Sysmac: A fully integrated platform
One connection - One software - One machine controller

FACTORY AUTOMATION
HMI · Programming · DB connection · IT systems

MACHINE CONTROL
Servo · Inverter · I/O · Safety · Vision · Robotics · Sensing
Omron provides tailored solutions

Flexible and integrated production business models
In today’s globalized manufacturing environment, diverse and complex challenges arise and need to be overcome. The global market rapidly changes, and manufacturing companies are under increasing pressure to supply products in a timely manner that satisfy a wide variety of consumer needs. Omron industrial automation makes efficient, flexible and cost effective manufacturing possible.

Innovation
- New technology for smart manufacturing
- Collaboration between humans and machines
- Environmentally safe products

Productivity
- Integrated systems for optimized manufacturing
- Production data available in real-time
- In-line quality inspection: zero defects

Flexibility
- Quick product changeovers
- Openness and third party connectivity
- Scalable systems for optimum solutions

Reliability
- Non-stop processes, 24/7 operation
- Extended product lifecycle

Globalization
- Products meet global standards
- Local support for training, repairs and spare-parts supply
- Engineering environment compliance with global standards

Through automation, Omron supports the advancement of manufacturing and contributes to a sustainable society by providing environmentally safe products.
The Sysmac technology platform ensures a flexible and integrated production business model.
Integration and Functionality
Sysmac is an integrated automation platform dedicated to providing complete control and management of your automation plant. At the core of this platform, the Machine Controller series offers synchronous control of all machine devices and advanced functionality such as motion, robotics and database connectivity. This multidisciplinary concept allows you to simplify solution architecture, reduce programming and optimize productivity.

✔ One Machine Controller
Complete integration of motion and logic sequence

✔ One Integrated Development Environment software for Configuration, Programming, Simulation and Monitoring

• Motion Control: Integrated within the IDE, and operating in real-time
• Standard PLCopen Function Blocks plus Omron generated motion FB’s
• Direct Synchronous control for Position, Speed and Torque

• All safety related data is synchronized with the whole network
• The PLCopen® FBD simplifies and accelerates the development process through structuring safety circuits and enhancing reuse.
Information

- Higher resolution images available without increasing the vision processing time
- Shape search technology: Provides more stable and accurate object detection for Pick & Place projects

Vision

- Higher resolution images available without increasing the vision processing time
- Shape search technology: Provides more stable and accurate object detection for Pick & Place projects

Robot

- Function Blocks in Adept Robot Control Library enable robot control from the NJ/NX/NY Controller using Ladder and Structured Text
- Full control of the process parameter setting and predictive maintenance functions
- High precision detection and positioning data synchronized on the network

Sensing

- Higher resolution images available without increasing the vision processing time
- Shape search technology: Provides more stable and accurate object detection for Pick & Place projects

Integrated Automation Control: The Sysmac platform is scalable and provides the performance and functionality for a wide range of solutions from simple machines through to manufacturing cells
One Connection

Seamless machine control and factory automation

One machine control through one connection and one software is how we define the Sysmac automation platform. The Machine Automation Controller integrates logic, motion, safety, robotics, vision, information, visualization and networking under one software: Sysmac Studio. This one software provides a true Integrated Development Environment (IDE) that also includes a custom 3D motion simulation tool. The machine controller comes standard with built-in EtherCAT and EtherNet/IP. The two networks with one connection purpose is the perfect match between fast real time machine control and data plant management.

EtherCAT - Machine Control

- Fast and precise: Fastest cycle time of 125 µs, synchronization with 1 µs jitter
- 512 slaves
- Embedded in Omron servo drive, inverter, I/O, Safety, Vision and Sensing
- Uses standard STP Ethernet cable with RJ45 connectors
- One connection using Safety over EtherCAT (FSoE) protocol
Datatypes supported: 17 of 26

Vision
- Robot
- Parallel/SCARA/Articulated Robot

Vision
- FH
- FQ-M

Sensing
- ZW-8000/7000/5000 Confocal Fiber Displacement Sensor
- N-Smart Fiber/Laser/Contact Sensor
- IoT Status Monitoring Amplifier

I/O
- NX I/O
- NX I/O

Software
- HMI
- NA Programmable Terminal
- Sysmac Studio
- Database
- SCADA/MES/ERP

Software
- Ethernet
- Factory Automation
- Peer-to-Peer controller communication
- Interface with Sysmac Studio, NA HMI or SCADA software
- Database connection for Microsoft SQL Server, Oracle, IBM DB2, MySQL and Firebird
- FTP server

Ethernet - Factory Automation
- Peer-to-Peer controller communication
- Interface with Sysmac Studio, NA HMI or SCADA software
- Database connection for Microsoft SQL Server, Oracle, IBM DB2, MySQL and Firebird
- FTP server
One Software

One Integrated Development Environment Software
Created to give you complete control over your automation system, Sysmac Studio integrates configuration, programming and monitoring. Graphics-oriented configuration allows quick set-up of the controller, field devices and networks while machine and motion programming based on IEC standard and PLCopen Function Blocks for Motion Control cuts programming time. Smart Editor with On-line debugging helps quick and error free programming. Advanced simulation of sequence and motion control, and data trace reduce machine tuning and set-up.

Design

Reusable programs

One Integrated Development Environment software Sysmac Studio is fully compliant with the open standard IEC 61131-3. Programming with variables eliminates the need to learn the internal memory map of the PLC and allows the programs to be reused.

Maintenance

Highly efficient maintenance

Troubleshooting

Troubleshooting in the Sysmac Studio and NA Programmable Terminal can manage errors across the entire system including the controller. You can check details of errors and solutions without reading manuals.

* This function can be used by applying the Team Development Option to Sysmac Studio version 1.20 or higher. Project version control function is supported by CPU Unit version 1.16 or later.
Collection of software functional components  
Sysmac Library
Packed with Omron’s rich technical know-how, the Function Blocks in the Sysmac Library for advanced applications and motion control cut programming time.

Development by multiple developers

- Project version control function *

When you develop a project at the same time as your colleagues, the Sysmac Studio combined with the version control system (Git™) merges changes automatically and resolves conflicting changes. This makes merging easier and faster. You can even revert to the previous revision after graphically comparing the current project with a previous one.

For advanced machine control

- Motion programming

Advanced motion control applications can be created quickly just by combining PLCopen® Function Blocks for Motion Control.

- Model-Based design

Complex feedback control that is designed with MATLAB®/Simulink® can be imported into programs.

- 3D simulation

Motion trajectories in 3D can be pre-tested with advanced simulation of sequence and motion control. Simulation of single Function Blocks, POU’s (Program Organization Unit) or the entire program can be performed. In addition all standard features such as Break & Step are available. Easy tuning and debugging reduce the set-up times of machines and production lines.

Verification

Fast system debugging

- Remote maintenance

Movement of the machine connected online can be displayed on the CAD in real time, and movement can also be reproduced from the trace data. Maintenance and troubleshooting can be performed in remote locations.

- Virtual mechanical debugging

Before the mechanical prototype is completed, motion can be checked and the program can be debugged. This cuts design time.

- 3D simulation

Motion trajectories in 3D can be pre-tested with advanced simulation of sequence and motion control. Simulation of single Function Blocks, POU’s (Program Organization Unit) or the entire program can be performed. In addition all standard features such as Break & Step are available. Easy tuning and debugging reduce the set-up times of machines and production lines.
One Machine Controller
NJ/NX/NY Machine Automation Controller

Powerful, yet easy to configure
The NJ/NX/NY Controller is at the heart of the Sysmac platform. One integrated controller is designed to meet extreme requirements in terms of logic sequence and motion control speed and accuracy. Standard programming and open networks make it easy to build your automation system.

High-speed, high-precision control*1
Architecture based on Intel® Core™ i7 processor significantly speeds up the execution of instructions (basic instructions 0.37 ns, math instructions for Long Real Data 3.2 ns). Command values to send to servomotors and stepper motors can be updated as fast as every 125 μs. This enables smooth cam motion and high-precision interpolation and phase adjustment between axes.

Complete integration of motion and logic
One controller integrates logic, motion, vision and information for complete control and management of machines. Position, displacement, and tension information collected from sensors can be quickly and easily fed back to the motion control.

Integrated safety into machine control*3
The controller integrates safety control into machine control in lines that require fast cycle times. It also integrates two different open networks: EtherNet/IP for safety control in production lines and EtherCAT for safety control in machines.

*1 Performance of NX701-1
*2 Based on Omron investigation in February 2015.
*3 Performance of NX102-□□□□ and NX-SL5□00
*4 Database connection CPU unit: NX102-□□□□/NJ□01-□□□□0
*5 Performance of NX102-□□□□/NX501-1□00
Fast machine data storage in database

The controller connects directly to a database without the need for a gateway. The special instructions allow easy access to the database. Real-time data collection enables productivity improvement, predictive maintenance, and quality traceability.

Supported database
- Microsoft SQL server
- Oracle Database
- IBM DB2
- MySQL
- PostgreSQL
- Firebird

Secure host connection

OPC UA is an IEC communication protocol which is listed as a recommendation for Industrie 4.0 and PackML. The NX1 comes equipped with an OPC UA server interface and provides a secure connection to IT systems such as MES and ERP.

Supported database

- Microsoft SQL server
- Oracle Database
- IBM DB2
- MySQL
- PostgreSQL
- Firebird

Standard programming

- Fully conforms with IEC 61131-3 standards
- PLCopen Function Blocks for Motion Control

Collection of software functional components

Sysmac Library
- FB library option for advanced applications
  (vibration suppression, temperature control, motion control…)
- High quality products with reliable global support
Case studies of machine innovation by increasing speed and precision

Case 1: High-speed alignment and vibration-free handling

1. High-speed, high-precision alignment system
The FH Vision System provides the Shape Search function for fast and accurate shape recognition and Visual Feedback that feeds back the current position to control the motor in every measurement cycle. These increase alignment speed without sacrificing accuracy.

2. Software functional components for vibration suppression
The Vibration Suppression Library facilitate programming for high-speed handling while suppressing vibration. Waiting time is reduced, and positional accuracy is increased.

1. Precisely stacking many sheets increases cycle time because retries caused by mechanical errors increase positioning time.
2. Vibration settling time is required when high-speed handling is stopped. Speed must be reduced to suppress vibration.

1. High-speed alignment
Fast and precise position correction by reducing retries

2. Vibration-free handling
Vibration suppression during handling by using function blocks
Case 2: Packaging machine using electric cam

Problems

1. The PLC and mechanical cam control cannot accurately synchronize axes. In addition, low precision, vibration, and noise caused by mechanical cam limit high-speed and high-precision packaging.

2. It takes time to adjust mechanical cam to different packaging materials and settings every time a different type of product is packaged.

Electronic cam optimizes packaging speed and precision

Electronic cam motion control realizes machine cam motion. Electronic cam enables 3 axes - "film feeding", "product feeding", and "rotary knife" - to be synchronized at high speed. This eliminates following errors between axes even during high-speed operation, leading to higher-speed and higher-quality packaging. Registering settings as a recipe reduces changeover time.

Software functional components for electronic cam control

The Rotary Knife Function Block in the Packaging Machine Library increases the speed and precision of horizontal flow packaging and enables mechanical cam motion without electronic cam table.

![Diagram of packaging machine using electric cam]
**Sysmac Family**

## Controller

### NX1
**Machine Automation Controller**

Compact size controller integrates production line and IT systems

**Improve productivity, improve your business**

The NX1 can utilize information, take safety measures, and control quality while at the same time improving production efficiency through high-speed, high-precision control.

**Fulfilling functions in compact size**

Three industrial Ethernet ports and a power supply are housed in a compact design with a width of 66 mm. The multicore microprocessor and OPC UA connectivity enable information utilization without compromising control performance.

### NY5□□-1/NY5□□-5
**IPC Machine Controller**

An IPC machine controller combines machine control and IT technology

**Real-time machine control**

Function Blocks make it easier to program high-speed, high-precision motion control including synchronized servomotor control and electronic cams.

**Windows for running applications**

Based on fourth-generation Intel® Core™ i7-4700EQ processor. Open operating system enables use of own software.

**Built-in EtherCAT port**

EtherCAT connectivity simplifies installation of FA devices and safety devices: up to 192 synchronized slaves, up to 64 axes of motion control, and Safety over EtherCAT. Fully conforms to IEC 61131-3 standard programming.
### Lineup

<table>
<thead>
<tr>
<th>Series</th>
<th>NX Series</th>
<th>NJ Series</th>
<th>NY Series</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Model</strong></td>
<td>NX1P2-□□□</td>
<td>NX102-□□□</td>
<td>NX701-□□□</td>
</tr>
<tr>
<td><strong>Feature</strong></td>
<td>Motion control and built-in I/O</td>
<td>Compact controller with up to 8 axes motion control</td>
<td>For large-scale control with up to 256 axes</td>
</tr>
<tr>
<td><strong>Appearance</strong></td>
<td><img src="image1" alt="NX1P2-□□□" /></td>
<td><img src="image2" alt="NX102-□□□" /></td>
<td><img src="image3" alt="NX701-□□□" /></td>
</tr>
<tr>
<td><strong>Instruction execution times (LD instruction)</strong></td>
<td>3.3 ns</td>
<td>3.3 ns</td>
<td>0.37 ns</td>
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<tr>
<td><strong>Program capacity</strong></td>
<td>1.5 MB</td>
<td>5 MB</td>
<td>80 MB</td>
</tr>
<tr>
<td><strong>Variables capacity (No retain attribute)</strong></td>
<td>2 MB</td>
<td>32 MB</td>
<td>256 MB</td>
</tr>
<tr>
<td><strong>I/O capacity</strong></td>
<td>40 points</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td><strong>Number of EtherCAT slaves</strong></td>
<td>16</td>
<td>64</td>
<td>512</td>
</tr>
<tr>
<td><strong>Number of motion axes</strong></td>
<td>0, 2, 4</td>
<td>0, 2, 4, 8</td>
<td>128, 256</td>
</tr>
<tr>
<td><strong>Functions</strong></td>
<td>—</td>
<td>Database connection (NX102-□□□20)</td>
<td>Database connection (NX701-□□□20)</td>
</tr>
<tr>
<td><strong>Detailed specification</strong></td>
<td>Catalog P116</td>
<td>P130</td>
<td>P089</td>
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</table>

### Series

<table>
<thead>
<tr>
<th>Series</th>
<th>NJ Series</th>
<th>NY Series</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Model</strong></td>
<td>NJ501-4□□□</td>
<td>NJ501-1□□□</td>
</tr>
<tr>
<td><strong>Feature</strong></td>
<td>For large-scale control with up to 64 axes</td>
<td>Perfect integration: Sysmac machine control and ICT</td>
</tr>
<tr>
<td><strong>Appearance</strong></td>
<td><img src="image8" alt="NJ501-□□□" /></td>
<td><img src="image9" alt="NY51□-1" /></td>
</tr>
<tr>
<td><strong>Instruction execution times (LD instruction)</strong></td>
<td>1.1 ns</td>
<td>0.33 ns</td>
</tr>
<tr>
<td><strong>Program capacity</strong></td>
<td>20 MB</td>
<td>40 MB</td>
</tr>
<tr>
<td><strong>Variables capacity (No retain attribute)</strong></td>
<td>4 MB</td>
<td>64 MB</td>
</tr>
<tr>
<td><strong>I/O capacity</strong></td>
<td>2,560 points</td>
<td>—</td>
</tr>
<tr>
<td><strong>Number of EtherCAT slaves</strong></td>
<td>192</td>
<td>192</td>
</tr>
<tr>
<td><strong>Number of motion axes</strong></td>
<td>16, 32, 64</td>
<td>16</td>
</tr>
<tr>
<td><strong>Functions</strong></td>
<td>Robot control</td>
<td>Database connection</td>
</tr>
<tr>
<td><strong>Detailed specification</strong></td>
<td>Catalog P089</td>
<td></td>
</tr>
</tbody>
</table>
Sysmac Family

Software

SYSMAC-SE2

Automation Software Sysmac Studio

One software for programming, configuration, simulation and monitoring

- One software for motion, logic sequence, safety, motion, vision and visualization
- Fully compliant with open standard IEC 61131-3
- Supports Ladder, Structured Text, and Function Block programming with a rich instruction set
- Advanced security function with 32 digit security password

SYSMAC-XR

Sysmac Library

Omron’s control expertise changes programming

- Advanced control such as vibration suppression and temperature control
- High-precision control of packaging machines and actuators for servo presses
- Productivity improvement by monitoring device operations and restoring parameters
- Reduction in programming time
### Lineup

<table>
<thead>
<tr>
<th>Series</th>
<th>Automation Software</th>
<th>Collection of software functional components</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>Sysmac Studio</td>
<td>Sysmac Library</td>
</tr>
</tbody>
</table>

#### Appearance

- ![Sysmac Studio](image)
- ![Sysmac Library](image)

#### System requirements

- **Operating system (OS):**
  - Windows 7 (32-bit/64-bit version)
  - Windows 8 (32-bit/64-bit version)
  - Windows 8.1 (32-bit/64-bit version)
  - Windows 10 (32-bit/64-bit version)

- **CPU:**
  - Windows computers with Intel® Celeron™ processor 540 (1.8 GHz) or faster CPU.
  - Intel® Core™ i5 M520 processor (2.4 GHz) or equivalent or faster recommended.

- **Applicable models**
  - For details, refer to the catalog of Sysmac Library.

#### Included software/ Libraries

- **CX-Designer**
- **CX-Integrator**
- **CX-Protocol**
- **Network Configurator**
- **SECS/GEM Configurator**
- **Adept Robot IP Address Setting Tool**
- **CX-ConfiguratorFDT**
- **IODD DTM Configurator**
- **MC Test Run Library**
- **MC Command Table Library**
- **MC Tool Box Library**
- **EtherCAT GS Series Library**
- **EtherCAT N-Smart Series Library**
- **Vibration Suppression Library**
- **Temperature Control Library**
- **Device Operation Monitor Library**
- **Adept Robot Control Library**
- **Weighing Control Library**
- **EtherCAT 1S Series Library**
- **Packaging Machine Library**
- **Servo Press Library**
- **Dimension Measurement Library**
- **Safety System Monitor Library**
- **High-Speed Analog Inspection Library**
- **SLMP Communications Library**
- **Visual Feedback Alignment Library**

**Detailed specification**

- Refer to your OMRON website.
NA Programmable Terminal

Make industrial machines more attractive and competitive by bringing technology to life

As part of the Sysmac automation platform, NA transforms machine data into information, shows information and controls devices based on requirements at FA manufacturing sites.

- One connection: Connectable with Sysmac products
- One software: The machine interface brings you a clear view in one integrated project.
- Rich media provide an intuitive and proactive machine management tool
- More than 16 million display colors (24-bit full color)

IAG – Intelligent Application Gadgets
The graphics collection accelerates the development process. You can make your own collections and share them between projects.
## Lineup

<table>
<thead>
<tr>
<th>Series</th>
<th>NA Series</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feature</td>
<td>More than 16 million color (24 bit full color) and wide screen for all models</td>
</tr>
<tr>
<td>Appearance</td>
<td><img src="image1.jpg" alt="images" /> <img src="image2.jpg" alt="images" /> <img src="image3.jpg" alt="images" /> <img src="image4.jpg" alt="images" /></td>
</tr>
<tr>
<td>Display device</td>
<td>TFT LCD</td>
</tr>
<tr>
<td>Screen size</td>
<td>15.4-inch widescreen</td>
</tr>
<tr>
<td>Number of dots (horizontal × vertical)</td>
<td>WXGA 1,280×800 dots</td>
</tr>
<tr>
<td>Colors</td>
<td>16,770,000 colors (24 bit full colors)</td>
</tr>
<tr>
<td>Built-in ports</td>
<td>2 Ethernet ports, 2 USB host ports, 1 USB slave port</td>
</tr>
<tr>
<td>Allowable power supply voltage range</td>
<td>19.2 to 28.8 VDC</td>
</tr>
<tr>
<td>Degree of protection</td>
<td>Front-panel controls: IP65 oil-proof type</td>
</tr>
<tr>
<td>Memory card</td>
<td>SD/SDHC memory card</td>
</tr>
<tr>
<td>Flame colors</td>
<td>Black, silver</td>
</tr>
<tr>
<td>Detailed specification</td>
<td>Catalog</td>
</tr>
</tbody>
</table>
Sysmac Family

Motion

R88M-1□/R88D-1SN□-ECT
1S AC Servo System

Improved machine design. Increased machine productivity

Optimized installation and commissioning tasks
- Cabinet size reduction: Compact servo drive with same height throughout the whole power range
- Fast and secure screw-less push-in in control I/O connector and brake interlock connector

23 bit high resolution encoder
- No battery, no maintenance and compact size

Multi-axis setup and tuning
- Configure and monitor multiple axes in one view
- Easy & fast parameter transfer among axes in the machine (up to 256 axes)
- Comprehensive gain tuning

Safety control via EtherCAT
- EN ISO 13849-1(Cat.3 PLd)
- EN61508(SIL2), EN62061(SIL2)
- EN61800-5-2(STO)

R88M-K/R88D-KN□-ECT□R88L-EC/R88D-KN□-ECT-L
G5 AC Servomotor/Linear Motor/Servo Drive

At the heart of every great machine

Rotary motors
- Motors with IP67
- Large range of motors from 0.16 Nm up to 96 Nm nominal torque (224 Nm peak)

Ironless linear motors
- Excellent force-to-weight ratio
- No latching force

Iron-core linear motors
- Optimum ratio between force and volume
- Weight-optimized magnetic track

Safety conformance
- ISO13849-1(PLc,d)
- EN61508(SIL2)
- IEC61800-5-2(STO)
## Lineup

<table>
<thead>
<tr>
<th>Series</th>
<th>1S Series</th>
<th>GS Series</th>
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### Appearance

<table>
<thead>
<tr>
<th>Type</th>
<th>Built-in EtherCAT Communications</th>
<th>Built-in EtherCAT Communications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Linear Type</td>
<td>No</td>
<td>Yes. Refer to the GS Series Catalogs (Cat. No. I815 and I816) for details.</td>
</tr>
<tr>
<td>100 VAC Applicable motor capacity/force</td>
<td>50 W to 400 W</td>
<td>50 W to 400 W</td>
</tr>
<tr>
<td>200 VAC Applicable motor capacity/force</td>
<td>50 W to 3 kW</td>
<td>50 W to 15 kW</td>
</tr>
<tr>
<td>400 VAC Applicable motor capacity/force</td>
<td>600 W to 3 kW</td>
<td>400 W to 15 kW</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Applicable servomotor</th>
<th>1S Servomotor</th>
<th>GS Rotary Servomotor</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Control mode</th>
<th>Position, speed and torque control</th>
<th>Position, speed and torque control</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Safety approvals</th>
<th>ISO 13849-1 (PL-c/PL-d)</th>
<th>ISO 13849-1 (PL-c/PL-d)</th>
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<tr>
<td></td>
<td>EN61508 (SIL3/SIL2)</td>
<td>EN61508 (SIL2)</td>
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<td></td>
<td>EN62061 (SIL3/SIL2)</td>
<td>EN62061 (SIL2)</td>
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<td></td>
<td>IEC 61800-5-2 (STO)</td>
<td>IEC 61800-5-2 (STO)</td>
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<table>
<thead>
<tr>
<th>Full closed loop</th>
<th>—</th>
<th>Built-in</th>
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### Appearance

<table>
<thead>
<tr>
<th>Rated rotation speed</th>
<th>3,000 r/min</th>
<th>2,000 r/min</th>
<th>3,000 r/min</th>
<th>2,000 r/min</th>
</tr>
</thead>
<tbody>
<tr>
<td>Momentary maximum rotation speed</td>
<td>5,000 to 6,000 r/min</td>
<td>3,000 r/min</td>
<td>4,500 to 6,000 r/min</td>
<td>3,000 r/min</td>
</tr>
<tr>
<td>Rated torque</td>
<td>0.318 to 9.53 N·m</td>
<td>4.77 to 14.3 N·m</td>
<td>0.16 to 15.9 N·m</td>
<td>1.91 to 23.9 N·m</td>
</tr>
<tr>
<td>Capacity</td>
<td>50 W to 3 kW</td>
<td>400 W to 3 kW</td>
<td>50 W to 5 kW</td>
<td>400 W to 5 kW</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Applicable servo drive</th>
<th>1S Servo Drive</th>
<th>GS Servo Drive (for rotary servomotor)</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Encoder resolution</th>
<th>23-bit absolute</th>
<th>23-bit absolute</th>
<th>20-bit incremental/17-bit absolute</th>
<th>20-bit incremental/17-bit absolute</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Protective structure</th>
<th>IP67</th>
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### Appearance

<table>
<thead>
<tr>
<th>Rated rotation speed</th>
<th>1,000 r/min</th>
<th>1,500 r/min</th>
<th>1,000 r/min</th>
</tr>
</thead>
<tbody>
<tr>
<td>Momentary maximum rotation speed</td>
<td>2,000 r/min</td>
<td>2,000 to 3,000 r/min</td>
<td>2,000 r/min</td>
</tr>
<tr>
<td>Rated torque</td>
<td>8.59 to 28.7 N·m</td>
<td>47.8 to 95.6 N·m</td>
<td>8.59 to 57.3 N·m</td>
</tr>
<tr>
<td>Capacity</td>
<td>900 W to 3 kW</td>
<td>900 W to 6 kW</td>
<td>900 W to 6 kW</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Applicable servo drive</th>
<th>1S Servo Drive</th>
<th>GS Servo Drive (for rotary servomotor)</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Encoder resolution</th>
<th>23-bit absolute</th>
<th>17-bit absolute</th>
<th>20-bit incremental/17-bit absolute</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Protective structure</th>
<th>IP67</th>
</tr>
</thead>
</table>

### Detailed specification

<table>
<thead>
<tr>
<th>Catalog</th>
<th>I821</th>
<th>I815 and I816</th>
</tr>
</thead>
</table>
Sysmac Family

Motion

3G3MX2-A□□□□□□□□-V1
MX2-V1 Multi-function Compact Inverter

Born to drive machines

**Torque control in open loop**
- Ideal for low to medium torque applications
- Can replace a flux vector inverter or servo drive in suitable systems

**Quick response to load fluctuation**
- Stable control without decreasing machine speed improves quality and productivity

**Safety inside**
- Conforms to safety norm ISO 1384901 Cat. 3 performance level PLd
- 2 Safety inputs
- External device monitoring (EDM)

**Other Features**
- Maximum applicable motor capacity: 15 kW
- Double rating (CT: Heavy load/VT: Light load)
- Permanent magnet motors
- Drive Programming
- Built-in brake control function

3G3RX-□□□□□□□□-V1
RX-V1 High-function General-purpose Inverter

Versatile for a wide range of applications

- Maximum applicable motor capacity: 132 kW
- Double rating (CT: Heavy load/VT: Light load)
- Sensorless vector control, Vector control with a PG
- Drive Programming
- Built-in Electronic gear
## Lineup

<table>
<thead>
<tr>
<th>Series</th>
<th>MX2 Series V1 type</th>
<th>RX Series V1 type</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Model</strong></td>
<td>3G3MX2-V1</td>
<td>3G3RX-V1</td>
</tr>
</tbody>
</table>

### Appearance

- **Three-phase 200 V**
  - 0.1 to 15 kW(CT)
  - 0.4 to 55 kW(CT)
- **Three-phase 400 V**
  - 0.4 to 15 kW(CT)
  - 0.4 to 132 kW(CT)
- **Single-phase/three-phase 200 V**
  - No
- **Single-phase 200 V**
  - 0.1 to 2.2 kW(CT)

### Power supply and capacity

- **Three-phase 200 V**
  - 0.1 to 15 kW(CT)
  - 0.4 to 55 kW(CT)
- **Three-phase 400 V**
  - 0.4 to 15 kW(CT)
  - 0.4 to 132 kW(CT)
- **Single-phase/three-phase 200 V**
  - No
- **Single-phase 200 V**
  - 0.1 to 2.2 kW(CT)

### Control methods

- **V/F control**
- **Sensorless vector control**
- **Vector control with a PG**
- **9 inputs (1 RUN (FWD) input + 8 multi-function inputs)**
- **5 transistor outputs**
- **1 relay output**
- **2 inputs**
  - 0 to 10 V, 4 to 20 mA
  - 0 to 10 V
- **1 output**
  - 0 to 10 V

### Input/output

- **No. of multi-function I/O points**
  - 7 inputs
  - 2 transistor outputs
  - 1 relay output
  - 9 inputs (1 RUN (FWD) input + 8 multi-function inputs)
  - 5 transistor outputs
  - 1 relay output

### Analog I/O

- **2 inputs**
  - 0 to 10 V, 4 to 20 mA
  - 0 to 10 V
- **1 output**
  - 0 to 10 V

### Braking

- **Braking resistor connection**
- **Regenerative Braking Unit connection**
- **Regenerative Braking Unit + braking resistor connection**
- **Braking resistor connection (22 kW max.)**
- **Regenerative Braking Unit connection**
- **Regenerative Braking Unit + braking resistor connection**

### Frequency

- **Frequency setting range**
  - 0.1 to 400 Hz
  - 0.1 to 400 Hz
- **Frequency output method**
  - Line-to-line sine wave PWM
  - Line-to-line sine wave PWM

### Installation and wiring

- **Side-by-side mounting**
  - Yes
  - No
- **Removable terminal block**
  - No
  - Yes
- **Power supply and motor wiring**
  - Bottom wiring
  - Bottom wiring

### Main functions

- **Multistep speed control**
  - 16 steps + jog
  - 16 steps + jog
- **Carrier frequency setting**
  - 2 to 15 kHz (default setting: 5 kHz)
  - 2 to 15 kHz (default setting: 5 kHz)
- **Torque assist function**
  - Auto/manual torque assist
  - Auto/manual torque assist
- **PID function**
  - Yes
  - Yes
- **Absolute value positioning**
  - No
  - Yes
- **Emergency shutoff**
  - Yes
  - Yes
- **0-Hz domain sensorless vector control**
  - No
  - Yes
- **Tripless function**
  - Yes
  - Yes
- **Momentary power interruption restart**
  - Yes
  - Yes
- **Double Rating**
  - Yes
  - Yes
- **Permanent magnet motor control**
  - Yes
  - —
- **Starting torque**
  - 200% at 0.5 Hz
  - 200% at 0.3 Hz in open loop
  - Full torque at 0 Hz in closed loop
- **PLC functionality (Drive Programming)**
  - Provided
  - Provided

### Communications

- **Optional EtherCAT communication unit**
- **Optional EtherCAT communication unit**

### Safety approvals

- **ISO 13849-1 (Cat.3/PlD)**
- **IEC 60204-1 Stop Category 0**
- —

### Detailed specification

| Catalog | I920 | I919 |
Sysmac Family

I/O

NX I/O System

Speed and accuracy for machine performance

Based on an internal high-speed bus running in synchronization with the EtherCAT network and using the time-stamp function, the NX I/O can be controlled with microsecond accuracy and with nanosecond resolution.

The I/O range consists of over 100 models including position control, temperature inputs and integrated safety.
## NX Series Features
- Over 100 models including digital I/O, analog I/O, position interface, temperature inputs, temperature control, RFID, safety CPU, and safety I/O
- NsynX technology provides I/O response with less than 1 μs jitter
- Screwless terminal block, connector, and M3 screw types
- Up to 32 channels per digital input unit or output unit

## NX Series Appearance
- Type: Modular I/O
- Communications interface: EtherCAT
- Number of connectable units: 63 units max.
  - Input: 1,024 bytes max., output: 1,024 bytes max.
- Unit types: Communications coupler, IO-Link master, serial communication, RFID, digital I/O, analog I/O, high-speed analog input, load cell input, safety I/O, safety CPU, temperature input, heater burnout detection, temperature control, position interface
- Mounting: DIN track
- Detailed specification: Catalog R183

* See page 27 for more information on safety I/O.

## GX Series Features
- Detachable screw terminal block and e-CON connector types
- Easy set-up: automatic and manual address setting

## GX Series Appearance
- Type: Block I/O
- Communications interface: EtherCAT
- Number of connectable units: One expansion unit can be connected with one digital I/O terminal (16 inputs + 16 outputs)
- I/O types: Digital I/O, analog I/O, encoder input, IO-Link master, expansion unit
- Mounting: DIN track
- Detailed specification: Refer to your OMRON website.
NX-SL/SI/SO
NX Safety Controller

Integrated safety into machine automation

- The safety controller meets PLe according to the ISO 13849-1 and SIL3 according to IEC 61508
- Flexible system lets you freely mix safety controller and safety I/O units with standard NX I/O
- Integration in One software, Sysmac Studio
- Certified programs can be reused, which reduces the amount of verification work
### Lineup

#### Safety Controller

<table>
<thead>
<tr>
<th>Product name</th>
<th>Safety CPU Unit</th>
<th>Safety Input Unit</th>
<th>Safety Output Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Model</strong></td>
<td>NX-SL5500/5700</td>
<td>NX-SIH400/SID800</td>
<td>NX-SOH200/SOD400</td>
</tr>
<tr>
<td><strong>Features</strong></td>
<td>- Two different networks, Safety over EtherCAT (FSoE) and EtherNet/IP (CIP Safety), in a single system - Line safety control and fast machine control at the same time - Sysmac Studio version 1.24 or higher for hardware configuration and programming - Flexible Safety system building - Optimal I/O building</td>
<td>- Integrated safety into machine automation through the use of Safety over EtherCAT - FSoE - protocol. Freely mixing with standard NX I/O - Sysmac Studio version 1.07 or higher for hardware configuration and programming - Flexible Safety system building - Optimal I/O building</td>
<td></td>
</tr>
<tr>
<td><strong>Appearance</strong></td>
<td><img src="image1.png" alt="Image of Safety CPU Unit" /></td>
<td><img src="image2.png" alt="Image of Safety Input Unit" /></td>
<td><img src="image3.png" alt="Image of Safety Output Unit" /></td>
</tr>
<tr>
<td><strong>Network</strong></td>
<td>Safety over EtherCAT (FSoE), EtherNet/IP (CIP Safety)</td>
<td>Safety over EtherCAT (FSoE)</td>
<td>Safety over EtherCAT (FSoE)</td>
</tr>
<tr>
<td><strong>Programming</strong></td>
<td>- IEC 61131-3 standard - PLCopen Function Blocks for Safety</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Program capacity</strong></td>
<td>2048 KB, 4096 KB</td>
<td>512 KB, 2048 KB</td>
<td></td>
</tr>
<tr>
<td><strong>Safety I/O connection</strong></td>
<td>128/254</td>
<td>32/128</td>
<td></td>
</tr>
<tr>
<td><strong>Maximum number of safety I/O points</strong></td>
<td>1024, 2032</td>
<td>256, 1024</td>
<td></td>
</tr>
<tr>
<td><strong>Units that can connect</strong></td>
<td>NX102 CPU Unit, Communication Control Unit</td>
<td>NX102 CPU Unit, EtherCAT Coupler Unit, EtherNet/IP Coupler Unit</td>
<td></td>
</tr>
<tr>
<td><strong>Detailed specification</strong></td>
<td>Catalog : F104</td>
<td>Refer to your OMRON website.</td>
<td>Refer to your OMRON website.</td>
</tr>
</tbody>
</table>

---

**Product name** Safety CPU Unit

- **Model**: NX-SL5500/5700
- **Features**:
  - Two different networks, Safety over EtherCAT (FSoE) and EtherNet/IP (CIP Safety), in a single system
  - Line safety control and fast machine control at the same time
  - Sysmac Studio version 1.24 or higher for hardware configuration and programming
  - Flexible Safety system building
  - Optimal I/O building

---

**Appearance**

- **Network**: Safety over EtherCAT (FSoE), EtherNet/IP (CIP Safety)
- **Applicable standards**: EN ISO 13849-1 (PLc/Safety Category 4), IEC 61508(SIL3), IEC/EN 62061(SIL CL3), IEC/EN 61131-2, IEC 6132-3-1
- **Programming**:
  - IEC 61131-3 standard
  - PLCopen Function Blocks for Safety
- **Program capacity**: 2048 KB, 4096 KB
- **Safety I/O connection**: 128/254
- **Maximum number of safety I/O points**: 1024, 2032
- **Units that can connect**: NX102 CPU Unit, Communication Control Unit
- **Detailed specification**: Catalog : F104

---

**Product name** Safety Input Unit

- **Model**: NX-SIH400/SID800
- **Applicable standards**: EN ISO 13849-1 (PLc/Safety Category 4), IEC 61508(SIL3), IEC/EN 62061(SIL CL3), IEC/EN 61131-2, IEC 6132-3-1
- **Number of safety input/output points**: 4, 8
- **Detailed specification**: Refer to your OMRON website.
FH Vision System

Flexible solution for machine vision

The FH Vision System is optimized to detect the position and orientation of any object at high speed and with high accuracy. The built-in EtherCAT communications enable reliable and easy networking with motion control, increasing the overall machine performance. A flexible machine vision tailored for quality inspection.

Unique light
- The MDMC light flexibly changes illumination colors and angles according to items to measure.

Advanced shape search technology
- Differences of the work piece
- Dust and dirt conditions
- Detection of overlapping objects
- Changing ambient environment

Multiple inspection
- Powerful 4-core i7 parallel processor
- Up to 8 camera by one controller

Compact design
- Camera and image processing in one
- Standard C-mount lenses; choose the field of view and focus distance you need
- Flexible cables
- Vision sensor with encoder input for tracking function

FQ-M Vision Sensor

Designed for object tracking

The FQ-M Series is a vision sensor designed specifically for pick and place applications. Up to 5,000 pieces per minute with 360 degree rotation can be detected. The FQ-M series include an incremental encoder input for easy tracking and calibration.

Advanced shape search technology
- Varying material ie. shiny
- Overlapping products
- Product detection: 10 pcs with rotation < 200 ms

Wide camera range
- Up to 20.4 M pixel
- High speed CMOS camera
- Use different fields of vision and at any angle

Flexible cables
- Vision sensor with encoder input for tracking function
### Lineup

<table>
<thead>
<tr>
<th>Product name</th>
<th>Smart Camera</th>
<th>Vision System</th>
</tr>
</thead>
<tbody>
<tr>
<td>Series</td>
<td>FQ-M Series</td>
<td>FH Series</td>
</tr>
</tbody>
</table>

**Appearance**

- Camera and image processing in one
- Easy to installation
- Flexible configuration of cameras and controller to suit your applications

**Software feature**

- Communication wizard for easy setting
- Flexible setting with flowchart

**Processing items**

- Processing items for Pick & Place applications
- Processing items covering general applications

**Processing resolution**

<table>
<thead>
<tr>
<th></th>
<th>0.4 Mpix</th>
<th>5 Mpix</th>
<th>20.4 Mpix</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resolution</td>
<td>752 (H)×480 (V)</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>720 (H)×540 (V)</td>
<td>2448 (H)×2048 (V)</td>
<td>5544 (H)×3692 (V)</td>
</tr>
</tbody>
</table>

**Communications interfaces**

- EtherCAT, Ethernet, Parallel I/O, encoder input

**Detailed specification**

- Catalog: Q183, Q197
ZW-8000/7000
Confocal Fiber Displacement Sensor

Measure anything from anywhere The most reliable in-line measurements

The ZW-8000 Series provides high-precision in-line measurements of rattling or inclined shiny, thin, or minute parts. The ZW-7000 Series provides ultra-high-speed, stable measurements of diffuse reflective objects during movement. These sensors help increase quality inspection accuracy and reduce inspection time.

Reliable measurements for any material and surface types

The white light confocal principle allows a continuous measurement of object in any mixed conditions such as mirror, coarse, transparent, curved, or narrow areas without stopping the sensor head.

- Angle characteristic: ±25° for shiny surfaces
- Linearity for different materials: ±0.3 μm
- Minimum sampling period: 20 μs
- Minimum spot diameter: 4 μm

Note: Specifications differ among models. Please ask Omron sales representative for details.

E3NX/E3NC/E9NC Series
N-Smart Series

Various sensors connected over EtherCAT

The N-Smart lineup of next-generation fiber sensors, laser sensors and contact sensors will quickly solve your problems and therefore maximize uptime and minimize downtime with optimum cost performance.

Features

- Ultra-easy Advanced Smart Tuning with the push of a button
- More stable detection of high-speed workpieces
- Predictive maintenance to reduce downtime
- Highly visible white LED display
- E3NX-FA has 1.5x the sensing distance of conventional amplifiers

* Compared with E3X-HD
### Lineup

<table>
<thead>
<tr>
<th>Product name</th>
<th>Confocal Fiber Displacement Sensor</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Series</strong></td>
<td><strong>ZW-8000 Series</strong></td>
</tr>
<tr>
<td><strong>Feature</strong></td>
<td>For measurements of rattling or inclined “transparent objects or mirror surfaces” such as thin film sheets or glass</td>
</tr>
</tbody>
</table>

**Appearance**

- **Measurement method**: White light confocal principle
- **Measuring range**: Min: 7±0.3 mm, Max: 30±2 mm
- **Static resolution**: 0.002 to 0.016 μm
- **Linearity**: ±0.3 to ±3.0 μm
- **Spot diameter**: 4 to 11 μm
- **Measurement cycle**: 60 to 7500 μs

<table>
<thead>
<tr>
<th>Detailed specification</th>
<th>Catalog</th>
<th>Web</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Q250</td>
<td></td>
</tr>
</tbody>
</table>

**Product name** | Fiber Sensor/Laser Sensor/Proximity Sensor/Contact Sensor |
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Series</strong></td>
<td><strong>N-Smart Series</strong></td>
</tr>
<tr>
<td><strong>Feature</strong></td>
<td>Connect fiber, laser and contact sensors to EtherCAT at low initial cost</td>
</tr>
</tbody>
</table>

**Appearance**

- **Network specification**: EtherCAT communication unit
- **Sensor Communications Units**: E3NW-ECT/DS, E3X-ECT
- **Connectable sensor amplifier units**:
  - Fiber Sensor: E3NX-FA0, E3NX-CA0
  - Laser Sensor: E3NC-LA0, E3NC-S40
  - Contact Sensor: E9NC-TA0, IOT Status Monitoring Amplifier: E9NC-AA0/VA0
  - Fiber Sensor: E3X-HD0, E3X-MDA0
  - Laser Sensor: E3C-LDA0
  - Proximity Sensor: E2C-EDA0

| Maximum number of connectable sensors | 30 | 30 |

**Detailed specification**

- **Web**: Refer to your OMRON website.
Sysmac Family

Robot

Hornet/Quattro, Cobra/eCobra, Viper Parallel Robot, SCARA Robot, Articulated Robot

Robots for flexible production lines

Parallel, SCARA, and articulated robots are designed to be programmed using familiar programming languages (IEC 61131-3) through the NJ/NX/NY Controller that is connected to the robots via EtherNet/IP.

Parallel robots

The Hornet and Quattro are parallel robots ideal for use in the food and beverage, pharmaceutical, and healthcare industries. The Quattro that is a four-axis parallel robot with a high payload capacity achieves high speed and high precision.

- Fast and high-precision conveyance and assembly
- Supports fast Pick & Place on a fast conveyor
- Maximum working range: 1130, 1300, and 1600 mm models

SCARA robots

High-performance four-axis SCARA robots are ideal for mechanical assembly, material handling, packaging, machine tending, and screw driving. Table/floor or inverted mounting models are available.

- High repeatability suitable for material handling and precision assembly
- Reach: 450, 500, 600, 650, and 800 mm models

Articulated robots

Six-axis articulated robots are ideal for mechanical assembly, material handling, packaging, and palletizing.

- Diagnostics display enables faster trouble shooting
- High accuracy, superior slow-speed following, and easy calibration
- Reach: 653 and 855 mm models
### Lineup

<table>
<thead>
<tr>
<th>Series</th>
<th>Hornet 565</th>
<th>Quattro 650/800</th>
<th>Cobra 450/500/650</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feature</td>
<td>Parallel robot ideal for use in the food and beverage, pharmaceutical, and healthcare industries</td>
<td>Four-axis parallel robot achieves high speed and high precision</td>
<td>Mid-size SCARA robot for material handling, assembly, precision machining and adhesive application</td>
</tr>
</tbody>
</table>

| Appearance | ![Hornet 565](image1) | ![Quattro 650/800](image2) | ![Cobra 450/500/650](image3) |
| Robot type | Parallel robot | Parallel robot | SCARA robot |
| Number of axes | 3, 4 | 4 | 4 |
| Mounting | Inverted | Inverted | Table/Floor |
| Payload capacity | 3 kg (8 kg: without rotation axis) | Quattro 650 6 kg (No rotation: 15 kg) Quattro 800 4 kg (No rotation: 10 kg) | 5 kg |
| Working volume (radius) | 565 mm | 650 to 800 mm | — |
| Reach | — | 450 to 650 mm | — |
| Position repeatability | ±0.10 mm | ±0.10 mm | ±0.02 mm |
| Protection/ Cleanroom classes | Specifications | — | — |
| | Option | — | — |
| | IP65: topside of robot (with optional cover) | IP65: topside of robot (with optional cover) | — |
| Detailed specification | Catalog | — | — |

<table>
<thead>
<tr>
<th>Series</th>
<th>eCobra 600/800</th>
<th>eCobra 800 Inverted</th>
<th>Viper 650/850</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feature</td>
<td>Mid-size/large SCARA robot for precision machining, assembly, and material handling</td>
<td>Overhead-mount large SCARA robot for precision machining, assembly, and material handling</td>
<td>Articulated robot for machining, assembly, and material handling</td>
</tr>
</tbody>
</table>

| Appearance | ![eCobra 600/800](image4) | ![eCobra 800 Inverted](image5) | ![Viper 650/850](image6) |
| Robot type | SCARA robot | SCARA robot | Articulated robot |
| Number of axes | 4 | 4 | 6 |
| Mounting | Table/Floor | Inverted | Table/Floor/Inverted |
| Payload capacity | 5.5 kg | 5.5 kg | 5 kg |
| Working volume (radius) | — | — | — |
| Reach | 600 to 800 mm | 800 mm | 635 to 855 mm |
| Position repeatability | ±0.017 mm | ±0.017 mm | ±0.02 to 0.03 mm |
| Specification/ Cleanroom classes | Specifications | — | — |
| | IP20 | IP20 | IP40 |
| | Option | — | — |
| | eCobra 600 Class10 Cleanroom model eCobra 800 IP65, Class10 Cleanroom model | — | — |
| Detailed specification | Catalog | — | — |
Service and support

Design
Our wide network of machine automation specialists will help you to select the right automation architecture and products to meet your requirements. Our flat structure based on expert-to-expert contact ensures that you will have ONE accountable and responsible expert to deal with on your complete project.

Proof of concept
As your project matures make use of our Automation centers to test and catch-up with technology trends in motion, robotics, networking, safety, quality control etc. and to interface, test and validate your complete system with our new machine network (EtherCAT) and factory network (EtherNet/IP).

We will assign a dedicated application engineer to assist with initial programming and proof testing of the critical aspects of your automation system. Our application engineers have in-depth expertise in and knowledge of networks, PLCs, motion, safety and HMIs when applied to machine automation.
**Design**
Our wide network of machine automation specialists will help you to select the right automation architecture and products to meet your requirements. Our flat structure based on expert-to-expert contact ensures that you will have ONE accountable and responsible expert to deal with on your complete project.

**Proof of concept**
During your prototyping phase you will need flexibility in technical support, product supply and exchange. We will assign an inside sales contact to help you source the correct products fast during your prototyping phase.

**Commissioning**
With our world-wide network for service and support the export of your product is made simple, we will support you on-site with your customer, anywhere in the world. We can arrange a liaison sales engineer to facilitate training, spare parts supply or even machine commissioning. All this in a localised language with localised documentation - giving you complete peace of mind.

**Serial production**
As your production increases we will engage in supplying you within 24hrs and repairing within 3 days. All our products are global products meeting global standards - CE, cULus, NK, LR -

**Development**
During your prototyping phase you will need flexibility in technical support, product supply and exchange. We will assign an inside sales contact to help you source the correct products fast during your prototyping phase.
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