eventually maximize the effectiveness of factory automation.

Software Feature

Controller Connectivity

- A universal gateway to connect major of CNC controllers
- Fanuc: 0i-B/0i-C/0i-D/16i/18i/ 21i/31i/32i
- Mitsubishi: M70/M700/M80/M800
- HEINDENHAIN: iTNC530
- Siemens: 828D/840D
- Syntec: 21/22/220

CNC Data Collection

- NC file
  - Support NC file transfer to and from CNC controller
  - Verify the part under production matches MES
  - Record the production history of every machine
- Controller status
  - Allow plant manager to have full awareness of all machine status
  - Record the complete status of all time for analysis
- Uptime analysis
  - Display uptime and graphical result to improve plant efficiency
- Alarm & history
  - Trace alarm history of each machine for review and optimization
- Servo spindle load
  - Monitor the reasonable working load to avoid excess temperature on machines, and elongate machine lifespan
- Maintenance management
  - Couple with CNC controller's self-detection function to predict maintenance schedule and prevent unexpected downtime
- Tool life management
  - Manage tool life to foresee the timing of tool replacement
  - Reduce number of defect parts cause by tool failure

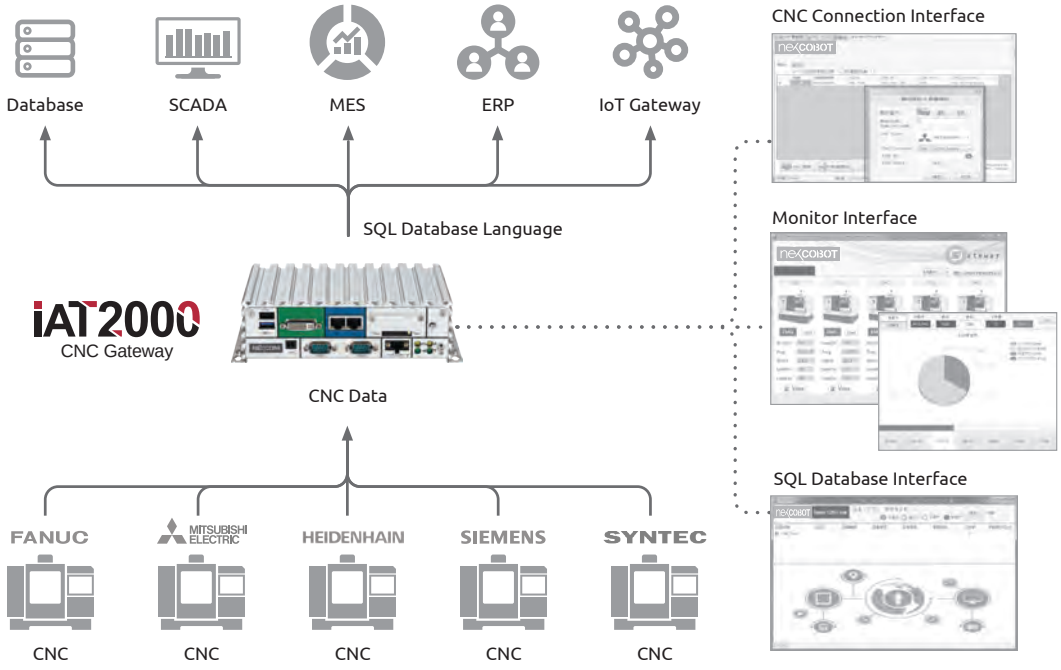
Internal SQL Interface

- Data management
  - Collected data is stored in CNC Gateway as a buffer database in SQL format
  - The buffer database is available for SCADA, main Database, and other applications to retrieve

Cloud Service

- Cloud service compatible with an additional IoT gateway

CNC Gateway Architecture



Hardware Specification

Communication Protocols
- CNC protocol
- SQL form database

System Configuration
- Intel Atom® E3826 dual-core 1.46GHz
- 4GB DDR3L system memory
- 500GB SATA 2.0 HDD storage
- Windows 7 Pro 64-bit
- iAT2000 CNC Gateway software package
  - CNC protocol interface
  - CNC data SQL interface

I/O Interface
- 1x External CFast socket
- 1x SIM card holder
- 2x Intel® I210IT GbE LAN ports
- 2x USB 2.0 (500mA per each), 1x USB 3.0 (900mA)
- 4x DB9 for COM1 ~ COM4
- 1x 2-pin DC input, support +9 to 30VDC input
- 1x HDMI & 1x DVI-I DisplayPort
- 2x Antenna holes for optional Wi-Fi/3.5G antenna
- 1x Optional mini-PCIe Wi-Fi/3.5G for wireless connectivity

Certification
- CE
- FCC Class A

Power & Dimension
- Power input: +9VDC to 30VD, Max. 30W power consumption
- Dimension: 206 x 131 x 60

Ordering Information

- **iAT2000 CNC-5 Gateway (P/N: A0J00010500X0)**
  iAT2000 CNC-5 Gateway Windows software (P/N: 88J00010512X0)
  (connect up to 5 CNC controllers)
- **iAT2000 CNC-10 Gateway (P/N: A0J00010500X0)**
  iAT2000 CNC-10 Gateway Windows software (P/N: 88J00010513X0)
  (connect up to 10 CNC controllers)

NEIO – EtherCAT I/O System

The Ideal I/O for EtherCAT Control Systems

NEIO is a series of EtherCAT slave I/O modules for distributed industrial applications. Each module is equipped with high density I/O (up to 32 points) and powerful features in a compact size. DIN-rail design and daisy-chain wiring powered by EtherCAT technology make it easy to install NEIO modules in the field. NEIO provides wide variety of I/O combinations with standard ESI file so that users can always find suitable I/O modules for their high-speed EtherCAT-based applications.

Finger-safe Wiring Cover

Smart latch design for easy opening/closing

- Flexibility to be installed in control cabinets
- Safe operation when connecting to I/O circuits

On-module LED indicators

LEDs for module status and I/O information

- Clear I/O status indication
- Quickly diagnose faults with multiple LEDs

Multiple mounting methods

DIN-rail mounting and wall mounting

- Works with standard DIN-rail
- Easy to install in most applications

Detachable screw terminals

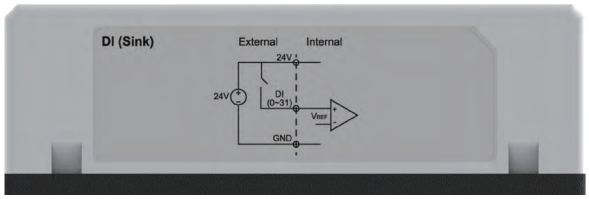
Secure screw connection technology

- Flexible wiring to terminals on-module or off-module
- Easy to switch modules while keeping existing wiring

Features:

- High-Density I/O Points
- Ease-of-maintenance
- State-of-art Design
- Standard EtherCAT Communications
- Rich I/O Selections

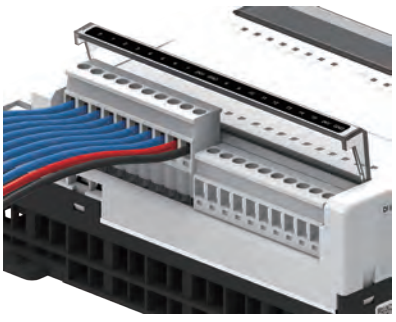
User-friendly wiring labels
Professional wiring instructions



- Detailed wiring diagram
- Instantly operate the I/O module with the given wiring information

QR code for ESI file
QR code sticker on module

- Quick access to ESI download link
- Also link to related product information

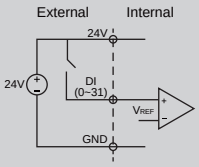
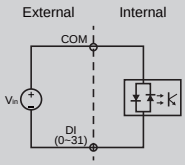
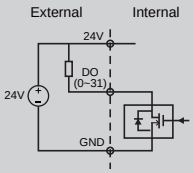


Rotational pin-assignment marks
Self-explanatory pin-assignment information

- No blind spots when checking pin assignments
- Easy maintenance even when the module is installed in a cabinet

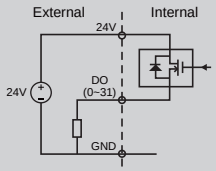
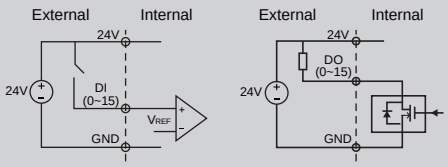
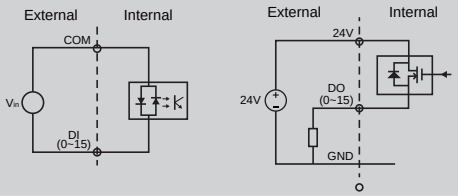
NEIO – Selection Guide

EtherCAT Digital I/O Module

Model Name	NEIO-B1101	NEIO-B1102	NEIO-B1201
Type	DI Module (PNP)	DI Module (PNP / NPN)	DO Module (NPN)
Wiring Diagram			
Number of Inputs	32	32	-
Input Voltage	24 V_{DC}	24 V_{DC}	-
On-State Voltage, "1"	15~30 V_{DC} (IEC 61131-2 type 1) 11~30 V_{DC} (IEC 61131-2 type 2/3)	9~24 V_{DC}	-
Off-State Voltage, "0"	0~5 V_{DC} (IEC 61131-2 type 1/2/3)	0~8 V_{DC}	-
Input Filter	3 ms	1 ms	-
Number of Outputs	-	-	32
Output Voltage	-	-	24 V_{DC}
Output Load Type	-	-	Resistive , Inductive
Max. Output Current	-	-	500 mA/ch
Switching Time			Off to On : 100 us On to Off : 150 us
Power Input	24 V_{DC} (±20%)	24 V_{DC} (±20%)	24 V_{DC} (±20%)
Operation Temperature	0°C to 55°C	0°C to 55°C	0°C to 55°C

EtherCAT Analog I/O Module

Model Name	NEIO-B1841		
Analog Input		Digital Input	
Number of Inputs	8 (single-ended)	Number of Inputs	8 (PNP/NPN)
Input Type	Voltage, Current	Input Voltage	24 VDC
Input Range	0 ~ 5 V, 0 ~ 10 V, ±5,±10 V 0 ~ 20 mA, 4 ~ 20 mA	On-State Voltage, "1"	9~24 VDC
Resolution	16-bit	Off-State Voltage, "0"	0~8 VDC
Sampling Rate	1 kHz per channel	Input Filter	1 ms
Accuracy	< ±0.3% of FSR	Electrical Isolation	2.75 KV
Analog Output		Digital Input	
Number of Outputs	2 (single-ended)	Number of Outputs	8 (PNP)
Output Type	Voltage, Current	Output Voltage	24 V_{DC}
Output Range	0 ~ 5 V, 0 ~ 10 V, ±5 V, ±10 V 0 ~ 20 mA, 4 ~ 20 mA	Output Load Type	Resistive, Inductive, Capacitive
Resolution	16-bit	Max. Output Current	500 mA/ch
Accuracy	< ±0.2% of FSR for voltage output < ±0.1% of FSR for current output	Switching Time	Off to On : 100 us On to Off : 150 us
Power Input	24 V_{DC} (±20%)	Power Input	24 V_{DC} (±20%)
Operation Temperature	0°C to 55°C	Operation Temperature	0°C to 55°C

NEIO-B1202	NEIO-B1811	NEIO-B1812
DO Module (PNP)	DI/O Module	DI/O Module
		
-	16	16
-	24 V_{DC}	24 V_{DC}
-	15~30 V_{DC} (IEC 61131-2 type 1) 11~30 V_{DC} (IEC 61131-2 type 2/3)	9~24 V_{DC}
-	0~5 V_{DC} (IEC 61131-2 type 1/2/3)	0~8 V_{DC}
-	3 ms	1 ms
32	16	16
24 V_{DC}	24 V_{DC}	24 V_{DC}
Resistive , Inductive , Capacitive	Resistive , Inductive	Resistive , Inductive , Capacitive
500 mA/ch	500 mA/ch	500 mA/ch
Off to On : 100 us On to Off : 150 us	Off to On : 100 us On to Off : 150 us	Off to On : 100 us On to Off : 150 us
24 V_{DC} (±20%)	24 V_{DC} (±20%)	24 V_{DC} (±20%)
0°C to 55°C	0°C to 55°C	0°C to 55°C

EtherCAT COM Port Module

Model Name	NEIO-B1603
Number of Channels	4
COM 1	RS 232/422/485
COM 2	RS 422/485
COM 3	RS422 / 485
COM 4	RS 422/485
Data Bits	5, 6, 7, 8
Stop Bits	1, 1.5, 2
Parity	None, Odd, Even, Space, Mark
Baud Rate	0.3~115.2 kbps
Flow Control	RTS/CTS and DTR/ DSR (RS-232 only)/ XON/XOFF
Power Input	24 V_{DC} (±20%)
Operation Temperature	0°C to 55°C

EtherCAT Pulse-output Module

Model Name	AXE-5904
Number of axes	4
Pulse Output Rate	up to 4 MHz
Pulse Command Output	CW/CCW, OUT/DIR
Committed I/O signal	LS±/CMP±/HS/SVON/RDY/ INP/ALM/ARST/DCLR for each axis
Encoder Input Type	Incremental
Encoder Resolution	32-bit
Encoder Input Signal	CW/CCW, AB/Z
Max. Input Frequency	4 MHz
General Purpose Input	3-channel Per Axis
Power Input	24 V_{DC} (±10%)
Operation Temperature	0°C to 50°C

NEIO-B1101/B1102

32-CH Digital Input EtherCAT Slave Module

NEIO-B1101

NEIO-B1102

Main Features

- Finger-safe wiring cover
- Detachable screw terminals
- Rotational pin-assignment marks
- On-module LED indicators
- User-friendly wiring label
- Multiple mounting methods

Product Overview

NEIO-B1101 is a 32-channel PNP type digital input EtherCAT slave module. The voltage input of NEIO-B1101 is 24 V_{DC} which complies with IEC-61131-2 Standard. NEIO-B1102 is a 32-channel PNP/NPN type digital input EtherCAT slave module. The input filter of NEIO-B1102 is 1ms, and its normal input voltage is 24 V_{DC}. All of the NEIO modules are provided with high isolation protection, and verified by the EtherCAT conformance test tool. Therefore NEIO is a reliable module to implement in your applications.

Specifications

Digital Input

Model Name	NEIO-B1101	NEIO-B1102
Type	PNP	PNP/NPN
Input Voltage	24 V_{DC}	
On-State Voltag, "1"	15~30 V_{DC} (IEC 61131-2 type 1) 11~30 V_{DC} (IEC 61131-2 type 2/3)	9~24 V_{DC}
Off-State Voltag, "0"	0~5 V_{DC} (IEC 61131-2 type 1/2/3)	0~8 V_{DC}
Inpurt Filter	3 ms	1 ms

Communication

- Protocol: EtherCAT
- Bus interface: 2 x RJ-45 (daisy-chain)
- Media: Ethernet cable (min. CAT 5), shielded
- Distance between stations: maximum. 100m (100BASE-TX)
- Data transfer rate: 100M baud

Power Requirements

- DC input range: DC 24V ±20% with over-voltage and reversed-voltage protection

Model Name	NEIO-B1101	NEIO-B1102
Power Consumption	2 W	2.5 W

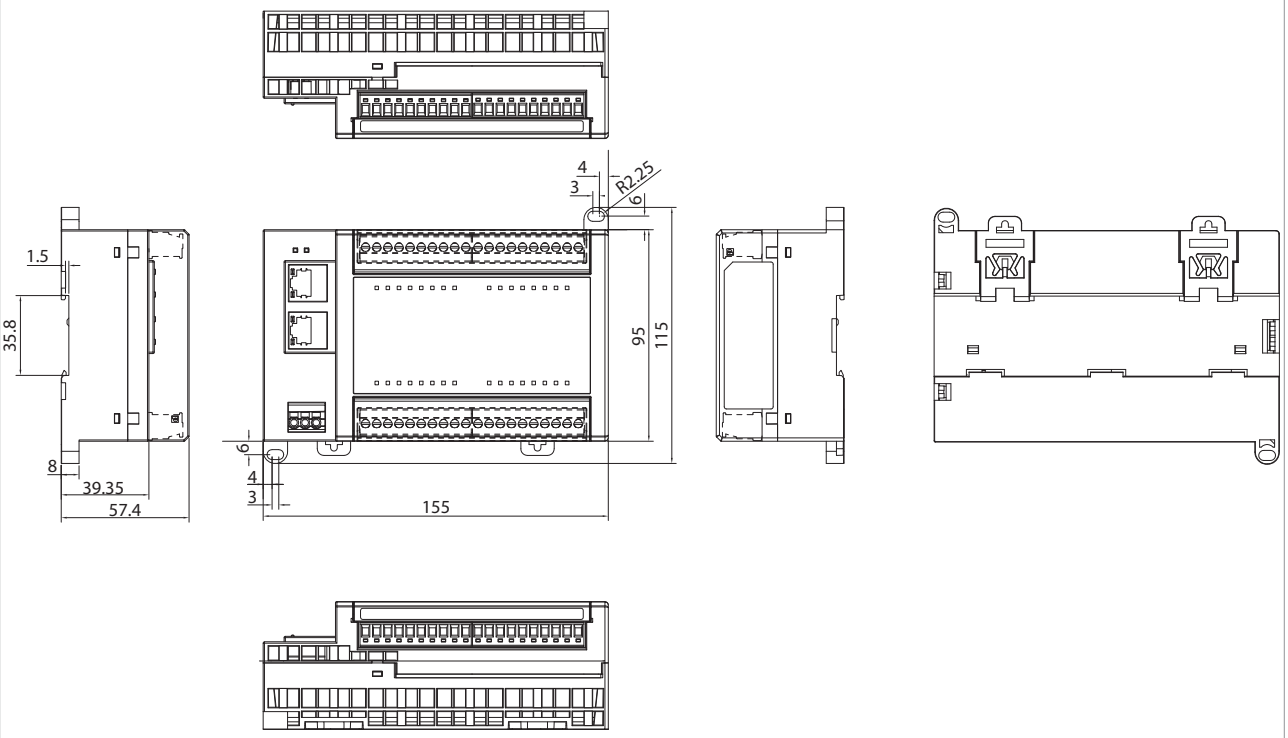
Common Section

- Electrical isolation: 2.5 kV (power contact)
- Operating temperature: 0°C~55°C
- Storage temperature: -40°C~85°C
- Relative humidity: 5~95%, non-condensation, non-operating
- Shock: IEC 60068-2-27
- Vibration: IEC 60068-2-6, IEC 60068-2-64
- Enclosure type rating: IP20
- Mounting type: din-rail (35mm), wall-mount
- Dimesions (mm): 155 x 115 x 57.4 (W x H x D)

Certifications

- CE
- FCC Class A

Dimension Drawing



Ordering Information

- **NEIO-B1101 (P/N:10J80110100X0)**
  32-CH digital input EtherCAT slave module (PNP)
- **NEIO-B1102 (P/N:10J80110200X0)**
  32-CH digital input EtherCAT slave module (PNP/NPN)
- **AC to DC din rail power supply (P/N: 7440060001X00)**
  60 W 24V/2.5A for NISE

NEIO-B1201/B1202

32-CH Digital Output EtherCAT Slave Module

NEIO-B1201

NEIO-B1202

Main Features

- Finger-safe wiring cover
- Detachable screw terminals
- Rotational pin-assignment marks
- On-module LED indicators
- User-friendly wiring label
- Multiple mounting methods

Product Overview

NEIO-B1201 is a 32-channel NPN type digital output EtherCAT slave module. Its normal output voltage is 24 V_{DC}, and it supports resistive, inductive types of loads. NEIO-B1202 is a 32-channel PNP type digital output EtherCAT slave module. Its normal output voltage is 24 V_{DC}, and it supports three types of loads - resistive, inductive and capacitive. All of the NEIO modules are provided with high isolation protection, and verified by the EtherCAT conformance test tool. Therefore NEIO is a reliable module to implement in your applications.

Specifications

Digital Output

Model Name	NEIO-B1201	NEIO-B1202
Type	NPN	PNP
Output Voltage	24 V_{DC}	24 V_{DC}
Load Type	Resistive, Inductive	Resistive, Inductive, Capacitive
Max. Output Current	500 mA/ch	500 mA/ch
Switching Times	Off to On: 100 µs On to Off: 150 µs	Off to On: 100 µs On to Off: 150 µs

Communication

- Protocol: EtherCAT
- Bus interface: 2 x RJ-45 (daisy-chain)
- Media: Ethernet cable (min. CAT 5), shielded
- Distance between stations: maximum. 100m (100BASE-TX)
- Data transfer rate: 100M baud

Power Requirements

- DC input range: DC 24V ±20% with over-voltage and reversed-voltage protection

Model Name	NEIO-B1201	NEIO-B1202
Power Consumption	2 W	2 W

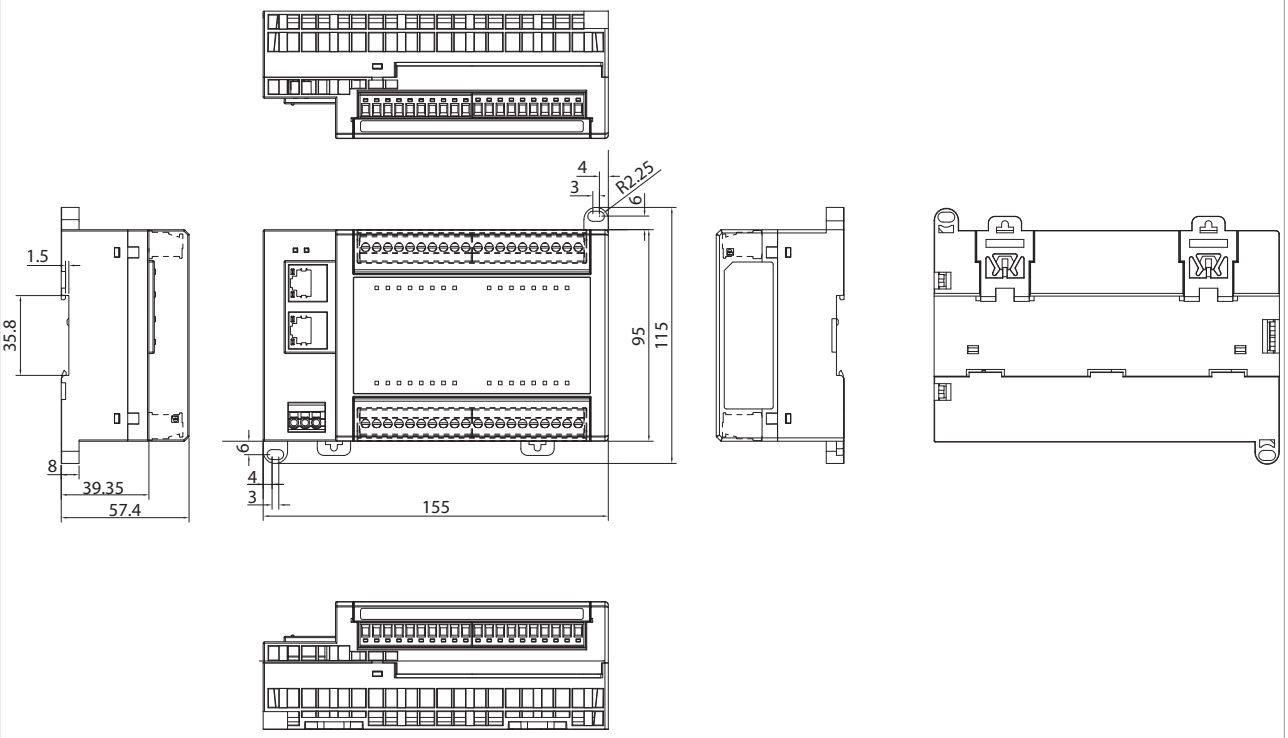
Common Section

- Electrical isolation: 2.5 kV (power contact)
- Operating temperature: 0°C~55°C
- Storage temperature: -40°C~85°C
- Relative humidity: 5~95%, non-condensation, non-operating
- Shock: IEC 60068-2-27
- Vibration: IEC 60068-2-6, IEC 60068-2-64
- Enclosure type rating: IP20
- Mounting type: din-rail (35mm), wall-mount
- Dimesions (mm): 155 x 115 x 57.4 (W x H x D)

Certifications

- CE
- FCC Class A

Dimension Drawing



Ordering Information

- **NEIO-B1201 (P/N: 10J80120100X0)**
  32-CH digital output EtherCAT slave module (NPN)
- **NEIO-B1202 (P/N: 10J80120200X0)**
  32-CH digital output EtherCAT slave module (PNP)
- **AC to DC din rail power supply (P/N: 7440060001X00)**
  60 W 24V/2.5A for NISE

NEIO-B1811/B1812

32-CH Digital Input/Output EtherCAT Slave Module

NEIO-B1811

NEIO-B1812

Main Features

- Finger-safe wiring cover
- Detachable screw terminals
- Rotational pin-assignment marks
- On-module LED indicators
- User-friendly wiring label
- Multiple mounting methods
- 16-CH digital input
- 16-CH digital output

Product Overview

NEIO-B1811 is a 16-CH digital input/16-CH digital output EtherCAT slave module. The voltage input of NEIO-B1811 is 24 V_{DC} which complies with IEC-61131-2 standard. Its normal output voltage is 24 V_{DC}, and it supports resistive, inductive types of loads.

NEIO-B1812 is a 16-CH digital input/16-CH digital output EtherCAT slave module. The input filter of NEIO-B1812 is 1ms, and its normal input voltage is 24 V_{DC}. Its normal output voltage is 24 V_{DC}, and it supports three types of loads-resistive, inductive and capacitive.

All of the NEIO modules are provided with high isolation protection, and verified by the EtherCAT conformance test tool. The mixed I/O module is usually used for fewer DI/O channels needed automation equipment. Mixed DI/O modules along with pure DI or DO modules provide more flexible module selection for users' applications.

Specifications

Digital Input

Model Name	NEIO-B1811	NEIO-B1812
Type	PNP	PNP/NPN
Input Voltage	24 V_{DC}	24 V_{DC}
On-State Voltage, "1"	15~30 V_{DC} (IEC 61131-2 type 1) 11~30 V_{DC} (IEC 61131-2 type 2/3)	9~24 V_{DC}
Off-State Voltage, "0"	0~5 V_{DC} (IEC 61131-2 type 1/2/3)	0~8 V_{DC}
Inpurt Filter	3 ms	1 ms

Digital Output

Model Name	NEIO-B1811	NEIO-B1812
Type	NPN	PNP
Output Voltage	24 V_{DC}	24 V_{DC}
Load Type	Resistive, Inductive	Resistive, Inductive, Capacitive
Max. Output Current	500 mA/ch	500 mA/ch
Switching Times	Off to On: 100 µs On to Off: 150 µs	Off to On: 100 µs On to Off: 150 µs

Communication

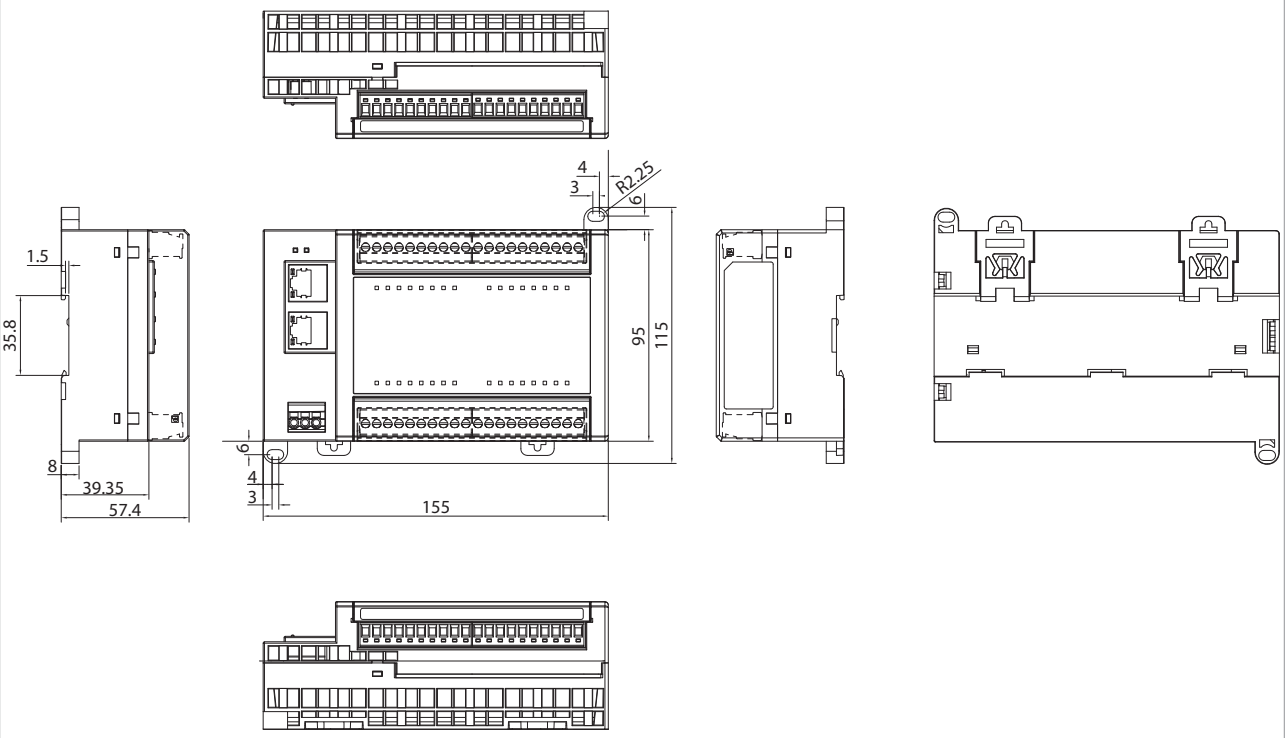
- Protocol : EtherCAT
- Bus interface: 2 x RJ-45
- Media: Ethernet cable (min. CAT5), shielded
- Distance between stations: maixmum. 100m (100BASE-TX)
- Data transfer rate: 100M baud

Power Requirements

- DC input range: DC 24V ±20% with over-voltage and reversed-voltage protection

Model Name	NEIO-B1811	NEIO-B1812
Power Consumption	2.2 W	2.2 W

Dimension Drawing



Common Section

- Electrical isolation: 2.5 kV (power contact)
- Operating temperature: 0°C~55°C
- Storage temperature: -40°C~85°C
- Relative humidity: 5~95%, non-condensation, non-operating
- Shock: IEC 60068-2-27
- Vibration: IEC 60068-2-6, IEC 60068-2-64
- Enclosure type rating: IP20
- Mounting type: din-rail (35mm), wall-mount
- Dimesions (mm): 155 x 115 x 57.4 (W x H x D)

Certifications

- CE
- FCC Class A

Ordering Information

- **NEIO-B1811 (P/N: 10J80181100X0)**
  32-CH digital input/output EtherCAT slave module
- **NEIO-B1812 (P/N: 10J80181200X0)**
  32-CH digital input/output EtherCAT slave module
- **AC to DC din rail power supply (P/N: 7440060001X00)**
  60 W 24V/2.5A for NISE

NEIO-B1841

8-CH AI, 2-CH AO, 16-CH DI/O EtherCAT Slave Module

NEIO-B1841

Main Features

- Finger-safe wiring cover
- Detachable screw terminals
- Rotational pin-assignment marks
- On-module LED indicators
- User-friendly wiring label
- Multiple mounting methods
- 8-CH analog inputs (single-ended)
- 2-CH analog outputs (single-ended)
- 8-CH digital inputs
- 8-CH digital outputs

Product Overview

NEIO-B1841 is a cost-effective EtherCAT I/O slave module. Each NEIO-B1841 is equipped with 8-CH analog Input, 2-CH analog output, 8-CH digital input, 8-CH digital output. NEIO-B1841 provides adjustable input range of voltage and current, so that it can fulfill different application requirements. NEIO-B1841 also provides watchdog function, when it is disconnected, watchdog function can keep the module in a safe state and restore to normal operation.All of the NEIO modules are provided with high isolation protection, and verified by the EtherCAT conformance test tool.

Specifications

Analog Input (voltage input)

- Number of channels : 8 (single-ended)
- Input type: voltage, current
- Input range: 0~5V, 0~10V, ±5V, ±10V, 0~20mA, 4~20mA
- Resolution: 16-bit
- Sampling rate: 1 kHz/ch
- Accuracy: < ±0.3% of FSR

Analog Output

- Number of channels : 2 (single-ended)
- Output type: voltage, current
- Output range : 0~5V, 0~10V, ±5V, ±10V, 0~20mA, 4~20mA
- Resolution: 16-bit
- Accuracy
  - < ±0.2% of FSR for voltage output
  - < ±0.1% of FSR for current output

Digital Input

- Number of channels : 8 (PNP/NPN)
- Input voltage: 24 V_{DC}
- On-state voltage, "1": 9~24 V_{DC}
- Off-state voltage, "0": 0~8 V_{DC}
- Input filter: 1ms

Digital Output

- Number of channels: 8 (PNP)
- Input voltage: 24 V_{DC}
- Output load type: resistive, inductive, capacitive
- Max. output current: 500 mA/ch
- Switching time
  - Off to on: 100 us
  - On to off: 150 us

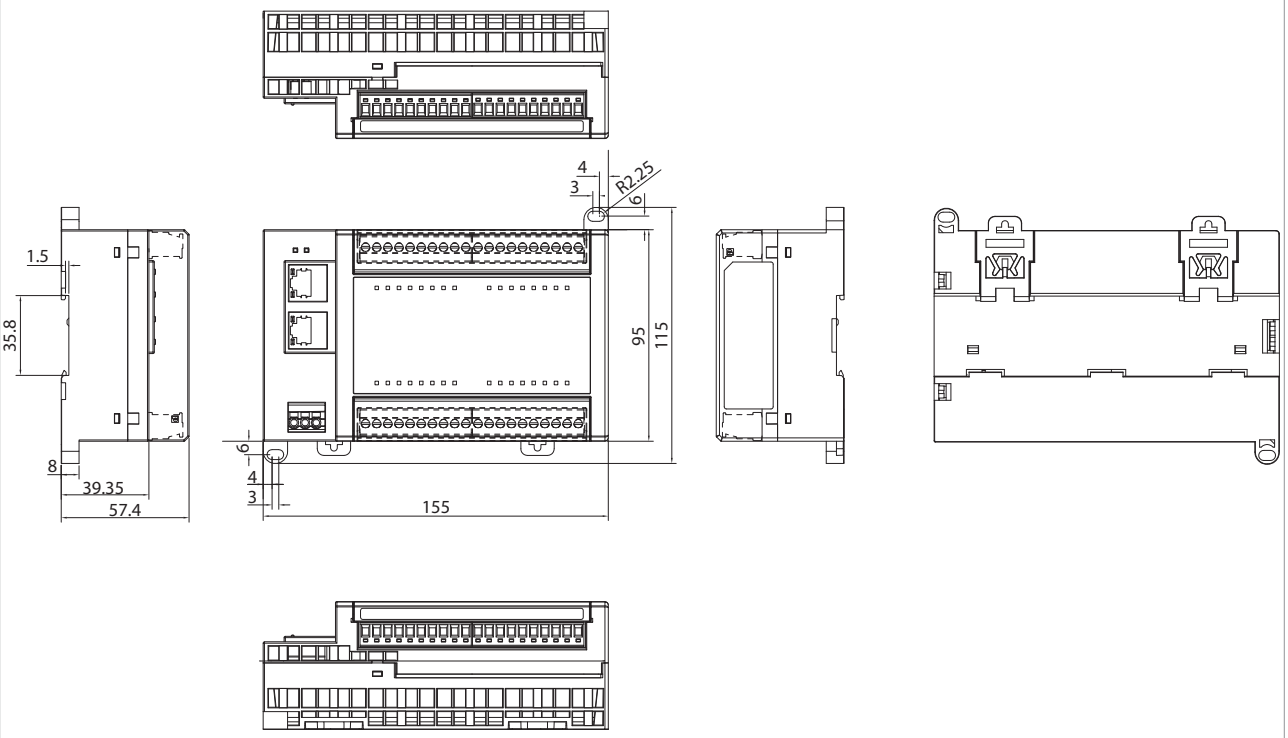
Communication

- Protocol: EtherCAT
- Bus interface: 2 x RJ-45 (daisy-chain)
- Media: Ethernet cable (min. CAT 5), shielded
- Distance between stations: maximum. 100m (100BASE-TX)
- Data transfer rate: 100M baud

Power Requirements

- DC input range: DC 24V ±20% with over-voltage and reversed-voltage protection

Dimension Drawing



Common Section

- Electrical isolation: 2.5 kV (power contact)
- Operating temperature: 0°C~55°C
- Storage temperature: -40°C~85°C
- Relative humidity: 5~95%, non-condensation, non-operating
- Shock: IEC 60068-2-27
- Vibration: IEC 60068-2-6, IEC 60068-2-64
- Enclosure type rating: IP20
- Mounting type: din-rail (35mm), wall-mount
- Dimesions (mm): 155 x 115 x 57.4 (W x H x D)

Certifications

- CE
- FCC Class A

Ordering Information

- **NEIO-B1841 (P/N: 10J80184100X0)**
  8-CH AI, 2-CH AO, 16-CH DI/O EtherCAT slave module
- **AC to DC din rail power supply (P/N: 7440060001X00)**
  60 W 24V/2.5A for NISE

NEIO-B1603

4 COM Ports EtherCAT Slave Module

NEIO-B1603

Main Features

- Finger-safe wiring cover
- Detachable screw terminals
- Rotational pin-assignment marks
- On-module LED indicators
- User-friendly wiring label
- Multiple mounting methods
- 1 x RS 232/422/485
- 3 x RS 422/485

Product Overview

NEIO-B1603 is an EtherCAT to serial conversion module which supports half-duplex and full-duplex communication modes. It offers one RS-232/422/485 and three RS-RS-422/485 interfaces. The transmission speed on NEIO-B1603 module is up to 115.2kbps. NEIO-B1603 can automatically detect the communication mode without setting any jumper and switch. Users can easily and quickly use this module to bridge their existing serial devices to the EtherCAT control network. All of the NEIO modules are provided with high isolation protection, and verified by the EtherCAT conformance test tool. Therefore NEIO is a reliable module to implement in your applications.

Specifications

COM Port

- Port type
  - 1 x RS 232/422/485
  - 3 x RS 422/485
- Data bits : 5, 6, 7, 8
- Stop bits: 1, 1.5, 2
- Parity: none, even, odd, space, mark
- Flow control: RTS/CTS and DTR/DSR (RS-232 only), XON/XOFF
- Baud rate: 0.3~115.2kbps

Communication

- Protocol : EtherCAT
- Bus interface: 2 x RJ-45
- Media: Ethernet cable (min. CAT5), shielded
- Distance between stations: maixmum. 100m (100BASE-TX)
- Data transfer rate:100M baud

Power Requirements

- DC 24V ±20% with over-voltage and reversed-voltage protection
- Power consumption: 6 W

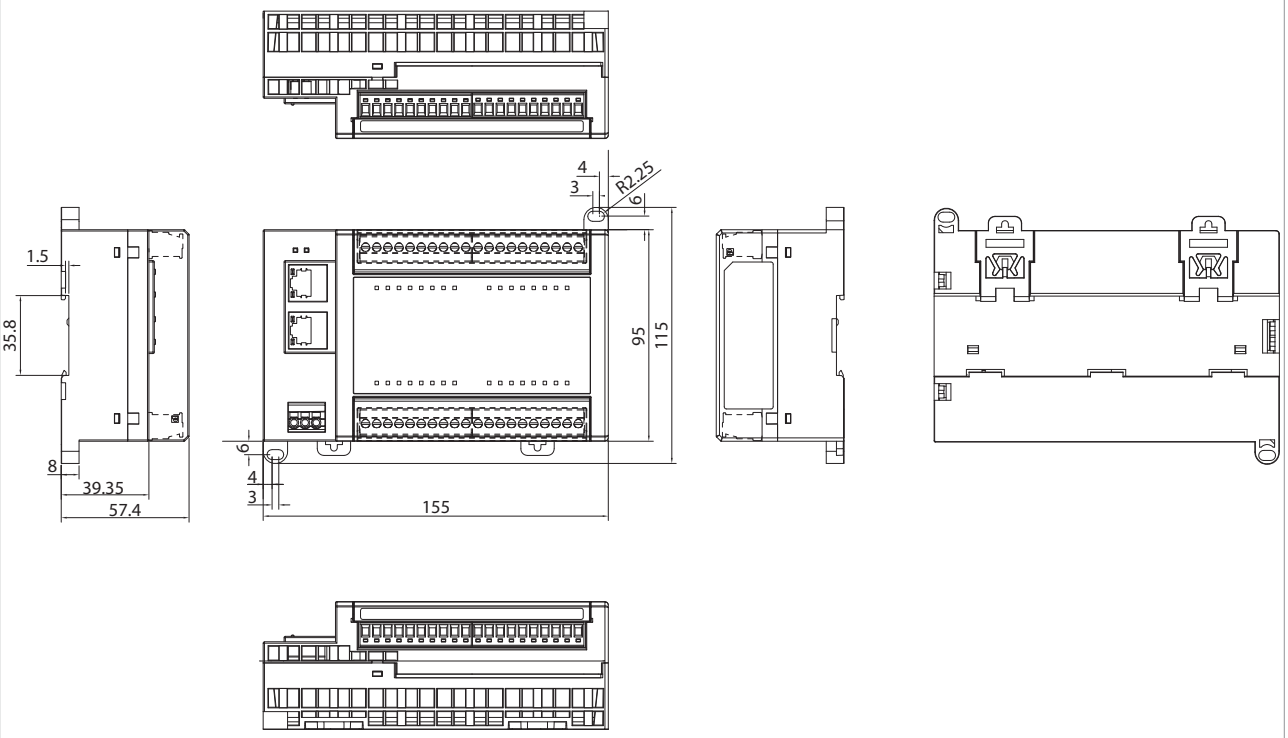
Common Section

- Electrical isolation: 2.5 kV (power contact)
- Operating temperature: 0°C~55°C
- Storage temperature: -40°C~85°C
- Relative humidity: 5~95%, non-condensation, non-operating
- Shock: IEC 60068-2-27
- Vibration: IEC 60068-2-6, IEC 60068-2-64
- Enclosure type rating: IP20
- Mounting type: din-rail (35mm), wall-mount
- Dimesions (mm): 155 x 115 x 57.4 (W x H x D)

Certifications

- CE
- FCC Class A

Dimension Drawing

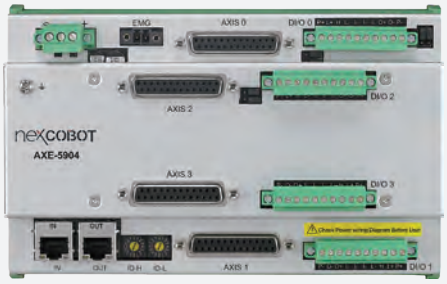


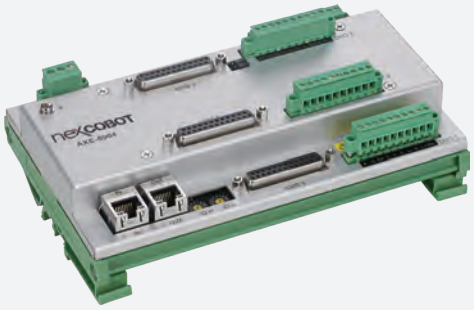
Ordering Information

- **NEIO-B1603 (P/N: 10J80160300X0)**
  4 COM ports EtherCAT slave module
- **AC to DC din rail power supply (P/N: 7440060001X00)**
  60 W 24V/2.5A for NISE

AXE-5904

Point-to-Point 4-Axis Pulse Type Motion EtherCAT Slave Module





Main Features

- 4-Axis independent control and pulse output up to 4Mpps
- Pulse output options: CW/CCW, OUT/DIR
- 4 x Differential encoder interface, ABZ phase
- EtherCAT slave protocol communication
- Support CiA 402 device profile
- General purpose I/O: 12 DI

Product Overview

AXE-5904 is a 4-axis pulse type point-to-point motion EtherCAT slave module, featuring real-time EtherCAT communication and CiA 402 device profile for machine automation applications requiring high-speed and point-to-points function. With pulse type commands, AXE-5904 supports pulse output rate and encoder input up to 4MHz in 4 xAB phase mode and build-in dedicated I/O points for servo control and mechanism to facilitate building up whole machines.

Specifications

Pulse Type Motion Control

- Number of axes: 4
- Pulse output rate: up to 4Mpps
- Pulse command output: CW/CCW, OUT/DIR
- Committed I/O signal: LS±/CMP±/HS/SVON/RDY/INP/ALM/ARST/DCLR for each axis

Encoder Input

- Encoder input type: incremental, 32-bit
- Encoder signal: CW/CCW, AB/Z
- Positioning range: -2,147, 483, 648 through 2, 147, 483, 647 pulse (32-bit)
- Max. input frequency: 4MHz

General I/O

- General-purpose input: 3 channel per axis
- Input type: photo-coupler input (corresponding to current sink output)
- Response time of DI (Max.): 100 µsec
- General-purpose output: 2 channel per axis
- Response time of DO (Max.): 100 µsec

Power Requirements

- DC input range: DC 24V ±10% with over-voltage and reversed-voltage protection

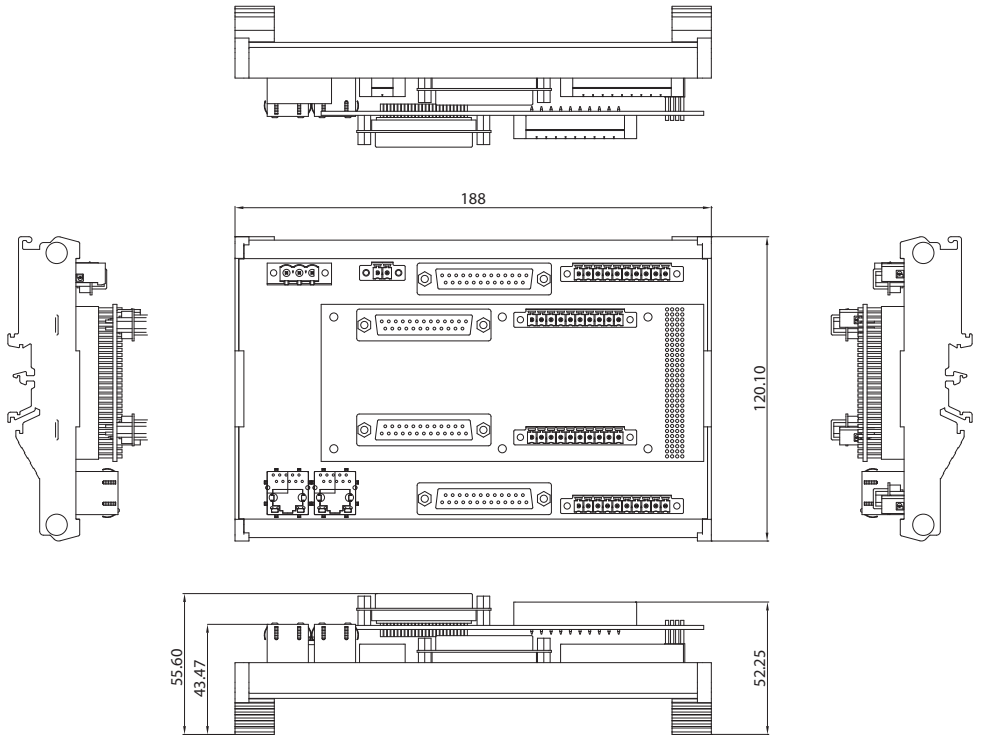
Common Section

- Data transfer medium: Ethernet cable (min CAT 5), shield
- Bus interface: 2 x RJ-45
- Data transfer rate: 100M baud
- Protocol: EtherCAT
- Device profile: CiA 402
- Operating temperature: 0°C~50°C
- Relative humidity:
  - 35~85%, non-condensation, operating
  - 10~90%, non-condensation, non-operating
- Shock: IEC 60068 2-27
- Vibration: IEC 60068-2-6, IEC 60068-2-64
- Enclosure type rating: IP00
- Mounting type: din-rail
- Dimension (mm): 120.1 x 188 x 55.6 (W x L x H)

Certifications

- CE
- FCC Class A

Dimension Drawing



Ordering Information

- **AXE-5904 (P/N: 10J40590400X0)**
  Point-to-point 4-axis pulse type motion EtherCAT slave module

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