# The Industrial IoT System

**EtherCAT Motion Solution**

## Assembly Line Dashboard

<table>
<thead>
<tr>
<th>Name</th>
<th>Quantity</th>
<th>Defect</th>
<th>Defect Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>TYPE-0002</td>
<td>2183</td>
<td>109</td>
<td>5.0%</td>
</tr>
</tbody>
</table>

### Machine Status

<table>
<thead>
<tr>
<th>RUN</th>
<th>Temperature(°C)</th>
<th>Humidity(RH%)</th>
<th>Pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>24.5</td>
<td>50.4</td>
<td>8.3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>FEED HOLD</th>
<th>Feed Rate</th>
<th>Max Glue Capacity</th>
<th>Remaining Glue Cap.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>100</td>
<td>500</td>
<td>400</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ALARM</th>
<th>Working Hours</th>
<th>Total Labels</th>
<th>Remaining Labels</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0002:02</td>
<td>5000</td>
<td>2817</td>
</tr>
</tbody>
</table>

## Predictive Maintenance Warning

- Monitor Machine Learning
- Powered by Microsoft Azure
- Predictive Day: 1-10
- Maintenance Day: 11-31
- Threshold: 0-50%
- Predictive: 1-50
- Maintenance Period: 1-50
- Motor vibration fault percentage
**Robot & Machine Automation Product Selection Guide**

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>About NEXCOM</td>
<td>004</td>
</tr>
<tr>
<td>IoT Automation Solution Brochures</td>
<td>005</td>
</tr>
<tr>
<td>Machine Automation in IoT</td>
<td>006</td>
</tr>
<tr>
<td>Machine Automation Solution</td>
<td>008</td>
</tr>
<tr>
<td>NexROBO</td>
<td>010</td>
</tr>
<tr>
<td>Robot Solutions for Smart Manufacturing</td>
<td>012</td>
</tr>
<tr>
<td>Open and Modular Robot Solutions</td>
<td>016</td>
</tr>
<tr>
<td>Development Package</td>
<td>018</td>
</tr>
<tr>
<td>Production Line Integration Service</td>
<td>020</td>
</tr>
<tr>
<td>Articulated Robot Solution</td>
<td>022</td>
</tr>
<tr>
<td>Delta Robot Solution</td>
<td>024</td>
</tr>
<tr>
<td>SCARA Robot Solution</td>
<td>026</td>
</tr>
<tr>
<td>NexMotion</td>
<td>028</td>
</tr>
<tr>
<td>EtherCAT Machine Automation</td>
<td>030</td>
</tr>
<tr>
<td>Professional EtherCAT Motion Control</td>
<td>032</td>
</tr>
<tr>
<td>Selection Guide</td>
<td>034</td>
</tr>
<tr>
<td>Compact EtherCAT Controller</td>
<td>036</td>
</tr>
<tr>
<td>EtherCAT Controller</td>
<td>038</td>
</tr>
<tr>
<td>EtherCAT Controller with Expansion</td>
<td>040</td>
</tr>
</tbody>
</table>

**NControl**

- Comprehensive CNC Solution for 2D/3D Machining | 042
- 5-Axis Milling Machine Solutions | 044
- 2.5D/3D CNC Controller | 046
- Panel PC | 048
- EtherCAT-based Control Panel | 050

**MAC**

- Purpose-built Machine Control Solutions | 052
- Glass Grinding Machine Solution | 054
- Machine Controller | 056
- Machine HMI | 058

**NEIO**

- EtherCAT I/O Systems | 060
- Selection Guide | 062
- EtherCAT 32-ch DI Module | 064
- EtherCAT 32-ch DO Module | 066
- EtherCAT 16-ch DI & 16-ch DO Module | 068
- EtherCAT 8-ch AI & 2-ch AO Module | 070
- EtherCAT 2-ch COM-port Module | 072
- EtherCAT 4-ch Pulse-output Module | 074

**Contents**
**IoT Automation Systems, The Solutions to Industry 4.0**

NEXCOM maps out a solution blueprint for Industry 4.0, which seamlessly integrates connected manufacturing and big data computing.

NEXCOM IoT Automation Solutions (IAS) Business Group has broadened its Industry 4.0 solutions to include cyber-physical system (CPS) ready solutions (Automation), robot solutions (NexROBO), EtherCAT motion solutions (NexMotion), and industrial network & cloud solutions. All solutions leverage NEXCOM IoT Studio and IoT gateways to stream field data to cloud services powered by world-renowned cloud services such as Microsoft Azure, IBM Bluemix™ and SAP etc.

The integrated cloud-enabled services such as remote management, big data analytics, machine learning, and business intelligence (BI) can provide benefits such as remote monitoring to enable exception management and advanced process control.

For instance, operators can benefit by getting an accurate measure of machine status and factory operations in real-time, as well as integrating enterprise resource planning (ERP) and manufacturing execution systems (MES) systems to optimize supply chain management. Based on live field data, big data analytics and machine learning can establish predictive models that assist operators in managing factory operations, identifying causes for abnormal conditions, and taking corrective actions. Preventive maintenance can be executed prior to an equipment failure to ensure production efficiency and yield rate.

Positioning itself as an industrial IoT forerunner, NEXCOM has broadened its Industry 4.0-ready Automation solutions, including cyber-physical system (CPS) ready solutions, robot solutions, EtherCAT motion solutions, and industrial network & cloud solutions for smart manufacturing. Mirroring the ambition for Industry 4.0, a connected factory will enable raw data to be exchanged over the network and translated into valuable information, helping enterprises make insightful decisions and therefore increase competitiveness in fast-paced industries. Our best-in-class solution topology has new technological breakthroughs and innovative convergence of data communications technology. It can better serve customers in an increasingly competitive global marketplace and lead manufacturers to smart factory automation.

**Application Layer**

- Microsoft Azure
- IBM Bluemix™
- Custom SaaS
- Private Cloud
- H.4 War Room
- Big SCADA

**Communication Layer**

- Edge Gateway: NISE Series
- IoT Gateway Builder
- IoT Studio Software
- Cloud Configurator
- Cloud Protocols
- Device Configurator
- Field Protocols

**Device Layer**

- Industrial Firewall: IFA Series
- Protocol Converter: JMobile Gateway CPS Gateway
- ISA100 Gateway: MAC Series
- WirelessHART Gateway: NIO 200H

**Factory Automation**

- SoftPLC: NPI Series
- IPCAPC Series
- HWJ Mobile
- eSmart Series
- IPCAPC Series
- Predictive Maintenance System: NISE/RA XM Series
- Automation I/O: VIPA SIO

**Machine Automation**

- EtherCAT Master Controller: NexECM Series
- NC Controller: NControl Series
- CNC Controller: MAC Series
- GCM Controller: NISE Series
- EtherCAT I/O: NEEP Series

**Robot Control**

- Robot Controller: NET Series
- Robot Solution Pack: Delta Robot
- SCARA Robot

NEXCOM provides a wide range of IoT Automation solutions for increasing demands of industrial applications. NEXCOM IoT Automation Solutions Master e-Catalog covers NEXCOM's most up-to-date and completed solutions, detailed product datasheets, and selection guides of high-performance industrial fanless computers, different-size industrial panel PCs, machine and robot automation lineups, PC-based factory automation families, IoT solutions, industrial wireless solutions, and embedded computing and customization services.
Machine Automation in IIoT

Total EtherCAT Motion Solution

Industrial IoT (IIoT) enables smart factories, smart machines, and smart products to connect to each other in order to communicate directly between devices and share information to promote instant business decision making.

To lay the groundwork for IIoT, NEXCOM’s leading machine automation solutions combine advanced embedded computing and automation technology to bolster the capabilities of smart machines. Based on an open architecture, the solution lineup features integrated and decentralized designs to meet the application requirements of a host of industrial automation applications ranging from general motion control, CNC machines, and industrial robots to EtherCAT-based distributed control systems.
NEXCOM machine automation solutions comprise of NexROBO, NexMotion, NControl, MAC, and NEIO series. Each of the product series is developed with state-of-art technologies to satisfy the changing demands for IIoT market. NEXCOM’s total machine automation solutions integrate NEXCOM’s products and third-party solutions such as robot bodies, servo motors, control panels, machine vision, and SoftMotion software with full compatibility tests. NEXCOM also provides quality services, such as customization, product training, direct technical support, and after-sales service to ensure the success of your projects.
NexROBO
Robot Solutions for Smart Manufacturing

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 and span machine control, monitoring, management, data reporting and analysis. Even operators interact with machines digitally using a human machine interface (HMI). Smart factories provide many benefits, including reduction in operator hours and opportunities to increase throughput, boost yields, improve efficiency, and reduce downtime through insights gained from advanced data analytics.

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 China, where, in some regions, 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, NEXCOM, 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, NexROBO, NEXCOM’s EtherCAT robot solutions perform precise robotic control and run essential industrial application software.

Although industrial robot systems come in all shapes and sizes, they will typically include the types of subsystems shown and described below:

Robot Body

Made of high-strength materials and designed for harsh environments, the robot body plays a "hands on" role in the manufacturing of goods by performing tasks such as welding, painting, packaging, inspecting, etc.

Robotic Control

Robotic control systems are typically responsible for sensing, motor driving, and movement functions that require sophisticated algorithms. The design of these rather complicated systems also requires vast experience in remote teaching, application expertise and networking technology suited to industrial environments (eg. EtherCAT). Control system components may include: Controller: PC-based system to control the robot body. Algorithms: Application software running on the controller. Teach pendant: Input device (HMI) enabling process control customization. Communications: Devices supporting advanced communications capabilities (eg. EtherCAT).

Device and Equipment

Addition to the robotics, other system are needed to complete the production line, and some examples are:
1. Remote I/O: Peripheral devices communicating with sensors, actuators, networks, etc.
2. HMI: Panel PCs enabling operators to interact with production equipment.
3. Conveying System: A variety of equipment for moving goods along the production line.

Distributed Control System

This architecture is used to flexibly connect distributed I/Os, sensors, and drives so developers can implement robot design without concerns for signal wiring length limitations.

Domain Know-how

In addition to robotics, production lines may require special functions, such as vision inspection, that require particular expertise.
NexROBO
Open and Modular Robot Solutions

Open Architecture Controller to Develop Your Own Robotic Control System
NexROBO, NEXCOM’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
NexROBO 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.

<table>
<thead>
<tr>
<th>Operation System</th>
<th>Robotic Control Functions (GRC)</th>
<th>Built-in Utility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Win 7 / WES 7</td>
<td>Jog</td>
<td>Parameter Setting</td>
</tr>
<tr>
<td>Development Tool</td>
<td>PTP</td>
<td>Limit Setting</td>
</tr>
<tr>
<td>Visual Studio 2010/2015</td>
<td>Linear interpolation</td>
<td>I/O Control</td>
</tr>
<tr>
<td>Supported Robot Type</td>
<td>Circular interpolation</td>
<td>Axis Control</td>
</tr>
<tr>
<td>6-axis Articulated</td>
<td>Blending movement</td>
<td>Robotic Move</td>
</tr>
<tr>
<td>4-axis SCARA</td>
<td>Tool</td>
<td>Position Monitor</td>
</tr>
<tr>
<td>3/4-axis Delta</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| HMI Example            | C/C++ VB/C#... Program                      | Operating System       |
| C#                     |                                              | Windows                |
|                        | User Control APIs Example (Win32 DLL)       |                        |

<table>
<thead>
<tr>
<th>Host Service (ShareMemory)</th>
<th>User RT Application Example</th>
<th>Real-Time Extension</th>
</tr>
</thead>
<tbody>
<tr>
<td>NexRobotKernel (Lib)</td>
<td>C/C++</td>
<td>RTX</td>
</tr>
<tr>
<td>NexECM</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

6-axis Articulated

4-axis SCARA

3/4-axis Delta
NexROBO
Open and Modular Robot Solutions

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, NexROBO 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 NexROBO provides modular solution to satisfy these needs.

<table>
<thead>
<tr>
<th>Robot Body</th>
<th>Motor Drive</th>
<th>Controller</th>
<th>Hardware Parts</th>
<th>Project Integration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Robot Builder</td>
<td>System Integrator</td>
<td>Academy User</td>
<td>End User / Operator</td>
<td></td>
</tr>
</tbody>
</table>

### Business

- **Requires Reliable Hardware Components**
  - NexCOM: Controller Platform, Teach Pendant
  - Customer: Robot Body, Robotic Software

- **Requires Ready-to-use Robot Controller for Integration**
  - NexCOM: Robot Controller, Robotic Software
  - Customer: Robot Body, System Integration

- **Requires Development Platform for Robot Operation**
  - NexCOM: NexROBO Development Package
  - Customer: Robotic Control Study, Application Research

- **Requires Complete Robot Solution**
  - NexCOM: Complete Robot Solution

### Robot Application Examples

<table>
<thead>
<tr>
<th>Subsystem</th>
<th>Component</th>
<th>Auto Pasting Machine</th>
<th>Assembly Line</th>
<th>Industrial Robot</th>
<th>Academic Development Platform</th>
</tr>
</thead>
<tbody>
<tr>
<td>Domain Knowledge</td>
<td>Robot Body</td>
<td>HIWIN IR603</td>
<td>HIWIN RA805</td>
<td>Third-party HIWIN BA805</td>
<td></td>
</tr>
<tr>
<td>Robotic Control</td>
<td>Controller</td>
<td>NexCOM NET101</td>
<td>NexCOM NET600E</td>
<td>NexCOM NSE 104/105</td>
<td>NexCOM NET3600E</td>
</tr>
<tr>
<td>Algorithm</td>
<td>NexCOM</td>
<td>Customer’s</td>
<td>NexCOM</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Communications</td>
<td>EtherCAT</td>
<td>EtherCAT</td>
<td>EtherCAT</td>
<td>Third-party EtherCAT</td>
<td></td>
</tr>
<tr>
<td>Device and Equipment</td>
<td>Application</td>
<td>Conveying System and HMI Partner</td>
<td>Conveying System and Air Compressor</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>HMI</td>
<td>NexCOM ICC VRC 1632P</td>
<td>NexCOM</td>
<td>N/A</td>
<td>NexCOM Teach Pendant, Customer’s Options</td>
<td></td>
</tr>
<tr>
<td>Remote I/O</td>
<td>NexCOM</td>
<td>AXE-9200</td>
<td>VIPA SLUD</td>
<td>N/A</td>
<td>NexCOM AXE-9200</td>
</tr>
</tbody>
</table>

### NexROBO Product Range

- **Controller**
  - NET101-DLT: Robot Controller for 3/4-Axis Delta Robot
  - NET200-SCR: Robot Controller for 4-Axis SCARA Robot
  - NET3600E-6R: Robot Controller for 6-Axis Articulated Robot

- **Teach Pendant**
  - TP100: 10.1” Multi-touch Teach Pendant

- **Control Software**
  - NexROBO Edu: Robotic Control API
  - NexROBO Simulator: Robot Simulator
  - NexROBO GRC: General Robot Control Software

- **I/O**
  - NET101-DLT: EtherCAT I/O Modules
  - NET200-SCR: Pulse Output Module

- **Motor & Drive**
  - HIWIN: Certified Driver List: Servotronix, HIWIN, Yaskawa, Panasonic, Sanyo, Omron, Maxon, Delta

- **Development Package**
  - NexROBO Delta Robot Development Package
  - NexROBO SCARA Robot Development Package
  - NexROBO Articulated Robot Development Package

  - Integrated robotic system for application creation and customized implementation
  - EtherCAT communication for I/O and motion expansion
  - No integration needed
  - Package models: Articulated, Delta, SCARA
NexROBO Development Package

NexROBO has released a series of robot development packages that consist of an industrial robot body, NEXCOM’s open robot controller, related circuits and wiring in a control cabinet. NexROBO 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 NEXCOM. To further reduce development time, it also comes with C/C++ robot APIs which save users’ needs to create their own. The real-time environment further enables users to perform programs required for time-deterministic tasks. By adding joint limits, mechanical safety is also implemented to prevent damage from the robot body’s mechanical constraints.

NexROBO 6R Edu Package
Open Robot Package for Articulated Robot
- Articulated Robot Body
- Servo Motors and Wiring Circuit
- Control Cabinet
- Open Robot Controller

EtherCAT-based NexROBO Edu package provides an open programming environment for users to develop their own robot control. It consists of a six-joint articulated robot and a robot controller in the control cabinet. Motor drives, I/O signals and related circuits are all integrated based on EtherCAT control network. Single-axis movement for every axis can be easily operated by provided examples. This package is suitable for academic study and R&D research of basic robotic control.

NexROBO SCARA Edu Package
Open Robot Package for SCARA Robot
- SCARA Robot Body
- Servo Motors and Wiring Circuit
- Control Cabinet
- Open Robot Controller

EtherCAT-based NexROBO Edu package provides an open programming environment for users to develop their own robot control. It consists of a 4-axis SCARA robot and a robot controller in the control cabinet. Motor drives, I/O signals and related circuits are all integrated based on EtherCAT control network. Single-axis movement for every axis can be easily operated by provided examples. This package is suitable for academic study and R&D research of basic robotic control.

NexROBO miniDelta Edu Package
Open Robot Package for Delta Robot
- Delta Robot Body Mounted in a Cupboard
- Servo Motors and Wiring Circuit
- Open Robot Controller

EtherCAT-based NexROBO Edu package provides an open programming environment for users to develop their own robot control. A three-joint delta is mounted in the cupboard along with robot controller. Motor drives, I/O signals and related circuits are all integrated based on EtherCAT control network. Point-to-point movement can be easily operated by provided examples. This package is suitable for academic study and R&D research of basic robotic control.

Package Contents of an Articulated Robot Development Package

<table>
<thead>
<tr>
<th>1</th>
<th>6R Robot SDK</th>
<th>Entry-level Control Software</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PTP Example</td>
<td>C/C++ Programming</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2</th>
<th>Robot Controller</th>
<th>NET3600E-6R Controller</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Intel Core-i5 CPU</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>3</th>
<th>Motor/Drive/Related Circuits</th>
<th>EtherCAT Slave Drive &amp; Circuit Control</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>100 ~ 400W Motors</td>
<td></td>
</tr>
</tbody>
</table>

* The robot system is based on EtherCAT
* Robot stand & teach pendent are optional
Production Line Integration

Since the integration of robots requires planning for mechanical, electrical and control schemata, as well as high-level software integration, NEXCOM, with their years of experience developing automation systems, can collaborate with customers and devise a plan for project implementation. As a robotics system integrator, we can:

- Perform a feasibility study on projects
- Provide helpful cost-saving tips
- Provide and program an industrial robot and workcell
- Produce tooling and part fixturing
- Incorporate systems into existing factory settings

Service with NexROBO

The NEXCOM Integration Team is committed to be the most valued supplier of innovative industrial automation and information products, services and solutions by working closely with its robot-vendor partners, OEMs and system integrators. We provide a preferred level of integration focused on saving design, development and delivery time. Preferred integration starts with using modular design and EtherCAT communication technology which means robots connect through EtherCAT with predefined software and service interfaces that simplify design, operation and maintenance efforts to improve machine and overall line.

Below are examples of our successful application cases: wet wipe packing machine, paper repackaging machines and a stack of agricultural equipment.

In these examples we have integrated NEXCOM products including Machine Vision, Delta Robot Controller, conveyor control and product loading and unloading.
Articulated Robot Solution

Main Features
- Standard EtherCAT Communication
- Robot Function APIs Provided
- 1 ms Control Cycle Time

Product Overview
NexROBO solution provides an open programming environment for users to develop their own robot applications. It consists of robot body and NEXCOM’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, NexROBO solution always allows the flexibility to change components in the robot system for unlimited possibilities.

Specifications
Robot
- Degree of freedom: 6
- Nominal load capacity: 5kg
- Motion Range
  - J1: ±165°
  - J2: ±85°~125°
  - J3: ±185°~55°
  - J4: ±190°
  - J5: ±115°
  - J6: ±360°
- Position repeatability: ±0.02 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 Display Ports and 1 x VGA or 2 x Display Ports 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: Position 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
- NexROBO 6R Edu Package (P/N: 7900000115X00)
Optional
- Robot Stand (P/N: 79000000160X00)
- Teach Pendant (P/N: 10IH0010001X00)

Software Architecture

Robot Operating Space

Operating System
Windows
- User Control APIs Example (Win32 DLL)
- Host Service (ShareMemory)
- User RT Application Example C/C++

Real-Time Extension
RTX
- NexRobotkernel (Lib) for Articulated Robot
Delta Robot Solution

Main Features
- Standard EtherCAT Communication
- Robotic Function APIs Provided
- 1 ms Control Cycle Time

Product Overview
NexROBO solution provides an open programming environment for users to develop their own robot applications. It consists of robot body and NEXCOM’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. Besides general system configuration, NexROBO solution always allows the flexibility to change components in the robot system for unlimited possibilities.

Specifications

**Robot**
- Degree of Freedom: 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 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: Position 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**
- NexROBO miniDelta Edu Package (P/N: TBC)

**Optional**
- Conveyor System (P/N: TBC)
- Vision Inspection System (P/N: TBC)
- Teach Pendant (P/N: 10IH0010001X0)

Software Architecture

**Operating System**
- Windows RTX

**Host Service (ShareMemory)**
- NexRobotkernel (Lib) for Delta Robot

**Real-Time Extension RTX**
- NexECM

**HMI Example**
- C/C++
- VB/C#...

**User Control APIs Example (Win32 DLL)**
- HMI Program

**User RT Application Example (Win32 dll project)**
- HMI Program
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
NexROBO solution provides an open programming environment for users to develop their own robot applications. It consists of robot body and NEXCOM’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. Besides general system configuration, NexROBO solution always allows the flexibility to change components in the robot system for unlimited possibilities.

Specifications
Robot
• Degree of freedom: 4
• Nominal load capacity: 6kg
• Motion Range
  - Maximum reach radius: 600mm
  - J1: ±130°
  - J2: ±150°
  - J3: ±200°
  - 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: Position Command, Velocity Command, Torque Command
• Parameters: position, velocity, torque
• RT Example (RTX project)
• User API Example (win32 dll project)

Ordering Information
Robot Package
• NexROBO SCARA Edu Package (P/N: 7900000163X00)
Optional
• Robot Stand (P/N: 7900000164X00)
• Teach Pendant (P/N: 10IH001001X0)

Software Architecture

Robot Operating Space

HMI Example
C#  
C/C++  
User Control APIs Example (Win32 DLL)
VB/C#, C#  
HMI Program
C/C++  
RTX
Programming System
Windows
Host Service (ShareMemory)
Real-Time Extension
NexRobotkernel (Lib) for SCARA Robot
NexECMRtx
NEXCOM
NexMotion
EtherCAT Machine Automation

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 machine automation.

NexMotion – Comprehensive EtherCAT Solution
NEXCOM has been investing R&D resources in developing its own EtherCAT master core architecture. Leveraging industrial grade Ethernet technology, NexMotion, NEXCOM’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 machine automation environments. Furthermore, the Ethernet-based wiring design allows NexMotion products to add greater flexibility and expandability to control systems.

Pre-Verified EtherCAT Slaves
EtherCAT, as a high-speed fieldbus protocol, is supported by many vendors to provide related slave module products. NEXCOM’s EtherCAT controller, NET Series controllers, has performed strict tests with a numbers 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.

Drive
- Yaskawa Sigma S7
- Hiwin D2, D1
- Omron R88D
- Delta A2E
- Servotronix CDHD
- Sanyo RB4D, R Series
- Panasonic MNAS ASB
- Mitsubishi MR-J3-T04
- Schneider LX M32
- MiControl mcDGA-665
- Maxon MAXPOS

I/O
- NEXCOM NEIO Series, AXE-5904, AXE-9801
- VIPA SLIO Series
- Beckhoff EL1, EL2, EL4, EL30, EL100
- SYN-TEK ESC5500, ESC6022
- WAGO 750 Series

Guaranteed Performance
Based on Microsoft’s Windows OS and well-known real-time extensions, NEXCOM’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 NEXCOM’s laboratory where more than one hundred EtherCAT slaves are configured for function validation of NEXCOM’s EtherCAT master. The CiA 402 standard protocol is also supported by NexECM which makes it easy to control EtherCAT slave drives.
NexMotion
Professional EtherCAT Motion Control

Powerful IDE Tool – NexMotion IDE
As an integrated development tool, NexMotion IDE, allows users to set/configure and test EtherCAT systems, compose real-time programs, and even select parameters for monitoring and data analysis. The setup and simulation of EtherCAT-based robot systems is also built in to the development tool for users to easily construct a multi-axis robot system.

Advanced Motion Control Functions
NEXCOM’s EtherCAT controller, NET Series provides up to 64-axis motion control with advanced functions. As well as point-to-point movement for single axis, it also supports multi-axis linear/circular interpolation, continuous moving, PT/PVT, T/S curve velocity profiles, E-gearing, E-CAM etc. Advanced applications such as gantry and fly-cut can be accomplished by the use of the motion control functions NET controller provides.

Set up / Test of EtherCAT System
EtherCAT Configurator
- Multiple Axis PTP, Jog and Synchronization Move
- Position and Speed on the Fly Change
- Master-Slave E-GEAR, E-CAM and Gantry
- User-defined Profile with PT and PVT Motion

Set up / Test of Motion System
Motion Group Configurator
- 3D Contouring with Look-ahead and Path Blending
- Dynamic Coordinate Change - Conveyor Tracking
- User-defined Standard Robot Kinematics (Delta, SCARA, 6 Axis Robot)

Real-Time Program Development
Motion Builder

Data Analysis
Motion Analyzer

Electronic Gearing & Electronic Cam
In some systems, where different rotating drums must turn at a given ratio to each other, Electronic Gearing and Electronic Cam are necessary. NET controller supports these functions so that the position of a slave axis can be mathematically linked to the position of a master axis. A more advanced case of Electronic Gearing is Electronic Camming. With Electronic Camming, a slave axis follows a profile that is related to the master position. This profile does not need to be salted, but it must be an animated function.
NexMotion
Selection Guide

Satisfy both C/C++ & IEC-61131 Users

NEXCOM’s EtherCAT controller NET series supports C/C++ and IEC-61131-3 programming languages to simplify the development of motion control applications. Featuring programming flexibility, the NET series controller enables machine builders and automation control engineers to fully leverage its powerful PC architecture and functional libraries by using a programming language that best serves the control purpose. Aimed at modernizing production lines, NEXCOM EtherCAT controllers allow close collaboration of PLC systems, industrial machines, and robots, taking factories one step closer to Industry 4.0.

To modernize production lines, NET EtherCAT controllers offer design flexibility and integration with C/C++ and IEC 61131-3 support. The multi-language feature makes NET series an ideal platform for motion control, robot applications, and PLC automation cases. With an unified controller like NET series, engineers can build highly automated production lines where CNCs, high-speed pick-and-place robots, conveyor systems, and other industrial machines all work together.

For complex motion control and robot applications, the NexECM-bundled solution makes an ideal choice. The solution includes a powerful EtherCAT Master controller and the programming software NexECM. Supporting C/C++, NexECM features high-level functionality, EtherCAT Master Library, and CiA 402 Motion Control Library. The software can automatically detect EtherCAT slaves, such as EtherCAT servo drives and EtherCAT I/O modules, connected to the EtherCAT Master controller. More importantly, it simplifies the building of advanced kinetic control and enables smooth movement of coordinated axes required for individual CNCs and robots.

As for PLC control systems, the CODESYS-bundled solution integrates an EtherCAT Master controller pre-installed with CODESYS SoftMotion. The solution provides SoftPLC functions with support for IEC-61131-3 standard programming languages including Ladder Diagram (LD), Instruction List (IL), Function Block Diagram (FBD). Engineers can easily devise and maintain motion sequence for sophisticated coordination of axes used in sorting, packing, material handling, and other sequential operations.
NET101-ECM

Front-access Compact EtherCAT Master

Main Features
- EtherCAT technology with new 2-channel Class A EtherCAT Master
- EtherCAT communication cycle time up to 250 μs
- Support high-level API for C# API profile
- Onboard Intel® Atom™ processor E8164 Dual Core 1.46GHz
- 1x DVI display output or 1x VGA converted from DVI1
- 1x USB 2.0 B & 1x USB 3.0
- 2x RS232/422/485 with 2.5KV isolation protection
- 1x M12 or PC-socket for optional WiFi/3.3G/4G LTE/ethernet module
- Support 1~+70℃ extended operating temperature

Product Overview
Powered by Intel® Atom™ processor E8164 (formerly codenamed "Bay Trail-F"), NET101-ECM presents intelligent PC-based EtherCAT controller for machine automation. It integrates NEXCOM’s EtherCAT master, NewCOM, to perform machine communication with cycle time up to 250 μs. NET101-ECM also provides API for C# API profile and built-in EtherCAT configuration tools to speed up development time for automation users.

Inside EtherCAT communication, NET101-ECM has high integration ability with optional Mini-PCI-e module and 2x COM ports with total 7, 5Kv protect, which makes it a flexible controller to connect with optional C36, LAN, Wi-Fi, 3.3G/4G LTE module. NET101-ECM is a compact yet powerful controller for your EtherCAT control system.

Specifications
EtherCAT Master
- Slave mode no. up to 64
- Cycle time: up to 250 μs
- Synchronization Error: <50ps
- Support C# API standard protocol

CPU Support
- Onboard Intel® Atom™ processor E8164 Dual Core 1.46GHz

Main Memory
- 1x DDR3L 4GB RAM

Display Option
- 1x DVI display output
- 1x VGA display output (converted from DVI1 to VGA adapter)

I/O Interface-Front
- 1x Power on/off switch
- 1x LED for power status, HDD access, battery low, 2x programming LED, 4x 1x/16 LED
- 1x External Chast socket
- 1x SIM card holder
- 1x EtherCAT port
- 1x Intel® E8164 Clt. LAN port
- 1x DVI display in/out
- 1x USB 3.0 (900mA per each)
- 1x USB 2.0 (500mA per each)

Power Requirement
- Typical 24V DC input with ±10% range
- 1x optional 24V, 60W power adapter

Dimensions
- 58mm (W) x 135.5mm (D) x 192.5mm (H)

Construction
- Aluminum and metal chassis with fanless design

Environment
- Operating temperature: Ambient with air flow -20°C to 70°C with industrial grade device

Certifications
- CE
- FCC Class A

Operating System
- Windows Embedded Standard 7, 32-bit, with RTX2012

Ordering Information
- NET101-ECM (P/N: 1010010100X00)
- 2x, 60W AC/DC power adapter w/f a power cord

Optional WiFi/LTE Module
- NET101/20100000X00
- NET101/20100000X10
- NET101/20100000X20
- NET101/20100000X30
- NET101/20100000X40
- NET101/20100000X50
- NET101/20100000X60
- NET101/20100000X70
- NET101/20100000X80
- NET101/20100000X90

Optional Dim Rail Kit
- NET101/20100000X00
- NET101/20100000X10
- NET101/20100000X20
- NET101/20100000X30
- NET101/20100000X40
- NET101/20100000X50
- NET101/20100000X60
- NET101/20100000X70
- NET101/20100000X80
- NET101/20100000X90
NET200-ECM

Front-access EtherCAT Controller

Main Features
- EtherCAT technology with NexIO-CM, Class A EtherCAT Master
- EtherCAT communication cycle up to 250 μs
- Support high-level API for EtherCAT profiles
- Onboard Intel Celeron® processor, J1900 Quad Core 2.0GHz
- Dual independent display from DP and LVDS
- 3 x USB 2.0 & 1 x USB 3.0
- 2 x RS232/422/485
- 2 x Mini-PCIe socket for optional WAN/3G/4G/LTE/Fieldbus modules
- Support 5~55 °C operating temperature

Product Overview
Powered by Intel® Celeron® processor J1900 (formerly codenamed "Bay Trail"), NET200-ECM presents an intelligent PC-based EtherCAT controller for machine automation. Integrates NexIoCM’s EtherCAT master, NexIO-CM to perform real-time communication with cycle time up to 250 μs. NET200-ECM also provides API for EtherCAT and builds in EtherCAT configuration tools to speed up development time for automation owners.

Besides EtherCAT communication, NET200-ECM has high integration ability with two optional Mini-PCIe modules and two COM ports, which makes it a flexible controller to connect with optional GigE LAN, Wi-Fi, 3G/4G/LTE module or other fieldbus devices. With the provided features, NET200-ECM is an ideal controller for your EtherCAT control system.

Specifications
EtherCAT Master
- Slave module no. up to 64
- Cycle time up to 250 μs
- Synchronization Error ±5μs
- Support CA-422 standard protocol

CPU Support
- Onboard Intel Celeron® processor J1900 Quad Core 2.0GHz

Main Memory
- 4GB RAM (2 x DDR3L)

Display Option
- Dual independent display
- - DVH and DP

I/O Interface-Front
- 10 x ATX-power on/off switch
- 10 x LED for HDD LED, Power LED, COM port 1/2/3/4/5/6 programmable GPIO LEDs
- 1 x External SD Card
- 1 x SIM card holder
- 1 x Ethernet® port, 1 x Intel® E100T GbE LAN port
- 1 x DP display in front
- 1 x DH485 display output
- 1 x USB 3.0 (500mA per each)

Ordering Information
- NET200-ECM (P/N: 101000200000X00)
  - 24V, 60W AC/DC power adapter w/ a power card
(P/N: K4000060204X00)

Certifications
- CE
- FCC Class A

Support OS
- Windows Embedded Standard 7, 32-bit, with RTX2012

According to IEC60869-3-1, IEC60869-2-2, IEC60869-2-14
- Storage temperature -25°C to 85°C
- Relative humidity: 10% to 95% (non-condensing)
- Shock protection:
  - SSD: 20G, Half sine, 11ms, IEC60869-2-7
  - Class: 3Gc, half sine, 11ms, IEC60869-2-7
- Vibration protection w/ Class & SSD condition:
  - Random: 2G rms @ 5~50Hz, IEC60869-2-6
  - Struck: 2G rms @ 5~50Hz, IEC60869-2-6

Environmental
- Operating temperature: Ambient with air flow: -5°C to 55°C
- Storage temperature: -25°C to 85°C
- Relative humidity: 10% to 95% (non-condensing)
NET300-ECM

Front-Access High-Performance EtherCAT Controller

Main Features
- EtherCAT technology with NetCOM, Class A EtherCAT master
- EtherCAT communication cycle up to 250 us
- Support high-level API for QR/ISO profile
- Support 1.4.2 generation Intel® Core™ i7-4700TE processor
- 8 x RJ45 to PCIe
- 1 x DVI-D, and 1x HDMI for dual independent display support
- 4 x USB 3.0, 2 x USB 2.0 and 2 x RS232/422/485 auto
- 1 x Front access 2.5”SATA-HDD tray
- 2 x MiniPCIe socket, support optional modules and mSATA device
- 1 x external CFast socket and 1 x SIM card socket

Product Overview
NET300-ECM is a high-performance EtherCAT controller, built in a generation Intel® Core™ i7-4700TE processor (Sylkade). Based on real-time operating system, NET300-ECM’s communication cycle time can be up to 250 us, and also offers EtherCAT distributed clock functions. The EtherCAT controller supports up to 8 slave modules which could be a wide variety of I/Os, such as servo motor drives and I/O modules.

NET300-ECM is the ideal intelligence system for machine applications. Its front-access I/O design simplifies the wiring, and it provides expansion Mini-PCIe slot which can integrate other Fieldbus devices for more application possibilities.

Specifications
CPU Support
- Support 6th generation Intel® Core™ i7-4700TE, Quad-Core, 2-4GB, 5BM cache

Main Memory
- 1 x 4GB DDR4 2400MHz

Display Option
- Dual independent display
- HDMI + DVI-D

Front I/O Interface
- 1 x ATX power on/off switch
- 1 x HDMI and 1 x DVI-D
- 4 x USB 3.0 ports (500mA per each)
- 2 x USB 3.0 ports (1000mA per each)
- 1 x RJ45 port and 1 x MIC in
- 2 x Antenna holes for WiFi/GSM
- 1 x Front access 2.5”HDD tray
- 1 x MiniPCIe expansion support optional modules
- 2 x RS232/422/485 auto with 1.8KV isolation
- 1 x Intel® M.2-10110 GbE LAN ports, support Wait., sleeping and PME

Top I/O Interface
- 1 x 35-pin - remote switch
- 1 x CFast expansion
- 1 x SIM card

Storage Device
- 1 x CFast (SATA 3.1)
- 1 x 2.5" HDD (external, SATA 3.0)
- 1 x 2.5" HDD (internal, SATA 3.0)

Expansion Slot
- 2 x miniPCIe socket for optional WiFi/LTE/Fieldbus modules

Power Requirement
- ATX power (default with ATX power mode)
- Power input: typ 215/400 VDC +/-20%, with reverse polarity protection
- Power acception: rational AC as DC power adapter (-144W, 10kHz)

Dimensions
- NET300-ECM: 90 mm(W) x 185 mm (D) x 231 mm (H)

Construction
- Aluminium and metal chassis with front access design

Environment
- Operating temperature: Ambient with 25°C flow (10°C to 55°C)
- Storage temperature: -20°C to 85°C
- Relative humidity: 10% to 93% (non-condensing)

Ordering Information
- NET300-ECM (P/N: 10110030001X00)
- Front-access high-performance EtherCAT controller
- 24V, 120W AC to DC power adapter w/o power core (P/N: 7400120015X00)

Certifications
- CE approval
- EN61096-2
- EN61096-4
- FCC Class A
- UL

OS Support Lists
- Windows Embedded Standard 7, 32-bit, RTX012
**NET3500-ECM**

**EtherCAT Controller with one PCI Expansion Slot**

**Product Overview**
Utilizing 32nm Intel® Core™ i7/i5 processor, NET3500-ECM features Intel® Turbo Boost and Intel® Hyper-Threading technologies (2 cores, 4 threads), as well as on-processor graphics and two DDRIII 800/1066 memory modules up to 4GB. In addition, NET3500-ECM provides a wide variety of display I/O configurations and rich I/O interfaces including two Intel® QSE Ethernet ports, 5 x COM ports, 6 x USB, 8 x GPIO, 2 x SATAII, 2 x eSATA, audio interfaces. NET3500-ECM is designed for a broad range of applications which demand an EtherCAT controller to handle advanced motion & I/O control.

**Specifications**

**Main Board**
- NSB 3500
- Onboard Mobile Intel® QM57 Platform Controller Hub
- Support Intel® Core™ i7-120W PCI Expansion Slot
- Support Intel® Core™ i5-520M PGA Processor (2.4GHz, 3M Cache)
- Support Intel® Core™ i7-620M PGA Processor (2.66GHz, 4M Cache)

**Main Memory**
- 2 x 240-pin memory DIMM, up to 4GB DDR3 800/1066MHz SDRAM, un-buffered and non-ECC

**I/O Interface-Front**
- 1 x Line-out and 1 x Mic-in
- Pre-installed Software Package
  - Operating System: Windows Embedded Standard 7
  - Ethernet Extension: RTX 2012
  - EtherCAT Controller: NexECM
  - Device: 1 x 2.5’’ HDD driver bay
  - Expansion: 1 x PCI expansion (10W max./per slot)

**Power Requirements**
- ATX power mode
- +9 to 30VDC input
- 2-pin Remote Power on/off switch
- 1 x DC/DC input
- 1 x PS/2 for Keyboard/Mouse
- 1 x EMB SLOT for add-on card length: 169mm max.
- 1 x DB15 VGA port
- 1 x DVI port

**Environment**
- Dimensions: 195mm (W) x 268mm (D) x 80mm (H) (7.7” x 10.5” x 3.1”)
- Operating temperature: Ambient with air flow: -0°C to 55°C
- Storage temperature: -20°C to 80°C
- Relative humidity: 10% to 98% (non-condensing)
- Shock protection:
  - HDD: 20G, half sine, 11ms, IEC60068-2-27
  - Vibration protection:
    - Random: 0.5Grms @ 5 – 500 Hz according to IEC68-2-64
    - Sinusoidal: 0.5 Grms @ 5 – 500 Hz according to IEC68-2-6

**Ordering Information**

**EtherCAT Controller**
- NET3500-ECM (P/N: 7410120002X00)
- 19V, 120W AC/DC Power Adapter w/o power cord (P/N: 7410120002X00)

**Certifications**
- CE approval
- FCC Class B
- UL/ULC
- e13

**Dimension Drawing**

**EtherCAT Support Table**

<table>
<thead>
<tr>
<th>Feature Name</th>
<th>Short Description</th>
<th>NexECMRTX</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic Features</td>
<td>Support of all commands</td>
<td>V</td>
</tr>
<tr>
<td>Service Commands</td>
<td>Support of all commands</td>
<td>V</td>
</tr>
<tr>
<td>Ring Master</td>
<td>Support of all commands</td>
<td>V</td>
</tr>
<tr>
<td>Device Emulation</td>
<td>Support of all commands</td>
<td>V</td>
</tr>
<tr>
<td>EtherCAT State Machine</td>
<td>Support of all commands</td>
<td>V</td>
</tr>
<tr>
<td>Error Handling</td>
<td>Support of all commands</td>
<td>V</td>
</tr>
<tr>
<td>Process Data Exchange</td>
<td>Support of all commands</td>
<td>V</td>
</tr>
<tr>
<td>Shared Memory</td>
<td>Support of all commands</td>
<td>V</td>
</tr>
<tr>
<td>Network Configuration</td>
<td>Support of all commands</td>
<td>V</td>
</tr>
<tr>
<td>Reading EIN</td>
<td>Support of all commands</td>
<td>V</td>
</tr>
<tr>
<td>Compare</td>
<td>Supports the comparison of two EIN files</td>
<td>V</td>
</tr>
<tr>
<td>Compare EIN</td>
<td>Supports the comparison of two EIN files</td>
<td>V</td>
</tr>
<tr>
<td>Compare Configuration</td>
<td>Supports the comparison of two configurations</td>
<td>V</td>
</tr>
<tr>
<td>EtherCAT Configuration</td>
<td>Supports the comparison of two configurations</td>
<td>V</td>
</tr>
<tr>
<td>Station Alias</td>
<td>Supports the comparison of two configurations</td>
<td>V</td>
</tr>
<tr>
<td>Access to EIN</td>
<td>Supports the comparison of two configurations</td>
<td>V</td>
</tr>
<tr>
<td>Network Support</td>
<td>Supports the comparison of two configurations</td>
<td>V</td>
</tr>
<tr>
<td>Support</td>
<td>Supports the comparison of two configurations</td>
<td>V</td>
</tr>
<tr>
<td>System Support</td>
<td>Supports the comparison of two configurations</td>
<td>V</td>
</tr>
<tr>
<td>Distributed Clock</td>
<td>Supports the comparison of two configurations</td>
<td>V</td>
</tr>
</tbody>
</table>
NET3600E-ECM

High Performance EtherCAT Controller

Main Features
- Support 3rd generation Intel® Core™ i5-3610 processor with Intel® QM77 PCH
- EtherCAT technology with NexECM, Class A EtherCAT Master, and RTX2012
- EtherCAT communication cycle up to 250 μs
- Support CoE protocol
- Support high-level API for CiA 402 profile
- Support DC (Distributed Clocks) technology
- Build-in full function EtherCAT application configurator, NexCAT
- Management of real time task SDK
- I/O access API for Windows user mode and RTX subsystem

Product Overview
NET3600E-ECM is an open real-time EtherCAT controller over Windows real-time extension, RTX, allowing integrating users’ algorithm and I/O control with communication cycle up to 250 μs. Not only does NET3600E-ECM support CoE protocol, but provide advanced API for CiA 402 profile, enabling seamless integration with servo drivers. Distributed Clocks function supports synchronization of all slave modules. In addition, NET3600E-ECM offers comprehensive and easy-to-use application configurator, NexCAT, for system development and debugging to speed up development period.

Specifications
- Intel® Core™ i5-3610ME processor pre-installed
- 4 x 4GB DDR3-SDRAM, pre-installed
- 160GB or above HDD pre-installed
- 1 x EtherCAT port (Intel® 82574L)
- 2 x Display Ports and 1 x VGA or 2 x Display Ports 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
- One PCIe x4 slot (10W max. per slot)
- 169mm max. with HDD installed
- 240mm max. without HDD installed

Pre-installed Software Package
- Operating System: Windows Embedded Standard 7
- Windows Extension: RTX 2012
- EtherCAT Master: NexECM
- EtherCAT Configurator: NexCAT

Power Requirements
- DC input range: +9 to 30VDC input

Dimensions
- 216mm (W) x 270mm (D) x 93mm (H)

Environment
- Air with air flow: -5°C to 55°C
- Storage temperature: -20°C to 80°C
- Relative Humidity: 10% to 93% (non-condensing)
- Shock protection: 20G, half sine, 11ms, IEC60068-2-27
- Vibration protection:
  - Random: 0.5Grms @ 5 ~ 500 Hz according to IEC68-2-64
  - Sinusoidal: 0.5 Grms @ 5 ~ 500 Hz according to IEC68-2-6

Certifications
- CE
- FCC Class A

EtherCAT Support Table

<table>
<thead>
<tr>
<th>Feature</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Service Commands</td>
<td>Support of all commands</td>
</tr>
<tr>
<td>TFQ Network</td>
<td>One TFQ information from Slave in network header</td>
</tr>
<tr>
<td>Slave with Device Simulation</td>
<td>Support slaves with and without application controller</td>
</tr>
<tr>
<td>EtherCAT Status Machine</td>
<td>Support of ESM special behavior</td>
</tr>
<tr>
<td>Error Handling</td>
<td>Checking of network or slave errors, #0 Working Counter</td>
</tr>
<tr>
<td>Process Data Exchange</td>
<td>Cyclic PDO, Cyclic process data exchange</td>
</tr>
</tbody>
</table>

Network Configuration
- Reading ENI
- Compare configured and existing network configuration during boot-up
- Support Mailbox: Main functionality for mailbox transfer
- Support Mailbox: Stacking Mailbox state in slaves
- SDO (Data Access to EtherCAT slaves)
- SDO transfer: Normal and expedited transfer
- Complete Access: Download entire object (with all sub-indices) at Once
- Distributed Clocks: Support of Distributed Clock

Ordering Information
EtherCAT Controller
- NET3600E-ECM (P/N: 10J10360002X0)
- 19V, 120W AC/DC Power Adapter w/o power core (P/N: 7410120002X00)

High performance EtherCAT controller with NexECM and RTX
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.

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

Specifications

<table>
<thead>
<tr>
<th>Motion Control</th>
<th>NControl 20</th>
<th>NControl 30</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Interpolated Axes</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>PLC Axes</td>
<td>10</td>
<td>14</td>
</tr>
<tr>
<td>Control Spindle</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>TCP Function</td>
<td>N/A</td>
<td>Yes</td>
</tr>
<tr>
<td>Calculation Resolution</td>
<td>0.1um</td>
<td>0.01um</td>
</tr>
<tr>
<td>Number of Control Channel</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Block Ahead</td>
<td>1ms</td>
<td></td>
</tr>
<tr>
<td>Constant Jerk Control</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Corner Deceleration</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Smooth Surface Function</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Control Cycle Time</td>
<td>1ms</td>
<td></td>
</tr>
<tr>
<td>CPU</td>
<td>Intel Core 2 Duo P8400</td>
<td></td>
</tr>
<tr>
<td>Storage</td>
<td>SSD 32G</td>
<td></td>
</tr>
<tr>
<td>LCD Size</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>Operating System</td>
<td>WinCE 6.0</td>
<td></td>
</tr>
<tr>
<td>LAN Port</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Dimension of Controller</td>
<td>219x268x107(mm)</td>
<td></td>
</tr>
</tbody>
</table>
5-axis machines combine three linear axes and two rotary axes. Three axes determine the position of the tool and two axes determine the direction of tool. Since 5-axis machines can reach any location from all directions, they can work on spiral curved surfaces. Also they increase machining precision and reduce loading and unloading time.

**Machine Features**
- B-axis tilt angle (spindle) +120° ~ -90°
- C-axis (table) rotation angle 0° ~ 360°
- Lightweight aluminum structure
- 50,000 rpm spindle speed, with Tapping function
- Automatic tools management, with 6 Tools
- Linear scale (Option)

**Applications**
Working on small mechanical components, watches, clocks, jewelry and enabling tooth die casting for rapid prototyping.

**System Architecture**
NControl Series

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 tool path planning and polynomial interpolation, NControl series ensures high machining precision with high speed. Derived from NextMotion 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 (independent display)
- 2 x Intel® GbE LAN ports (support WOL & LAN networking)
- 1 x DB44 Serial Port for 4 x RS232 (CON224)
- 6 x USB 2.0 ports
- 1 x PS2 Connector supporting KB/MS
- Fast I/O: 4 digital in/4 digital out
- Encoder: 1 in/1 out (A/B/phase)

CNC Control
- Axes Management
  - Circular 3D interpolation
  - Rollover Axes
  - Gantry Axes
  - Dynamic follower axes
- G code ISO 6983 programming
- M, S, T functions programming
- Look Ahead (up to 1024 blocks)
- Velocity Feed Forward (VFF)
- Tool Centre 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
- Analog I/O module: E-501
- Terminal type
  - Digital I/O module: AXE-R200

Power Requirements
- DC input range: +16 to 30VDC input ATX Power mode
  (Optional AC/DC 120W power adapter)

Environment
- Operating temperature: 4°C to 55°C
- Storage temperature: -20°C to 80°C
- Relative humidity: 10% to 93% (Non-Condensing)
- Shock protection: 11ms, IEC 60068-2-27
- Vibration: 0.5Grms @ 5 ~ 500 Hz according to IEC 60068-2-64
- 19V, 120W AC/DC Power Adapter w/o power core (P/N: 7410120002X00)

Ordering Information

CNC Controller
- NControl20
- 2D/3D CNC Controller for Machining and Turning Center with Win CE 6.0
- NControl20D
- 2D/3D CNC Controller for Machining and Turning Center with Win CE 6.0 and WE2009
- NControl30
- 3D CNC Controller for Machining and Turning Center with Win CE 6.0 and WE2009
- NControl30D
- 3D CNC Controller for Machining and Turning Center with Win CE 6.0 and WE2009

- 19V, 120W AC/DC Power Adapter w/o power core (P/N: 7410120002X00)
APPD 1700T

17" IP65 Industrial 4:3 SXGA LCD Flush Touch Monitor

Main Features
• IP65 compliant plastic front bezel with flush panel by 5-wire touch screen
• Dual display input interface: analog VGA and DVI-D
• Shares identical appearance with APPC series
• Dual touch screen interface: RS232 and USB
• Ultra slim in depth
• OSD Multilanguage function

Product Overview
17" 4:3 LCD display APPD 1700T is based on a 5-wire resistive touch screen. It has 380 nits brightness and can support resolutions up to 1280 x 1024. APPD 1700T is ideal for space-critical environments where systems and displays are kept apart. In addition, APPD 1700T adopts a flush panel design and has IP65 front panel. APPD 1700T provides prevailing video interfaces: VGA and DVI, supporting both digital and analog signals; touch screen can be connected with RS232 or USB ports. Moreover, APPD 1700T supports 12~24VDC power input and offers panel mount and VESA mount, allowing users to choose the mounting method that meets their situation. APPD 1700T is the best solution for NEXCOM NISE fanless computer, NViS security surveillance series and APPC panel PC when a second display is required.

Specifications
Panel
• LED Size: 17", 4:3
• Resolution: SXGA 1280 x 1024
• Luminance: 380cd/m²
• Contrast ratio: 1000:1
• LCD color: 16.7M
• Viewing Angle: 80(U), 80(D), 85(L), 85(R)
• Backlight: CCFL

Touch Screen
• 5-wire resistive (flush panel type)
• Light transmission: 81%
• Interface: USB and RS232

Rear I/O
• Touch interface port: RS232 (1 x DB9)/USB Type A
• Video port: VGA (1 x DB15)/DVI-D (1 x DVI-I connector)
• DC power input connector: 3-Pin Phoenix terminal Blocks

OSD Function
• OSD keypad
• Multilanguage OSD

Mechanical & Environment
• Color: pantone black
• IP protection: IP65 Front
• Mounting: panel/wall/Grnd/VESA 100mm x 100mm
• Power input: 12V~24VDC
• Power adapter: optional AC to DC power adapter (+12V, 60W)
• Vibration:
  IEC 68-2-64
  2Gms @ sine, 5~500Hz, 1Hz/axis (Operating)
  2.2Gms @ random condition, 5~500Hz, 0.5Hz/axis (Non-operating)
• Shock:
  IEC 68-2-27
  20G @ wall mount, Half sine, 1ms
• Operating temperature: -20°C to 70°C
• Storage temperature: -20°C to 70°C
• Operating humidity: 10%~90% relative humidity, non-condensing
• Dimension: 410.4 x 340.4 x 43.7mm
• Weight: 5.3 Kg

Certifications
• CE approval
• FCC Class B

Ordering Information
• APPD 1700T (P/N: 10IAD170000X0)
  17" SXGA industrial 4:3 LCD flush touch monitor with VGA and DVI-D input, 12~24VDC input, RS232 and USB touch screen
• 1.8m DVI-D male to DVI-D male Cable
  (P/N: 602230DV28X00)
• 12V, 60W AC/DC power adapter w/o power cord
  (P/N: 7400060019X00)
AXE-9801
EtherCAT-based Control Panel

Main Features
- High-performanced EtherCAT communication
- All-in-one board design
- 22 Function keys, 2 knobs and 2 push buttons for CNC machine applications
- On module LEDs for diagnosis monitoring
- Typical 24V DC input; within 10% range
- Support 0 ~ 60°C operating temperature

Product Overview
AXE-9801 is an EtherCAT-based control panel for CNC machine, with 22 function keys, 2 knobs and 2 push buttons for Cycle Start/Feed Hold. It controls 31-channel digital inputs, and 24-channel digital outputs, based on EtherCAT protocol, for interface operation. AXE-9801 provides enhanced performance and users can integrate it into their CNC control systems easily.

Specifications

I/O Information
- Numbers of DI channel: 31
- Numbers of DO channel: 24
- I/O function key mapping table

Communication
- Protocol: EtherCAT
- Bus interface: 2 x RJ45
- Media: Ethernet cable (min. CAT3), shielded
- Distance between stations: maximum 100m (100BASE-TX)
- Data transfer rate: 100M baud

Power Requirements
- DC input range: DC 24V±10% range

Common Section
- Operating temperature: 0°C to 60°C
- Storage temperature: -20°C to 80°C
- Relative humidity: 35~85%, non-condensation, operating
- 10~90%, non-condensation, non-operating
- Dimensions (mm): 335.63(W) x 190.83(D) x 53.87(H)

Certifications
- CE
- FCC: Class A

Ordering Information
- AXE-9801 (PN: 90J40980100X0)
  EtherCAT-based control panel
- 19V, 120W AC/DC Power Adapter w/ a power core
  (PN: 741012000X2X0)
MAC

Purpose-built Machine Control Solutions

MAC Meets Your Machine Control Needs in a Single Platform

NexMotion’s MAC Controller is an all-in-one machine automation controller that integrates functions of motion control, input/output and vision in a single platform. With all related drivers and software pre-installed, this ready-for-application controller allows users to jump right into application development.

Vertical Motion Functions

The MAC controller provides up to 8-axis close-loop motion control with advanced functions. Besides point-to-point movement for single axis, it also supports multi-axis linear/circular interpolation, continuous moving, TSP/PT, etc. Advanced applications such as gantry and fly-cut can be accomplished by the motion control functions the MAC controller provides. Adding machine vision control with triggering I/O also enables the MAC controllers to handle vision inspection in assembly lines or inspection machines.

System Architecture

MAC Meets Your Machine Control Needs in a Single Platform

NexMotion’s MAC Controller is an all-in-one machine automation controller that integrates functions of motion control, input/output and vision in a single platform. With all related drivers and software pre-installed, this ready-for-application controller allows users to jump right into application development.

Vertical Motion Functions

The MAC controller provides up to 8-axis close-loop motion control with advanced functions. Besides point-to-point movement for single axis, it also supports multi-axis linear/circular interpolation, continuous moving, TSP/PT, etc. Advanced applications such as gantry and fly-cut can be accomplished by the motion control functions the MAC controller provides. Adding machine vision control with triggering I/O also enables the MAC controllers to handle vision inspection in assembly lines or inspection machines.

System Performance

1. Speed smoothing can reduce the machine vibration and smooth surface
2. Reduce the process cycle time
3. Control for brittle materials processing speed

MVP Configuration Process

NEXCOM’s 3-step MVP process aims to offer the best-fit controller solution for customers’ applications. By consolidating the Motion, Vision and Platform needs of customers, NEXCOM can provide a configuration setup that’s most efficient and effective for customers. The proposed configuration will be tested beforehand so that customers can enjoy the benefits of verified system compatibility and cost-effectiveness provided by MAC controllers.
MAC

Glass Grinding Machine Solutions

**Glass Processing Characteristics**
- Strict machine performance
- Motion control conditions
- Tool wear
- Long processing times
- High production costs

**Glass Processing Requirements**
- Strict machine performance
- Motion control conditions
- Tool wear
- Long processing time
- High production costs

For Glass grinding machine MAC Series support those application-specified functions which greatly lift machine performance

<table>
<thead>
<tr>
<th>Glass Grinding Function</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Pitch Error Compensation</td>
<td>Tool Management</td>
</tr>
<tr>
<td>Tool Radius Compensation</td>
<td>Authority Management</td>
</tr>
<tr>
<td>Tool Length Compensation</td>
<td>Tool Path Simulation</td>
</tr>
<tr>
<td>Vibration Suppression</td>
<td>Operator Log</td>
</tr>
<tr>
<td>Smoothing Path</td>
<td>Macro Function</td>
</tr>
<tr>
<td>Friction Compensation</td>
<td>Tool Changing</td>
</tr>
</tbody>
</table>

**Friction Compensation**

**Vibration Suppression**

**Specifications**

**Motion Control**
- Control Axis: 4 axes
- Control Command: Pulse / Analog
- Special Function: PID + Feed Forward + Acceleration Forward
- Control Cycle Time: 200 us
- Pulse Frequency: 1MHz
- Analog Command: -10V ~ +10V / 16bit
- Encoder: ABZ phase differential

**System**
- CPU: Intel® Core™ 2 Duo/Celeron® Fanless Bare-Bone System with One PCI Expansion
- Dimensions: 195mm (W) x 268mm (D) x 80mm (H)
- Power: 24 Vcc (3A min)
- Temperature: -5°C to 55°C

**Glass Processing Characteristics**
- Strict machine performance
- Long processing times
- High production costs

**Glass Processing Requirements**
- Strict machine performance
- Motion control conditions
- Tool wear
- Long processing times
- High production costs

For Glass grinding machine MAC Series support those application-specified functions which greatly lift machine performance

**Smoothing Path**

Before Smoothing

After Smoothing

**Pitch Error Compensation**

Before Smoothing

After Smoothing
MAC 1000

Motion Controller for Specified Applications

Main Features
- Pitch error compensation
- Tool radius compensation
- Tool length compensation
- Vibration suppression
- Tool management
- Authority management
- Tool path simulation
- Operator log

Product Overview
MAC is a series of coordinated motion controllers dedicated to specified machines such as glass grinding machine. Featuring application-related functions and advanced motion control, MAC controllers T5-Curve, PT (Position-Time profiling), E-Gear and E-CAM functions for machine automation applications requiring more accuracy and excellent performance. Equipped with uncommitted DI/O up to 32 channels DI and 32 channels DO in total, MAC 4000P4E-GTS series reduces the number of add-on cards and thus reduces the controller size. When working on machine vision applications, data from industrial cameras can be transmitted via GbE LAN ports, USB 3.0 ports or add-on cards depending on the interfaces of the camera. MAC 4000P4E-GTS series is designed for modern machine automation applications and ensures the shortest integration and development period.

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)

Motion Control
- ±10V 16-bit control output with 4 x AB phase encoder input
- Dedicated home, limits and alarm for every single axis
- Dedicated SVON and clear for every single axis
- Intelligent look-ahead trajectory planning
- Support PID plus feed forward gain control (PID+Vff+Aff)
- Support E-CAM, E-Gear, PT and PVT control
- Support standalone procedure access up to 32 tasks

Optional I/O
- System: Uncommitted DI/O up to 16-channel DI and 16-channel DO
- Terminal board: Uncommitted DI/O up to 16-channel DI and 16-channel DO

Power Requirements
- DC input range: +16 to 30VDC (input ATX power mode)
- Terminal board: Uncommitted DI/O up to 16-channel DI and 16-channel DO

Environment
- 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
- 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
- MAC1000 (P/N: TBD)
- Machine controller for glass grinding machine
- 19V, 120W AC/DC Power Adapter w/o power core (P/N: 7410120002X00)
Main Features

- OS independent HMI platform
- Online and mobile access
- Remote monitoring of equipment
- Scalable and standardized system
- Multiple communication protocol support
- Drag-and-drop interface development
- Configure system and communication
- Reduce development time
- On-line and off-line simulation
- Rich set of symbols, widgets and advanced functions (e-mail, RSS, PDF Reporting Scheduler, HTML5 Browser)
- Rich symbol library and project templates
- Dynamic objects, data acquisition, alarm handling, Multilanguage, applications, recipes, tag editor and tag database, user and password, scripting
- Multiple Communication Protocols support
- Integrated PLC Support
- CODESYS V2 and V3 runtime available as options
- Multi-language for JMobile Studio, JMobile HMI Runtime and JMobile PC Runtime

Product Overview

JMobile is a modern & innovative software solution for the design of HMI applications in a simple and intuitive way. A powerful and versatile tool set allowing for the rapid design of tailored applications crafted for a better, more modern user experience. Designed for simplicity, flexibility, and efficiency, JMobile and its advanced graphical engine is based on SVG technology with full object-oriented design properties. These modern and flexible widgets allow for tailoring a truly better, more intuitive "User Experience". Better "Usability" for operators with modern widgets and navigation, better "Visibility" for management with remote tools and reporting, and better "Serviceability" both locally and from afar.

JMobile client/server architecture is based on current web technologies providing users with advanced control and remote supervision, from any browser, any device (smartphone, tablet, or computer). In addition, the ability to capture, store and share data in higher-level structures makes it an effective tool for integration across the entire enterprise. A rich set of symbols, widgets and advanced functions (e-mail, RSS, PDF Reporting Scheduler, HTML5 Browser) allows JMobile deployment in a wide variety of applications and industries, from industrial to building and marine automation.

Specifications

- JMobile Suite installation contains:
  - JMobile Studio: an application for designing custom HMI projects in a user-friendly manner, along with a variety of objects in its built-in library, the Widget Gallery
  - JMobile Client: a lightweight application that can be used on Windows computers to remotely view and manage a project running on an HMI device
  - JMobile HMI Runtime: a standalone application that runs on the HMI devices (eTOP/ eSMART series). The HMI Runtime is installed via JMobile Studio
  - JMobile PC Runtime: a standalone application that runs on Win32 platforms (computers instead of HMI device)
  - Support for all industrial communication protocols, up to 4 simultaneous

- Operating Environment:
  - JMobile Studio has the Following System Requirements
    - Operating Systems: Windows XP (SP2 or SP3)/ Windows Vista Business/ Ultimate/ Windows 7/ Windows 8
    - Storage: 500 MB minimum
    - RAM: 512 MB
    - Other: one Ethernet connection
  - JMobile PC Runtime as the following Minimum System Requirements
    - Storage: 256 MB
    - RAM: 512 MB
    - CPU: min. 300 MHz Pentium III or similar processors with 500 MHz
    - Graphical: min. SVGA
    - Other: One Ethernet connection

- Ordering Information:
  - JMobile Studio License (P/N: 6014500029X00)
    - HMI development software. JMobile Studio License – one license for ten active development PCs
  - JMobile PC Runtime License (P/N: 6014500020X00)
    - HMI PC Runtime License for x86 Windows PC – one license for one active HMI up to 4000 Tags
  - Note: “JMobile Studio” and “JMobile Runtime PC” have 30 days free trial fully functional, “trial period” is not allowed on Virtual Machine environment.

For more detailed about HMI / Panel PC product information, please refer to IoT Automation Solution Product Selection Guide Brochure (Page 32–39)
NEIO
EtherCAT I/O Systems

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.

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

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

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
# Selection Guide

## EtherCAT Digital I/O

<table>
<thead>
<tr>
<th>Model Name</th>
<th>NEIO-B1101</th>
<th>NEIO-B1102</th>
<th>NEIO-B1201</th>
<th>NEIO-B1202</th>
<th>NEIO-B1811</th>
<th>NEIO-B1812</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Type</strong></td>
<td>DI Module (Sink)</td>
<td>DI Module (Sink / Source)</td>
<td>DO Module (Sink)</td>
<td>DO Module (Source)</td>
<td>DI/O Module (Sink)</td>
<td>DI/O Module (Source)</td>
</tr>
<tr>
<td><strong>Wiring Diagram</strong></td>
<td><img src="NEIO-B1101" alt="Wiring Diagram" /></td>
<td><img src="NEIO-B1102" alt="Wiring Diagram" /></td>
<td><img src="NEIO-B1201" alt="Wiring Diagram" /></td>
<td><img src="NEIO-B1202" alt="Wiring Diagram" /></td>
<td><img src="NEIO-B1811" alt="Wiring Diagram" /></td>
<td><img src="NEIO-B1812" alt="Wiring Diagram" /></td>
</tr>
<tr>
<td><strong>Number of Channels</strong></td>
<td>32</td>
<td>32</td>
<td>-</td>
<td>-</td>
<td>16</td>
<td>16</td>
</tr>
<tr>
<td><strong>Power Input</strong></td>
<td>24 Vdc (±20%)</td>
<td>24 Vdc (±20%)</td>
<td>24 Vdc</td>
<td>24 Vdc</td>
<td>24 Vdc</td>
<td>24 Vdc</td>
</tr>
</tbody>
</table>

### Digital Input

| **Number of Channels** | - | - | 32 | 32 | 16 | 16 |
| **Load Type** | - | - | Resistive , Inductive | Resistive , Inductive , Capacitive | Resistive , Inductive , Capacitive | Resistive , Inductive , Capacitive |
| **Max. Output Current** | - | - | 500 mA/ch | 500 mA/ch | 500 mA/ch | 500 mA/ch |
| **Switching Time** | - | - | Off to On : 100 us | Off to On : 100 us | Off to On : 100 us | Off to On : 100 us |

### Digital Output

| **Number of Channels** | - | - | 32 | 32 | 16 | 16 |
| **Output Voltage** | - | - | 24 Vdc | 24 Vdc | 24 Vdc | 24 Vdc |
| **Max. Output Current** | - | - | 500 mA/ch | 500 mA/ch | 500 mA/ch | 500 mA/ch |
| **Switching Time** | - | - | Off to On : 100 us | Off to On : 150 us | Off to On : 100 us | Off to On : 150 us |

### EtherCAT Analog I/O

<table>
<thead>
<tr>
<th>Model Name</th>
<th>NEIO-B1831</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Type</strong></td>
<td>Analog Input</td>
</tr>
<tr>
<td><strong>Wiring Diagram</strong></td>
<td><img src="NEIO-B1831" alt="Wiring Diagram" /></td>
</tr>
<tr>
<td><strong>Number of Channels</strong></td>
<td>6</td>
</tr>
<tr>
<td><strong>Input Range</strong></td>
<td>±10 V</td>
</tr>
<tr>
<td><strong>Resolution</strong></td>
<td>16 bit</td>
</tr>
</tbody>
</table>

### EtherCAT COM Port

<table>
<thead>
<tr>
<th>Model Name</th>
<th>AXE-5904</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Type</strong></td>
<td>COM Module</td>
</tr>
<tr>
<td><strong>Number of Channels</strong></td>
<td>2</td>
</tr>
<tr>
<td><strong>COM 1</strong></td>
<td>RS232 / 422 / 485</td>
</tr>
<tr>
<td><strong>COM 2</strong></td>
<td>RS422 / 485</td>
</tr>
<tr>
<td><strong>Data Bits</strong></td>
<td>5, 6, 7, 8</td>
</tr>
<tr>
<td><strong>Stop Bits</strong></td>
<td>1, 1, 5, 2</td>
</tr>
<tr>
<td><strong>Parity</strong></td>
<td>none, odd, even, space, mark</td>
</tr>
<tr>
<td><strong>Baud Rate</strong></td>
<td>0.3 – 115.2 kbps</td>
</tr>
<tr>
<td><strong>Power Input</strong></td>
<td>24 Vdc (±20%)</td>
</tr>
</tbody>
</table>
NEIO-B1101/B1102

32ch Digital Input EtherCAT Slave Module

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

Product Overview
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. DH+and design and delay chain wiring powered by EtherCAT technology make it easy to install I/O modules in the field. NEIO provides wide variety of I/O combinations with standard ES File so that users can always find suitable I/O modules for their high-speed EtherCAT-based applications.

Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>NEIO-B1101</th>
<th>NEIO-B1102</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model name</td>
<td>NEIO-B1101</td>
<td>NEIO-B1102</td>
</tr>
<tr>
<td>Model name</td>
<td>NEIO-B1101</td>
<td>NEIO-B1102</td>
</tr>
<tr>
<td>Input Voltage</td>
<td>24 VAC</td>
<td>24 VDC</td>
</tr>
<tr>
<td>Output Voltage</td>
<td>36-35 VDC</td>
<td>100-180 VAC</td>
</tr>
<tr>
<td>Supply Voltage</td>
<td>5-15 VDC</td>
<td>5-15 VDC</td>
</tr>
<tr>
<td>Input Power</td>
<td>200 mW</td>
<td>200 mW</td>
</tr>
</tbody>
</table>

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

Power Requirements
- EEC input voltage DC 24V ±10% with over-voltage and reversed-voltage protection
- Power Consumption
  - NEIO-B1101: 1.2 W
  - NEIO-B1102: 1.5 W
  - NEIO-B1101: 0.8 W
  - NEIO-B1102: 1.0 W

Ordering Information
- NEIO-B1101 (P/N: 10J8B0110100X00)
- NEIO-B1102 (P/N: 10J8B0110200X00)

AC to DC DIN Rail Power Supply (P/N: 7440060001X00)
- 65W 24V/0.3A for NEIO
NEIO-B1201/B1202
32ch Digital Output EtherCAT Slave Module

Main Features
- Fingerprint resistant cover
- Detachable screw terminals
- Rotational pin assignment marks
- On-module LED indicators
- User-friendly wiring label
- Multiple mounting methods

Product Overview
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 I/O modules in the field. NEIO provides wide variety of I/O combinations with standard I/O file so that users can always find suitable I/O module for their high-speed EtherCAT-based applications.

Specifications

<table>
<thead>
<tr>
<th>Digital Output</th>
<th>NEIO-B1201</th>
<th>NEIO-B1202</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model Name</td>
<td>NEIO-B1201</td>
<td>NEIO-B1202</td>
</tr>
<tr>
<td>Vdc</td>
<td>24 Vdc</td>
<td>24 Vdc</td>
</tr>
<tr>
<td>Load Type</td>
<td>Resistive, Inductive</td>
<td>Resistive, Inductive</td>
</tr>
<tr>
<td>Max. Output Current</td>
<td>500 mA</td>
<td>500 mA</td>
</tr>
<tr>
<td>Switching Times</td>
<td>Off to On: 140 μs</td>
<td>Off to On: 140 μs</td>
</tr>
<tr>
<td></td>
<td>On to Off: 135 μs</td>
<td>On to Off: 135 μs</td>
</tr>
</tbody>
</table>

Communication
- Protocol: EtherCAT
- I/O Type: 2 x RS-485 (daisy-chain)
- Media: EtherCAT cable (min. CAT 3), shielded
- Distance between subnodes: maximum 100m (100Mbit/s)
- Data transfer rate: 100M baud

Common Section
- Electrical isolation: 2.5 kV (power contact)
- Operating temperature: 0°C to 55°C
- Storage temperature: -40°C to 85°C
- Relative humidity: 5% to 95%, non-condensation, non-operating
- Shock: IEC 60068-2-27
- Vibration: IEC 6068-2-6, KC 60686-2-6
- Enclosure type rating: IP20
- Mounting type: 35mm (DIN rail), wall mount
- Dimensions (max): 155 (W) x 115 (H) x 57 (D)

Certifications
- CE
- FCC Class A

Power Requirements
- DC input range: DC 24V ±10% with overvoltage and reverse-voltage protection

<table>
<thead>
<tr>
<th>Model Name</th>
<th>NEIO-B1201</th>
<th>NEIO-B1202</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power Consumption</td>
<td>2.6 W</td>
<td>6.6 W</td>
</tr>
<tr>
<td>Input current without load</td>
<td>83 mA</td>
<td>83 mA</td>
</tr>
<tr>
<td>Input current with full load</td>
<td>107 mA</td>
<td>276 mA</td>
</tr>
</tbody>
</table>

Ordering Information

EtherCAT Slave Module
- NEIO-B1201 (P/N: 10JB0120100X0)
- NEIO-B1202 (P/N: 10JB0120200X0)
32ch digital output (sink) EtherCAT slave module

- AC to DC DIN rail Power Supply (P/N: 7440060001X0)
50W 24V/2.1A for NER.
NEIO-B1811/B1812
16ch Digital Input/output EtherCAT Slave Module

Main Features
- Finger-safe wiring cover
- Detectable screw terminals
- Rotational pin-assignment marks
- DI/DO module LED indicators
- User-friendly wiring label
- Multiple mounting methods
- 16ch digital input
- 16ch digital output

Product Overview
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 57 points) and powerful features in a compact size. EtherCAT 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 EtherCAT network so that users can always find suitable I/O modules for their high-speed EtherCAT-based applications.

Specifications

<table>
<thead>
<tr>
<th>Digital Input</th>
<th>NEIO-B1811</th>
<th>NEIO-B1812</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>E1908</td>
<td>E1908</td>
</tr>
<tr>
<td>Input Voltage</td>
<td>24 VDC</td>
<td>24 VDC</td>
</tr>
<tr>
<td>InState Voltage</td>
<td>0-35 VDC</td>
<td>0-35 VDC</td>
</tr>
<tr>
<td>OffState Voltage</td>
<td>0-5 VDC</td>
<td>0-7 VDC</td>
</tr>
<tr>
<td>Current</td>
<td>1 mA</td>
<td>1 mA</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Digital Output</th>
<th>NEIO-B1811</th>
<th>NEIO-B1812</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>E1908</td>
<td>E1908</td>
</tr>
<tr>
<td>Output Voltage</td>
<td>24 VDC</td>
<td>24 VDC</td>
</tr>
<tr>
<td>Load Type</td>
<td>Capacity</td>
<td>Capacity</td>
</tr>
<tr>
<td>Power output current</td>
<td>500 mA(Max)</td>
<td>500 mA(Max)</td>
</tr>
<tr>
<td>Switching Times</td>
<td>Off→On 100 µs</td>
<td>Off→On 100 µs</td>
</tr>
<tr>
<td></td>
<td>On→Off 100 µs</td>
<td>On→Off 100 µs</td>
</tr>
</tbody>
</table>

Power Requirements
- DC input range: DC 24V ±2% with over-voltage and reversed-voltage protection

Common Section
- Electrical isolation: 2.5 kV (power contact)
- Operating temperature: 0°C to 55°C
- Storage temperature: -40°C to 85°C
- Relative humidity: 5% to 95% non-condensation, non-operating
- Shock: IEC 60068-2-27
- Vibration: IEC 60068-2-4, 60068-2-64
- Enclosure type rating: IP20
- Mounting type: Din-rail (35mm), wall mount
- Dimensions (mm): 155(W) x 115(H) x 57.4(D)
- Certifications: CE, FCC, CUL

Communication
- Protocol: EtherCAT
- Bus Interface: 2 x MC4
- Max. Ethernet cable: 10m (CAT5), shielded
- Distance between stations: maximum 100m (100BASE-TX)
- Data transfer rate: 100M baud

Ordering Information
EtherCAT Slave Module
- NEIO-B1811 (P/N: 10JBC01811000X0) 16ch digital input/output (sink) EtherCAT slave module
- NEIO-B1812 (P/N: 10JBC01812000X0) 16ch digital input/output (source) EtherCAT slave module
- AC to DC Din Rail Power Supply (P/N: 7440060001X00) 65W 2A/2.5A for NKE.
NEIO-B1831
8ch Analog Input and 2ch Analog Output EtherCAT Slave Module

Main Features
- Uniframe wiring cover
- Detachable screw terminals
- Rotational preassignment marks
- 8-bit module LED indicators
- User-friendly wiring label
- Multiple mounting methods
- 6 ch. voltage type analog input (input range between 0~±10 V)
- 2 ch. current type analog input (input range between 0~70 mA)
- 2 ch. analog outputs

Product Overview
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 easy 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 ES File so that users can always find suitable I/O modules for their high-speed EtherCAT-based applications.

Specifications
Analog Input (Voltage Input)
- Number of channels: 6
- Input range: 0~10V
- Resolution: 16-bit
- Accuracy: 0.05%
- Input impedance: >10MO

Analog Input (Current Input)
- Number of channels: 2
- Input range: 0~30 mA
- Resolution: 16-bit
- Accuracy: 0.05%
- Input impedance: >10MO

Analog Output
- Number of channels: 2
- Output Range: 0~10V
- Resolution: 12-bit

Power Requirements
- DC input range: DC 24V ±10% with over-voltage and reverse-voltage protection

Common Section
- Electrical isolation: 2.5kV (DC, primary)
- Operating temperature: 0°C to 50°C
- Storage temperature: -40°C to 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: IP65
- Mounting type: DIN-rail (35mm), wall mount
- Dimensions (mm): 155(W) x 115(H) x 57(D)

Certifications
- CE
- FCC Class A

EtherCAT Slave Module
- NEIO-B1831 (Part No: 1380183100X0)
- 8ch analog input 2ch analog output EtherCAT slave module
- AC to DC Diam Rail Power Supply (Part No: 7440060001X000) 60W 24VDC for NEIO
NEIO-B1601

2 COM Ports EtherCAT Slave Module

Main Features
- Finger-safe wiring cover
- Detachable screw terminals
- Rear panel pin assignment marks
- On-module LED indicators
- User-friendly wiring label
- Multiple mounting methods
- 1 port: RS422/485
- 1 port: RS422/485

Product Overview
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. Unique design and keypad 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 ES, f.i. so that users can always find suitable I/O modules for their high-speed EtherCAT-based applications.

Specifications
- **COM Port**
  - Port Type: 1 x RS232/422/485, 1 x RS422/485
  - Data Bits: 5, 6, 7, 8
  - Stop Bits: 1, 1.5, 2
  - Parity: none, even, odd, space, mark
  - Flow Control: RTS/CTS, RTS/CTS (RS-232 only), XON/XOFF
  - Baud Rate: 0.3 – 115.2 kbps

- **Communication**
  - Protocol: EtherCAT
  - Bus Interface: 2 x RJ45
  - Med: Ethernet cable (min. CAT5), shielded
  - Distance between stations: max. 100 m (100BASE-TX)
  - Data transfer rate: 100M baud

- **Power Requirements**
  - DC 24 V ±10% with over-voltage and reversed-voltage protection

- **Common Section**
  - Electrical isolation: 2.5 kV (power contact)
  - Operating temperature: 0°C to 50°C
  - Storage temperature: -40°C to 85°C
  - Relative humidity: 5%~95%, non-condensation, non-operating
  - Shock: IEC 68-2-27
  - Vibrations: IEC 60664-1, IEC 60664-2-64
  - Enclosure type rating: IP60
  - Mounting type: Din Rail (35mm), wall-mount
  - Dimensions (mm): 155xW x 115 (H x 27.4 (F))

- **Certifications**
  - CE
  - FCC Class A

Ordering Information
- **EtherCAT Slave Module**
  - NEIO-B1601 (P/N: 1UJB160100X00)
  - 2 COM ports EtherCAT slave module
  - AC to DC Din Rail Power Supply (P/N: 7440060901X00)
  - 65W 24V/2.5A for NEIO
AXE-5904

Point-to-point 4-axis Pulse Type Motion EtherCAT Slave Module

Main Features
- Axes: independent control and pulse output up to 8MHz
- Pulse output options: CW, CCW, OUT, IN
- 4x differential encoder interface, A/B2 phase
- EtherCAT slave protocol communication
- Support GA 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 GA 402 device profile for machine automation applications, requiring high-speed and point-to-point functions. With pulse type commands, AXE-5904 supports pulse output rate up to 4MHz and encoder input up to 1MHz in 4-phase mode and includes dedicated I/O points for safety control and monitoring to facilitate building up whole machines.

Specifications

Pulse Type Motion Control
- Number of axes: 4
- Pulse output rate: up to 8MHz
- Pulse command output: CW, CCW, OUT, IN
- Encoder type: incremental, 32-bit
- Encoder signal: CW, CCW, A/B2
- Positioning range: ±2,147,483,648 through 2,147,483,647 pulses (32-bit)
- Max. input frequency: 4MHz

Encoder Input
- Encoder input type: incremental, 32-bit
- Encoder signal: CW, CCW, A/B2
- Positioning range: ±2,147,483,648 through 2,147,483,647 pulses (32-bit)
- Max. input frequency: 4MHz

General I/O
- General-purpose I/O: 3 channel per axis
- Input type: photobeschwick input (corresponding to current sink output)
- Response time of DI (Max.): 100μs
- Response time of DO (Max.): 100μs

Power Requirements
- DC input range: DC 24V ±10% with overvoltage and reverse-voltage protection

Common Section
- Data transfer medium: Ethernet cable (min CAT 3), shielded
- Bus interface: 2x RJ45
- Data transfer rate: 100M baud
- Protocol: EtherCAT
- Device profile: GA 402
- Operating temperature: 0°C to 50°C
- Relative humidity: 33%~85%, non-condensation, operating
- 10%~90%, non-condensation, non-operating
- Shock: BJE 60548 2.27T
- Vibration: IEC 68068-2-64
- Endurance type rating: IP60
- Mounting type: 35mm
- Dimension (mm): 120 (W) x 188 (L) x 55 (H)

Certifications
- CE
- FCC Class A

Ordering Information

Motion Controller
- AXE-5904 (P/N: 10J405504000X0)
  Point-to-point 4-axis pulse type motion EtherCAT slave module