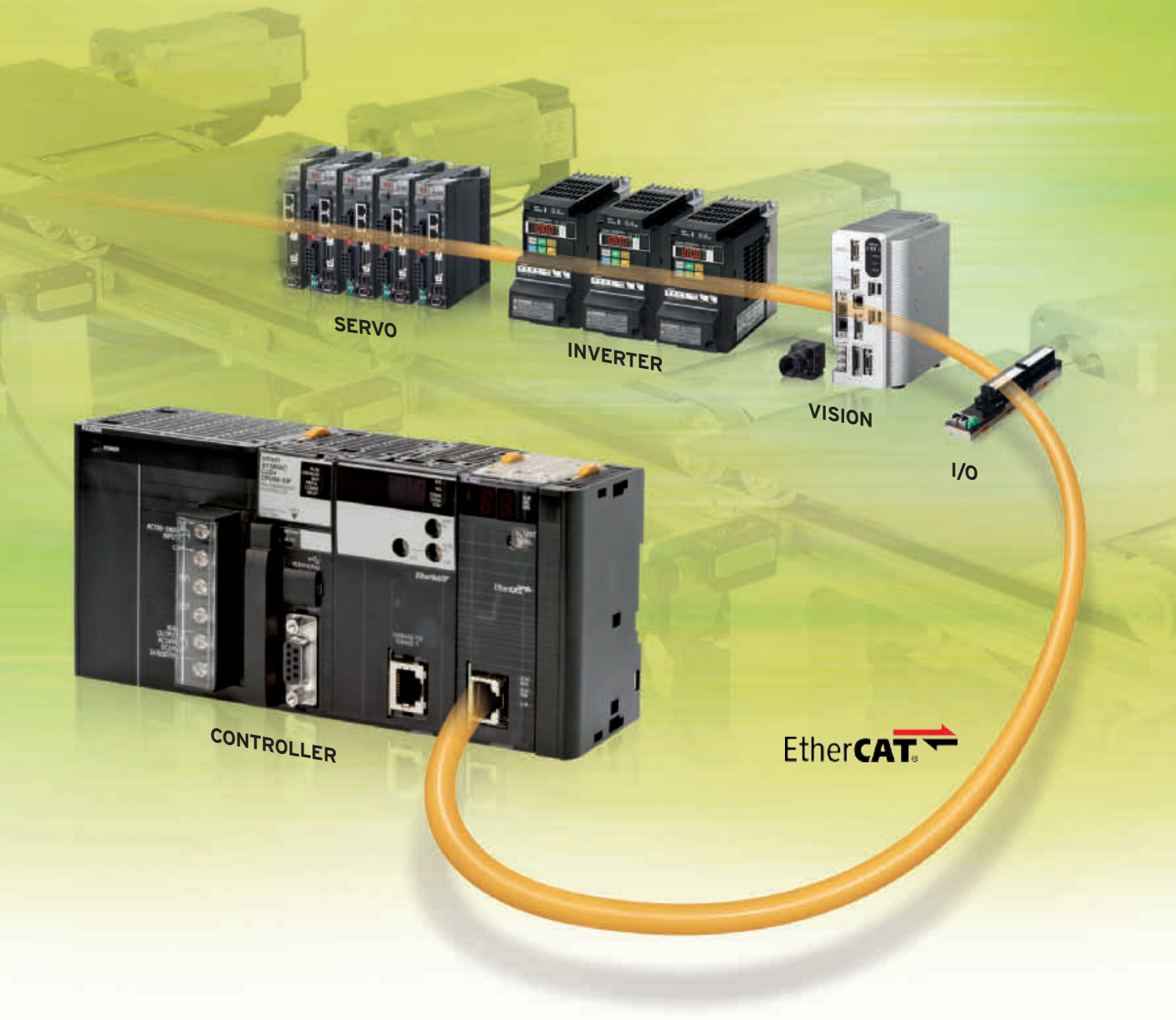
OMRON

# One Machine Network

## Machine Automation Solutions




realizing

# One Network...

## Proven solutions now available with EtherCAT

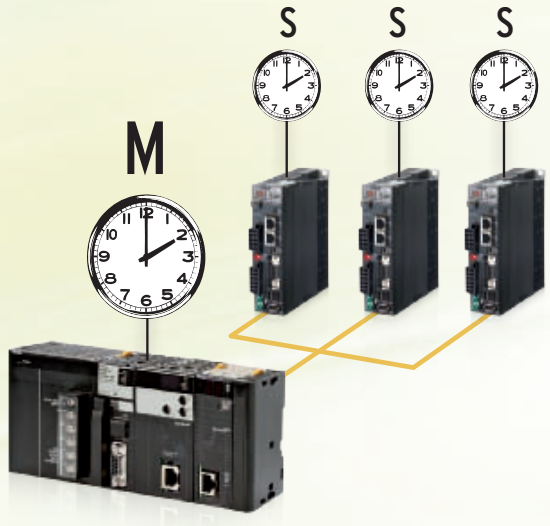
Building on the accepted quality, performance and features of our automation solutions, you can now add the benefits of linking them under one single machine network. Far from compromising the machine throughput, EtherCAT as a Machine network increases the speed and the synchronisation accuracy.

### Flexible control modes

- Cyclic synchronous Position (CSP), Velocity (CSV) and Torque (CST) modes in the servo ensure the EtherCAT master has complete control of the multiaxes system
- Homing modes and Profile Position mode inside the servo slave, enable the possibility to use it with EtherCAT masters without motion functionality

### Distributed clock synchronisation

- With the distributed clock system, all servos in an EtherCAT application can be synchronised within a microsecond tolerance

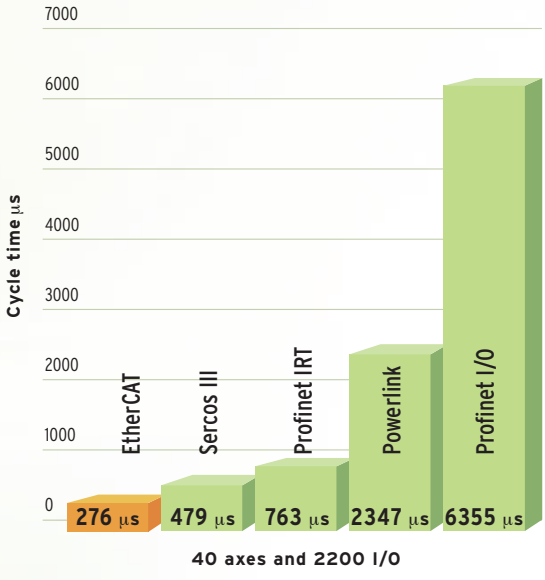



### Ethernet based

- No need for dedicated cables. EtherCAT uses Standard Ethernet cable (CAT-5 or above)
- Up to 100 metres distance between nodes
- No need for network switches

### Ethernet optimised for machine control

- EtherCAT is an Ethernet based network optimised for machine control with unrivalled performance
- The diagram below shows the cycle time of several Ethernet based networks under the same test conditions




Note: Refer to www.ethercat.org for complete test details

# EtherCAT products

## Controller

**CJ2 PLC**

- Compatible with CJ1 and CJ2 PLCs
- Control of 16 servo axes
- Support for 64 device nodes
- Circular and linear interpolation
- Linear and infinite axes management
- Position registration capture
- Certified PLC open function blocks

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**Trajexia**

- Control of 64 servo axes
- Scalable Motion controller system
- Electronic cams and gears
- Linear, circular, helical and spherical interpolation
- Open communication to PLCs, EtherNet/IP, PROFIBUS, DeviceNet

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## Servos

**Accurax G5**

- High-response frequency of 2 kHz
- Safety conforming to ISO13849-1
- High accuracy provided by 20 bit encoder
- Advanced tuning algorithms

- Rotary Motors from 50 W up to 15 kW

- Linear motor solutions

**Page 10**

## Inverters

**MX2**

- 200% starting torque
- Torque control in open loop
- Support for permanent magnet motors
- Positioning functionality
- Up to 15 kW

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## Vision

**Xpectia FZM1**

- Stable measurements under changing conditions
- Wide variety of positioning measurement methods
- Simple auto calibration
- Flexible camera installation

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## I/O

**GX Series**

- Simple setup
- Easy wiring
- High-speed input

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**SmartSlice for Trajexia**

- Up to 64 I/O units per station
- Screwless wiring
- Hot-swap with auto-restore

**Page 17**

# ...for Machine Automation Solutions

With over 50,000 buying machine builders world-wide - 10,000 in Europe - and 50 years experience in machine automation, we particularly pride ourselves in helping these companies turn their dreams into reality... world class machines. Because when we say it works, IT WORKS!

This statement embodies our core values of supporting you with competent and experienced people, quality products that work in conditions far beyond their published specifications and always maintaining our commitment to you the customer.

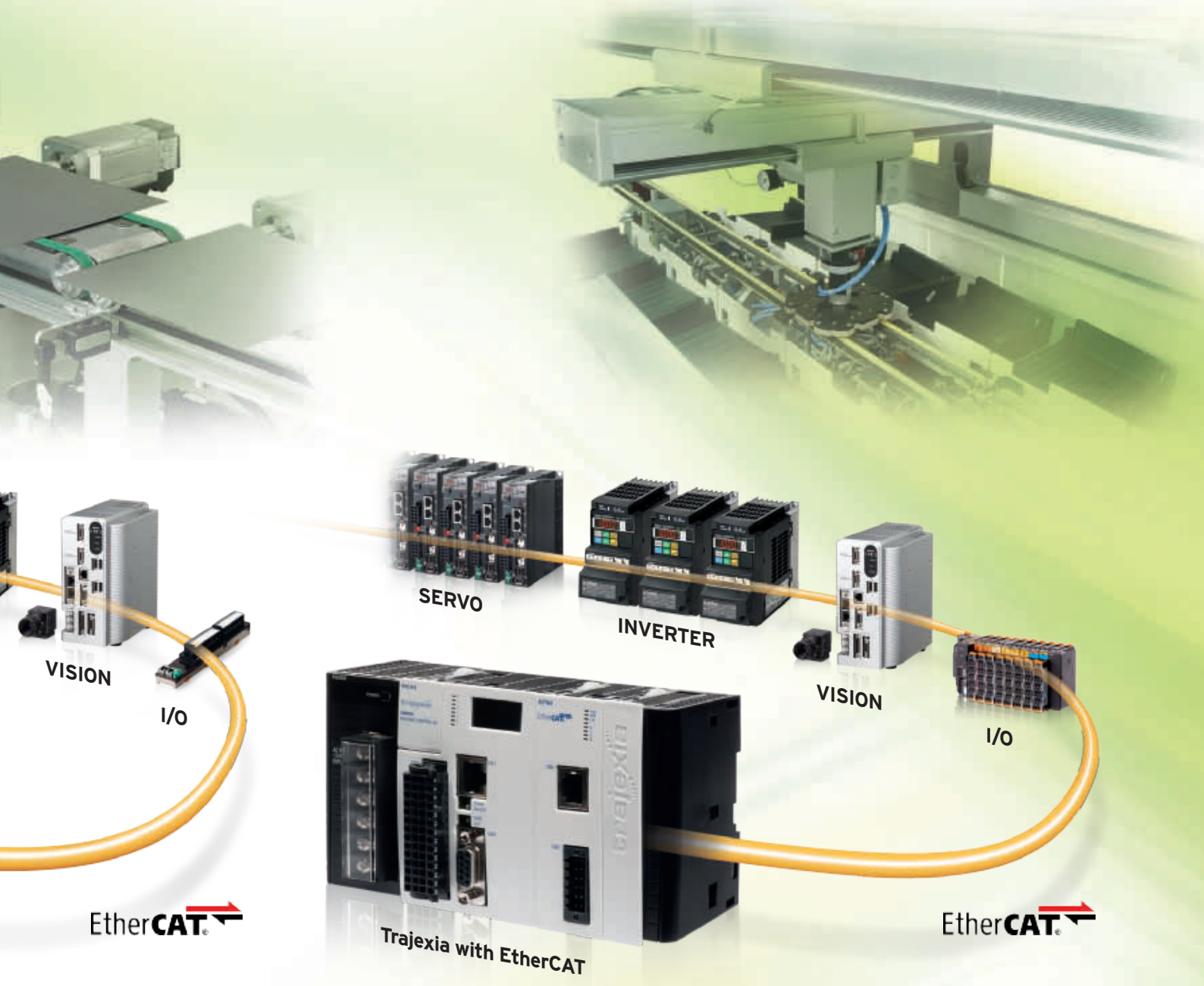
We are successful because we provide solutions based on our customers needs, whether that solution is used in a fixed form or a highly flexible machine.

We believe this is a solid basis to start turning YOUR IDEAS into MACHINES THAT WORK.


## Complete and compact machine controller

Logic and motion control integrated in the CJ PLC platform. Control of 16 axes; positioning with linear and circular interpolation

- Scalable and modular solution
- Simplified programming
- Precise motion functionality made simple
- One Machine network




## Total freedom in motion control

Flexible and dedicated motion controller. Control of up to 64 axes with advanced motion functions including registration, cams and gearing

- Stand-alone and scalable motion controller
- Powerful motion control
- Intuitive and powerful engineering
- One Machine network

# CJ2 PLC with EtherCAT

## Complete and compact machine controller

In the minimum of space you can have a complete and powerful position control system when combining the Omron CJ2 PLC, the CJ1W-NC(EtherCAT) unit and the G5 servo drives with EtherCAT built-in. This configuration offers up to 16-axis positioning with linear and circular interpolation, as well as support for 64 I/O, inverter and vision device nodes over the network.

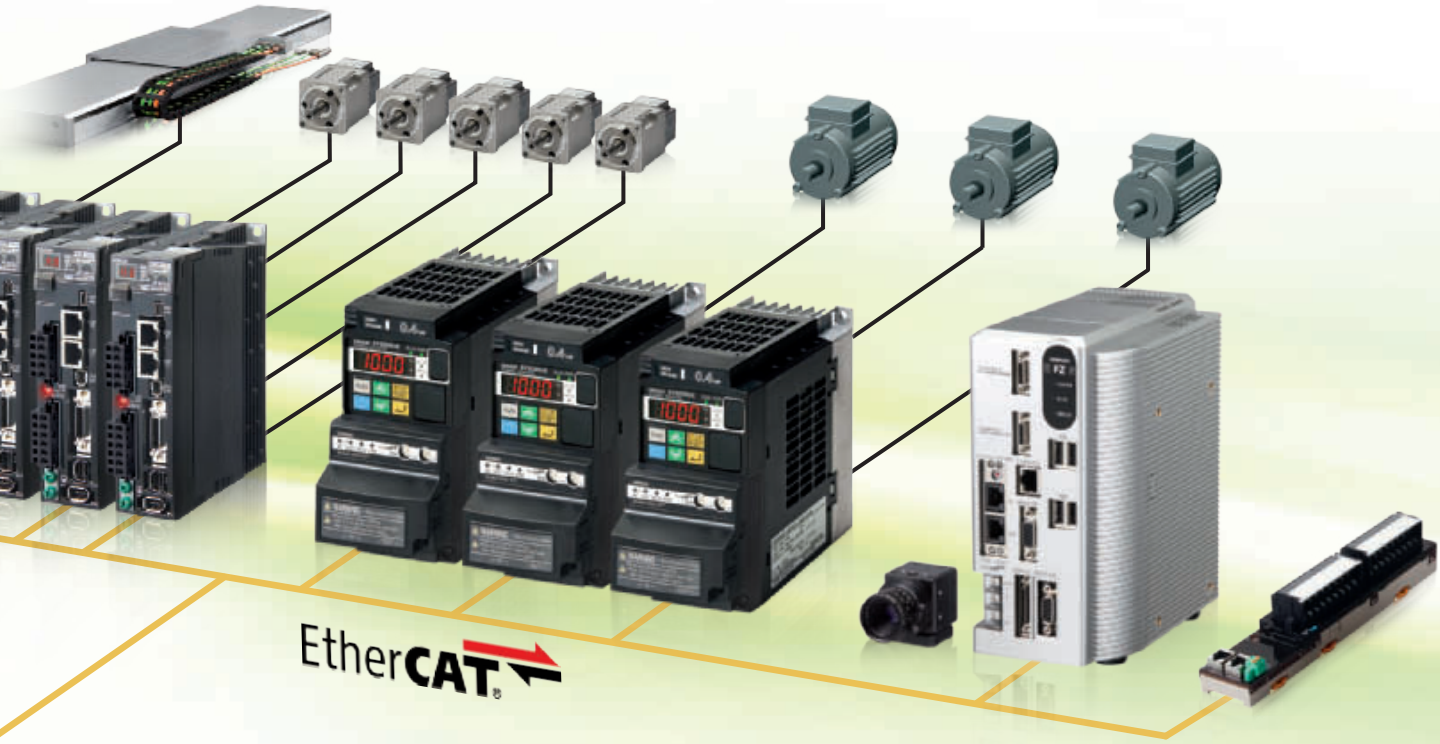
**Scalable and modular solution**
- CJ1 and CJ2 family CPUs available
- EtherCAT masters for 2, 4, 8 and 16 axes
- Wide range of CJ PLC modules

**One Machine network**
- Servo
- Inverter
- Vision system
- Distributed I/O


CJ2 PLC with EtherCAT

**Simplified programming**
- Complete machine control from CJ PLC program
- PLCopen motion function blocks

**Precise motion functionality made simple**
- Position control of up to 16 axes
- Circular and linear interpolation
- Position registration capture




## CJ EtherCAT unit features

- Position controller supporting up to 16 servo axes
- Support for 64 I/O, inverter and vision device nodes
- Compact unit compatible with CJ1 and CJ2 PLCs
- Circular and linear interpolation
- Linear and infinite axes management
- Position registration capture
- Zone outputs (CAM outputs)
- Certified PLCopen motion control function blocks: Part 1 and 2
- Support for servo, inverter, vision system and I/O in a single EtherCAT network

## Reference list

| PLC CPU item description | Item Model |
|---|---|
| CJ2M CPUs | CJ2M-CPU_ |
| CJ2H CPUs (Support for CST and CSV from v1.4) | CJ2H-CPU_ |
| Power supply for CJ PLC system, 100-240 VAC | CJ1W-PA20_ |
| Power supply for CJ PLC system, 24 VDC | CJ1W-PD02_ |
| **CJ EtherCAT Master unit description** | **Item Model** |
| Position controller unit - EtherCAT Master - 4 axes + 64 nodes (Support for CST and CSV from v1.3) | CJ1W-NC482 |
| Position controller unit - EtherCAT Master - 8 axes + 64 nodes (Support for CST and CSV from v1.3) | CJ1W-NC882 |
| Position controller unit - EtherCAT Master - 16 axes + 64 nodes (Support for CST and CSV from v1.3) | CJ1W-NCF82 |
| Position controller unit - EtherCAT Master - 2 axes | CJ1W-NC281 |
| Position controller unit - EtherCAT Master - 4 axes | CJ1W-NC481 |
| Position controller unit - EtherCAT Master - 8 axes | CJ1W-NC881 |
| Position controller unit - EtherCAT Master - 16 axes | CJ1W-NCF81 |
| **PLC I/O units description** | **Item Model** |
| Refer to Industrial Automation Guide on Omron website for details of available CJ1 I/O units | CJ1W-_ |

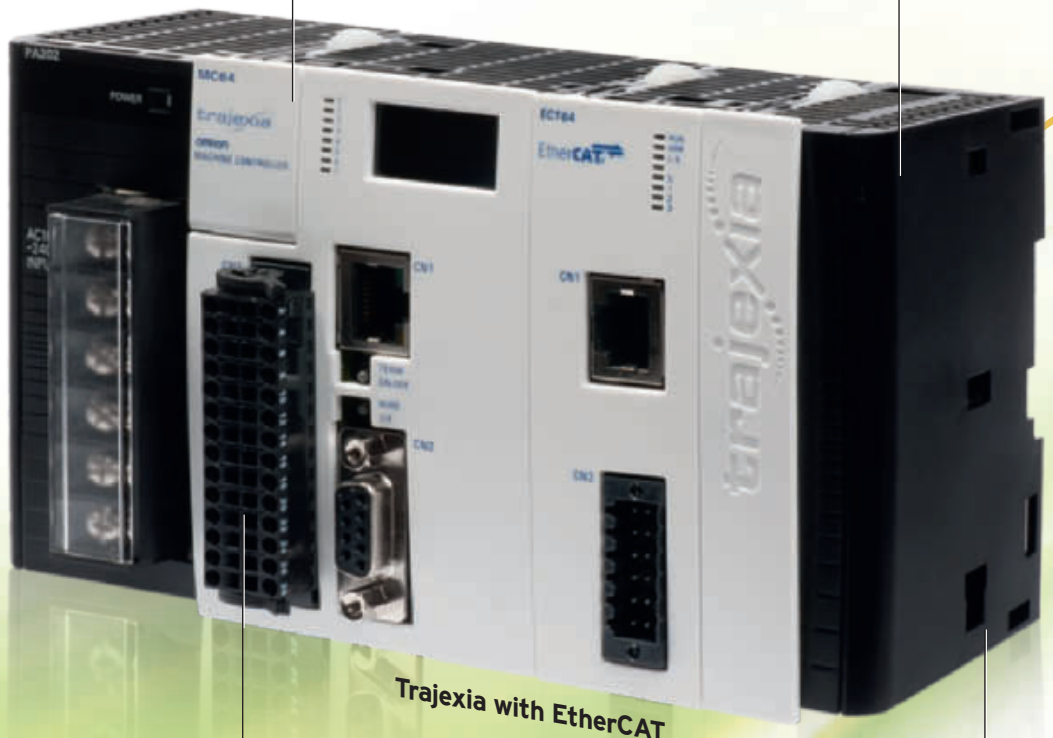
# Trajexia with EtherCAT

## Total freedom in motion control

The stand-alone Trajexia controller TJ2-MC64 together with an EtherCAT master TJ2-ECT provides a significant improvement in machine performance and accuracy allowing you to run your machines faster. Controlling all 64 axes with a minimum system cycle time and with the use of 64 bit integers, Trajexia TJ2 ensures the fastest operation at the highest accuracy. It is ideal for highly-demanding packaging, printing and textile machines. As you would expect, a wide choice of best-in-class actuators are available to meet your needs in terms of size, performance and reliability.

**Powerful motion control**
- Single axis moves and axes interpolation
- Electronic cams and gearboxes
- Control of SCARA and Delta robots

**One Machine network**
- Servo
- Inverter
- Vision system
- Distributed I/O

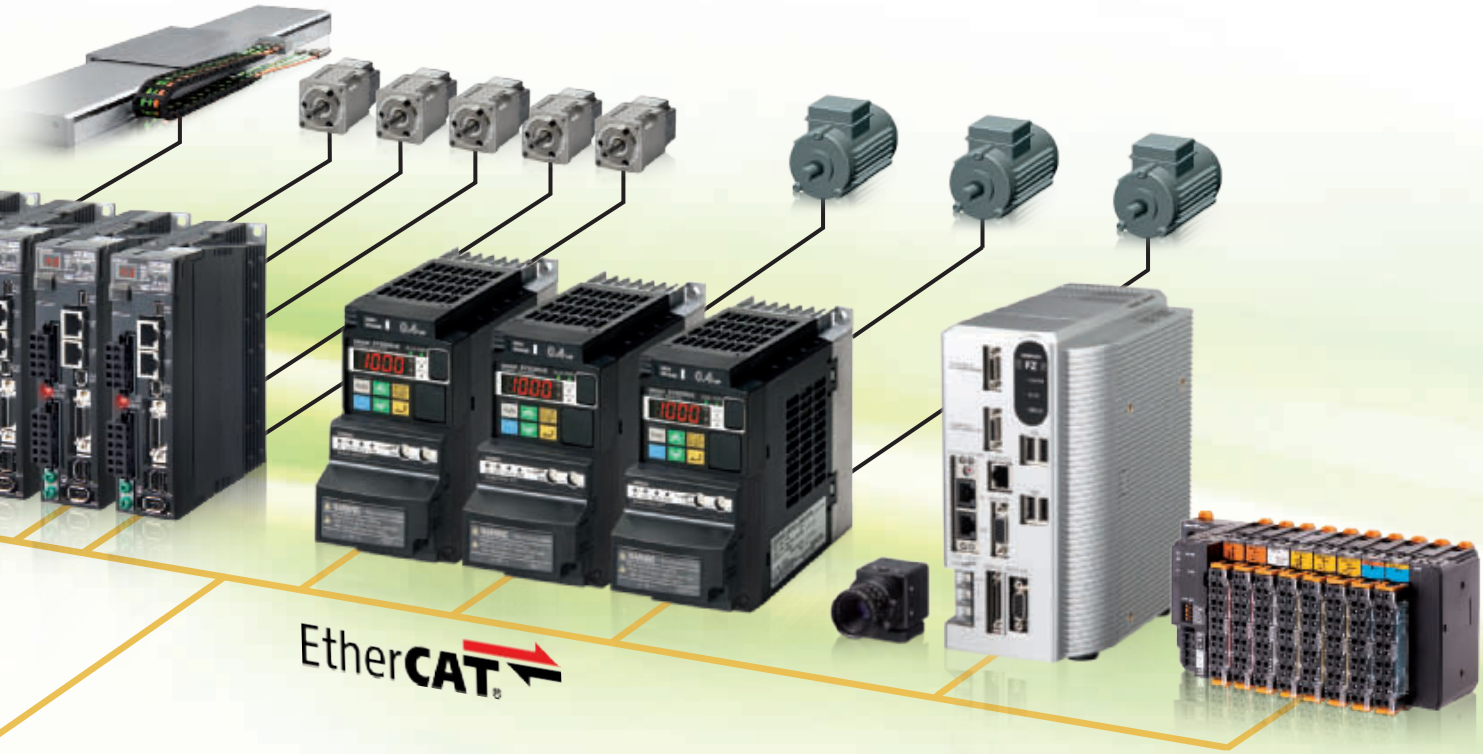



Trajexia with EtherCAT

**Intuitive and powerful programming**
- Motion BASIC programming
- Dedicated motion commands

**Stand-alone and Scalable motion controller**
- Freedom to choose the machine PLC
- Scalability with EtherCAT masters for 4, 16 and 64 axes

trajexia you decide




## Trajexia with EtherCAT features

- Perfect control of 64 axes
- Scalability provided by the 3 versions of EtherCAT masters; 4, 16 and 64 axes
- Each axis can be programmed using linear, circular, helical or spherical interpolation, electronic cams and gearboxes.
- Control of SCARA and Delta robots
- Multi-tasking controller capable of running up to 22 tasks simultaneously
- Open communication – Serial and EtherNet/IP built-in, PROFIBUS-DP, DeviceNet and CANopen options
- Reuse of engineering code, compatible programming with existing Stand-alone and PLC based Trajexia CPUs
- Support for servo, inverter, vision system and I/O in a single EtherCAT network

## Reference list

| **Trajexia controller items description** | **Item Model** |
|---|---|
| Trajexia motion controller Unit, up to 64 axes | TJ2-MC64 |
| Power supply for Trajexia system, 100-240 VAC | CJ1W-PA202 |
| Power supply for Trajexia system, 24 VDC | CJ1W-PD022 |
| **EtherCAT master description** | **Item Model** |
| Trajexia EtherCAT master unit (up to 4 servo drives) | TJ2-ECT04 |
| Trajexia EtherCAT master unit (up to 16 servo drives) | TJ2-ECT16 |
| Trajexia EtherCAT master unit (up to 64 servo drives) | TJ2-ECT64 |
| **Optional units description** | **Item Model** |
| Trajexia flexible axis unit (for 2 stations) | TJ1-FL02 |
| Trajexia DeviceNet slave unit | TJ1-DRT |
| Trajexia PROFIBUS-DP slave unit | TJ1-PRT |
| Trajexia CANopen unit | TJ1-CORT |

# Accurax G5 servo system

## At the heart of every great machine

Great machines are born from a perfect match between electronics and mechanics. Accurax G5 gives you that extra edge to build more accurate, faster, smaller and safer machines. You will benefit from an almost 25% reduction in motor weight, and gain 50% cabinet space.

**Up to 50% cabinet size reduction**

- 40% smaller drive
- Extra 10% saving thanks to side by side mounting


EtherCAT®

**EtherCAT connectivity**

- Compliant with CoE -CiA402 Drive Profile-
- Cyclic synchronous Position, Velocity and Torque modes
- Embedded Gear Ratio, Homing and Profile Position mode
- Distributed clock to ensure high precision synchronisation

**Improved rotary motors**

- Low cogging torque servo motors
- High accuracy provided by 20 bit encoder
- IP67 for all motors and connectors
- Large range of motors from 0.16 Nm up to 96 Nm nominal torque (224 Nm peak)

**Improved linear motor solutions**

- Ironless motor type with excellent force-to-weight ratio and no magnetic attraction force
- Iron-core motor type with optimum ratio between force and volume
- Compact and efficient design
- Linear parts and assembled linear systems available
- For customised linear systems contact your Omron sales representative

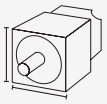
### G5 Features

- Compact size servo drives with EtherCAT connectivity built-in
- High-response frequency of 2 kHz
- Load vibration suppression
- Embedded safety conforming to ISO13849-1 Performance Level D
- Advanced tuning algorithms (Anti-vibration function, torque feedforward, disturbance observer)
- Wide range of linear and rotary servo motors

## Rotary motors reference list

| Rotary servo motor specifications | | | | | | Servo drive specifications | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Speed (rpm)** | **Voltage** | **Flange (mm)** | **Rated Torque** | **Capacity** | **Motor Model** | **Drive Model** | **W** | **D** | **H** |
| 3000 | 230 V | 40x40 | 0.16 Nm | 50 W | R88M-K05030(**H/T**)-(**B**)S2 | R88D-KN01H-ECT | 40 | 132 | 150 |
| | | | 0.32 Nm | 100 W | R88M-K10030(**H/T**)-(**B**)S2 | R88D-KN01H-ECT | | | |
| | | 60x60 | 0.64 Nm | 200 W | R88M-K20030(**H/T**)-(**B**)S2 | R88D-KN02H-ECT | | | |
| | | | 1.3 Nm | 400 W | R88M-K40030(**H/T**)-(**B**)S2 | R88D-KN04H-ECT | 55 | | |
| | | 80x80 | 2.4 Nm | 750 W | R88M-K75030(**H/T**)-(**B**)S2 | R88D-KN08H-ECT | 65 | 172 | |
| | | 100x100 | 3.18 Nm | 1 kW | R88M-K1K030(**H/T**)-(**B**)S2 | R88D-KN15H-ECT | 86 | | |
| | | | 4.77 Nm | 1.5 kW | R88M-K1K530(**H/T**)-(**B**)S2 | R88D-KN15H-ECT | | | |
| | 400 V | 100x100 | 2.39 Nm | 750 W | R88M-K75030(**F/C**)-(**B**)S2 | R88D-KN10F-ECT | 92 | 172 | 150 |
| | | | 3.18 Nm | 1 kW | R88M-K1K030(**F/C**)-(**B**)S2 | R88D-KN15F-ECT | | | |
| | | | 4.77 Nm | 1.5 kW | R88M-K1K530(**F/C**)-(**B**)S2 | R88D-KN15F-ECT | | | |
| | | | 6.37 Nm | 2 kW | R88M-K2K030(**F/C**)-(**B**)S2 | R88D-KN20F-ECT | 94 | 195 | 198 |
| | | 120x120 | 9.55 Nm | 3 kW | R88M-K3K030(**F/C**)-(**B**)S2 | R88D-KN30F-ECT | 130 | 213 | 250 |
| | | 130x130 | 12.7 Nm | 4 kW | R88M-K4K030(**F/C**)-(**B**)S2 | R88D-KN50F-ECT | | | |
| | | | 15.9 Nm | 5 kW | R88M-K5K030(**F/C**)-(**B**)S2 | R88D-KN50F-ECT | | | |
| 2000 | 230 V | 130x130 | 4.77 Nm | 1 kW | R88M-K1K020(**H/T**)-(**B**)S2 | R88D-KN10H-ECT | 86 | 172 | 150 |
| | | | 7.16 Nm | 1.5 kW | R88M-K1K520(**H/T**)-(**B**)S2 | R88D-KN15H-ECT | | | |
| | 400 V | 100x100 | 1.91 Nm | 400 W | R88M-K40020(**F/C**)-(**B**)S2 | R88D-KN06F-ECT | 92 | 172 | 150 |
| | | | 2.86 Nm | 600 W | R88M-K60020(**F/C**)-(**B**)S2 | R88D-KN06F-ECT | | | |
| | | 130x130 | 4.77 Nm | 1 kW | R88M-K1K020(**F/C**)-(**B**)S2 | R88D-KN10F-ECT | | | |
| | | | 7.16 Nm | 1.5 kW | R88M-K1K520(**F/C**)-(**B**)S2 | R88D-KN15F-ECT | | | |
| | | | 9.55 Nm | 2 kW | R88M-K2K020(**F/C**)-(**B**)S2 | R88D-KN20F-ECT | 94 | 195 | 198 |
| | | | 14.3 Nm | 3 kW | R88M-K3K020(**F/C**)-(**B**)S2 | R88D-KN30F-ECT | 130 | 213 | 250 |
| | | 176x176 | 19.1 Nm | 4 kW | R88M-K4K020(**F/C**)-(**B**)S2 | R88D-KN50F-ECT | | | |
| | | | 23.9 Nm | 5 kW | R88M-K5K020(**F/C**)-(**B**)S2 | R88D-KN50F-ECT | | | |
| 1500 | 400 V | 176x176 | 47.8 Nm | 7.5 kW | R88M-K7K515C-(**B**)S2 | R88D-KN75F-ECT | 233 | 334 | 250 |
| | | 220x220 | 70.0 Nm | 11 kW | R88M-K11K015C-(**B**)S2 | R88D-KN150F-ECT | 261 | 271 | 450 |
| | | | 95.5 Nm | 15 kW | R88M-K15K015C-(**B**)S2 | R88D-KN150F-ECT | | | |
| 1000 | 230 V | 130x130 | 8.59 Nm | 900 W | R88M-K90010(**H/T**)-(**B**)S2 | R88D-KN15H-ECT | 86 | 172 | 150 |
| | 400 V | 130x130 | 8.59 Nm | 900 W | R88M-K90010(**F/C**)-(**B**)S2 | R88D-KN15F-ECT | 92 | 172 | 150 |
| | | 176x176 | 19.1 Nm | 2 kW | R88M-K2K010(**F/C**)-(**B**)S2 | R88D-KN30F-ECT | 130 | 213 | 250 |
| | | | 28.7 Nm | 3 kW | R88M-K3K010(**F/C**)-(**B**)S2 | R88D-KN50F-ECT | | | |
| | | | 43.0 Nm | 4.5 kW | R88M-K4K510C-(**B**)S2 | R88D-KN50F-ECT | | | |
| | | | 57.3 Nm | 6 kW | R88M-K6K010C-(**B**)S2 | R88D-KN75F-ECT | 233 | 334 | 250 |

**Flange dimensions**

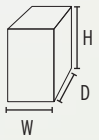


**Motor model type designation detail**

**H=** 230 V and Incremental Encoder
**T=** 230 V and Absolute Encoder
**F=** 400 V and Incremental Encoder
**C=** 400 V and Absolute Encoder

**B=** Motor with Brake (Blank=No brake)

**Drive dimensions**




## Linear motors reference list

| Type | Rated Force | Peak Force | Max. Speed (m/s) 230 V | Max. Speed (m/s) 400 V | Linear Coil Model (Without connectors) | Drive Model 230 V | Drive Model 400 V |
|---|---|---|---|---|---|---|---|
| **Iron-core**  | 48 N | 105 N | 5 | 10 | R88L-EC-FW-0303-ANPC | R88D-KN02H-ECT-L | R88D-KN06F-ECT-L |
| | 96 N | 210 N | | | R88L-EC-FW-0306-ANPC | R88D-KN04H-ECT-L | R88D-KN10F-ECT-L |
| | 160 N | 400 N | 4 | 8 | R88L-EC-FW-0606-ANPC | R88D-KN08H-ECT-L | R88D-KN15F-ECT-L |
| | 240 N | 600 N | | | R88L-EC-FW-0609-ANPC | R88D-KN10H-ECT-L | R88D-KN20F-ECT-L |
| | 320 N | 800 N | | | R88L-EC-FW-0612-ANPC | R88D-KN15H-ECT-L | R88D-KN30F-ECT-L |
| | 608 N | 1600 N | 2 | 4 | R88L-EC-FW-1112-ANPC | R88D-KN15H-ECT-L | R88D-KN30F-ECT-L |
| | 760 N | 2000 N | | | R88L-EC-FW-1115-ANPC | R88D-KN15H-ECT-L | R88D-KN30F-ECT-L |
| **Ironless**  | 26.5 N | 100 N | 16 | N/A | R88L-EC-GW-0303-ANPS | R88D-KN02H-ECT-L | N/A |
| | 53 N | 200 N | | | R88L-EC-GW-0306-ANPS | R88D-KN08H-ECT-L | |
| | 80 N | 300 N | | | R88L-EC-GW-0309-ANPS | R88D-KN10H-ECT-L | |
| | 58 N | 240 N | 4.4 | N/A | R88L-EC-GW-0503-ANPS | R88D-KN02H-ECT-L | |
| | 117 N | 480 N | | | R88L-EC-GW-0506-ANPS | R88D-KN04H-ECT-L | |
| | 175 N | 720 N | | | R88L-EC-GW-0509-ANPS | R88D-KN08H-ECT-L | |
| | 117 N | 700 N | 2.4 | N/A | R88L-EC-GW-0703-ANPS | R88D-KN04H-ECT-L | |
| | 232 N | 1400 N | | | R88L-EC-GW-0706-ANPS | R88D-KN08H-ECT-L | |
| | 348 N | 2100 N | | | R88L-EC-GW-0709-ANPS | R88D-KN10H-ECT-L | |

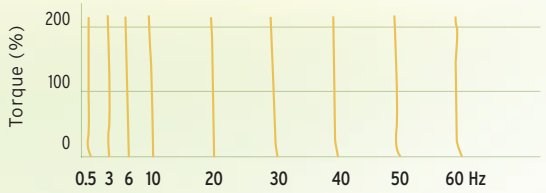
# MX2 Inverter

## Born to drive machines

Thanks to the advanced design and algorithms, the MX2 provides smooth control down to zero speed, plus precise operation for cyclic operations and torque control capability in open loop. The MX2 is fully integrated within the Omron automation solutions.

**Frequency response vs Torque variation**

(Example with 7.5 kW 4-pole motor)




**200% starting torque**
- Near stand-still operation (0.5 Hz)
- Smooth control of high inertia loads
- Control of fast cyclic loads

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


EtherCAT

**EtherCAT connectivity**
- Compliant with CoE -CiA402 Drive profile-
- Velocity Mode

**Quick response to load fluctuation**
- MX2 provides accurate speed control with less than 2% error at 1Hz
- Stable control without lowering machine speed

**Special motors**
- Permanent magnet motors
- High speed motors up to 1000 Hz

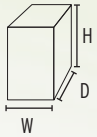
## MX2 features

- Torque control in open loop, ideal for low to medium torque applications
- 200% starting torque near stand-still operation (0.5 Hz)
- Specialized motor control for PM motor and high speed motors up to 1000 Hz
- One parameter auto-tuning just by entering the kW rating of the motor
- Simple positioning functionality built-in

## Reference list

| Inverter specifications | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Voltage | Variable Torque | | Constant Torque | | Drive Model | EtherCAT Option Unit Model | W | D | H |
| | Motor (kW) | Output current | Motor (kW) | Output current | | | | | |
| Single-phase 200 V | 0.2 | 1.2 A | 0.1 | 1.0 A | 3G3MX2-AB001-E | 3G3AX-MX2-ECT | 68 | 141 | 128 |
| | 0.4 | 1.9 A | 0.2 | 1.6 A | 3G3MX2-AB002-E | | | | |
| | 0.55 | 3.5 A | 0.4 | 3.0 A | 3G3MX2-AB004-E | | | 155 | |
| | 1.1 | 6.0 A | 0.75 | 5.0 A | 3G3MX2-AB007-E | | 108 | 202,5 | |
| | 2.2 | 9.6 A | 1.5 | 8.0 A | 3G3MX2-AB015-E | | | | |
| | 3.0 | 12.0 A | 2.2 | 11.0 A | 3G3MX2-AB022-E | | | | |
| Three-phase 200 V | 0.2 | 1.2 A | 0.1 | 1.0 A | 3G3MX2-A2001-E | 3G3AX-MX2-ECT | 68 | 141 | 128 |
| | 0.4 | 1.9 A | 0.2 | 1.6 A | 3G3MX2-A2002-E | | | | |
| | 0.55 | 3.5 A | 0.4 | 3.0 A | 3G3MX2-A2004-E | | | 145 | |
| | 1.1 | 6.0 A | 0.75 | 5.0 A | 3G3MX2-A2007-E | | | 178 | |
| | 2.2 | 9.6 A | 1.5 | 8.0 A | 3G3MX2-A2015-E | | 108 | 203 | |
| | 3.0 | 12.0 A | 2.2 | 11.0 A | 3G3MX2-A2022-E | | | | |
| | 5.5 | 19.6 A | 3.7 | 17.5 A | 3G3MX2-A2037-E | | 140 | | |
| | 7.5 | 30.0 A | 5.5 | 25.0 A | 3G3MX2-A2055-E | | | 187 | 260 |
| | 11 | 40.0 A | 7.5 | 33.0 A | 3G3MX2-A2075-E | | | | |
| | 15 | 56.0 A | 11 | 47.0 A | 3G3MX2-A2110-E | | 180 | 207 | 296 |
| | 18.5 | 69.0 A | 15 | 60.0 A | 3G3MX2-A2150-E | | 220 | | 350 |
| Three-phase 400 V | 0.75 | 2.1 A | 0.4 | 1.8 A | 3G3MX2-A4004-E | 3G3AX-MX2-ECT | 108 | 176 | 128 |
| | 1.5 | 4.1 A | 0.75 | 3.4 A | 3G3MX2-A4007-E | | | 203 | |
| | 2.2 | 5.4 A | 1.5 | 4.8 A | 3G3MX2-A4015-E | | | | |
| | 3.0 | 6.9 A | 2.2 | 5.5 A | 3G3MX2-A4022-E | | | | |
| | 4.0 | 8.8 A | 3.0 | 7.2 A | 3G3MX2-A4030-E | | | | |
| | 5.5 | 11.1 A | 4.0 | 9.2 A | 3G3MX2-A4040-E | | 140 | | |
| | 7.5 | 17.5 A | 5.5 | 14.8 A | 3G3MX2-A4055-E | | | 187 | 260 |
| | 11 | 23.0 A | 7.5 | 18.0 A | 3G3MX2-A4075-E | | | | |
| | 15 | 31.0 A | 11 | 24.0 A | 3G3MX2-A4110-E | | 180 | 207 | 296 |
| | 18.5 | 38.0 A | 15 | 31.0 A | 3G3MX2-A4150-E | | | | |

**Drive dimensions**



# Xpectia FZM1 vision system

## Machine Vision tailored for pick & place

The FZM1 Vision System is optimized to detect the position and orientation of any object at high speed and with high accuracy. The FZM1 provides a new generation of image processing technologies and an intuitive user interface optimized for positioning applications. The built-in EtherCAT communications enables reliable and easy networking with motion control increasing the overall machine performance.

EtherCAT®


**Stable measurements under changing conditions**

- Differences of the work piece
- Dust and dirt
- Changing ambient environment

**Alignment and quality inspection in one system**

- Inspection of scratches and defects
- Detection of dirty or overlapping objects
- Edge and corner breakage inspection

**Flexible camera installation**

- Use different fields of vision
- Install at any angle


**Shape based object positioning:**

- Separation of attached objects
- Detection of partially hidden objects
- Compensation of rounded or broken edges

## FZM1 features

- Easy and guided setup using the Application Wizard
- Simple auto-calibration with the picker
- High speed cameras and positioning algorithm
- Simultaneous quality inspection
- EtherCAT connectivity built-in

## Reference list

| Controller description | Model |
|---|---|
| Xpectia FZM1 controller with EtherCAT, Two cameras, NPN Output | FZM1-350-ECT |
| Xpectia FZM1 controller with EtherCAT, Two cameras, PNP Output | FZM1-355-ECT |

| Camera description | Model |
|---|---|
| High-speed Monochrome camera, 300000 pixels | FZ-SH |
| High-speed Colour camera, 300000 pixels | FZ-SHC |
| Digital Monochrome camera, 300000 pixels | FZ-S |
| Digital Colour camera, 300000 pixels | FZ-SC |
| Digital Monochrome camera, 2 million pixels | FZ-S2M |
| Digital Colour camera, 2 million pixels | FZ-SC2M |

# GX Series Block I/O

## High-speed remote I/O terminals

An extensive line-up of digital I/O terminals, analogue I/O terminals and encoder input terminal are available for EtherCAT connectivity. The wiring type of the digital I/O terminal can be either screw terminal block or e-CON formats, it's your choice.

EtherCAT®

### GX I/O features

- Easy installation and wiring, all modules have EtherCAT connectivity built-in
- Simple setup, EtherCAT node addresses can be easily set with a simple rotary switch
- The allocation area of the remote I/O terminal is automatically decided by simply setting the node address
- High-speed input
- The digital I/O terminals are equipped with high-speed input functionality, ON/OFF delay of 200 μs max.
- Digital input filter prevents malfunction when status is unstable due to chattering or noise. Available input filter values are 0 ms, 0.5 ms, 1 ms (default), 2 ms, 4 ms, 8 ms, 16 ms and 32 ms

### Reference list

| Unit description | Specification, modules with EtherCAT | Model |
|---|---|---|
| 16 NPN inputs | 24 VDC, 6 mA, 1-wire connection, expandable | GX-ID1611 |
| 16 PNP inputs | 24 VDC, 6 mA, 1-wire connection, expandable | GX-ID1621 |
| 16 NPN outputs | 24 VDC, 500 mA, 1-wire connection, expandable | GX-OD1611 |
| 16 PNP outputs | 24 VDC, 500 mA, 1-wire connection, expandable | GX-OD1621 |
| 8 inputs and 8 outputs, NPN | 24 VDC, 6 mA input, 500 mA output, 1-wire connection | GX-MD1611 |
| 8 inputs and 8 outputs, PNP | 24 VDC, 6 mA input, 500 mA output, 1-wire connection | GX-MD1621 |
| 16 NPN inputs | 24 VDC, 6 mA, 3-wire connection | GX-ID1612 |
| 16 PNP inputs | 24 VDC, 6 mA, 3-wire connection | GX-ID1622 |
| 16 NPN outputs | 24 VDC, 500 mA, 3-wire connection | GX-OD1612 |
| 16 PNP outputs | 24 VDC, 500 mA, 3-wire connection | GX-OD1622 |
| 8 inputs and 8 outputs, NPN | 24 VDC, 6 mA input, 500 mA output, 3-wire connection | GX-MD1612 |
| 8 inputs and 8 outputs, PNP | 24 VDC, 6 mA input, 500 mA output, 3-wire connection | GX-MD1622 |
| 16 relay outputs | 250 VAC, 2 A, 1-wire connection, expandable | GX-OC1601 |
| 4 analogue inputs, current/voltage | ±10 V, 0-10 V, 0-5 V, 1-5 V, 4-20 mA | GX-AD0471 |
| 2 analogue outputs, current/voltage | ±10 V, 0-10 V, 0-5 V, 1-5 V, 4-20 mA | GX-DA0271 |
| 2 encoder open collector inputs | 500 kHz Open collector input | GX-EC0211 |
| 2 encoder line-driver inputs | 4 MHz Line driver input | GX-EC0241 |

# SmartSlice

## Plug-and-Play I/O for Trajexia

SmartSlice I/O units extend Trajexia's I/O capability with digital and analogue I/O units, ranging from basic relay outputs to configurable temperature inputs. All SmartSlice units feature screwless 'push-in' I/O wiring, detachable I/O connector, and hot-swap capability. The SmartSlice EtherCAT "coupler" automatically scans the connected I/O units at startup. The Trajexia controller with EtherCAT master will automatically map the detected I/O data to its designated I/O allocations.

EtherCAT®

### SmartSlice I/O features

- Up to 64 I/O units per station
- Automatic I/O assignment
- Easy configuration backup
- Hot-swap with auto-restore
- Optional address setting

### Reference list

| Unit description | Specification | Model |
|---|---|---|
| SmartSlice EtherCAT coupler | SmartSlice EtherCAT coupler | GRT1-ECT |
| End plate | one unit required per bus interface | GRT1-END |
| 4 NPN inputs | 24 VDC, 6 mA, 3-wire connection | GRT1-ID4 |
| 4 PNP inputs | 24 VDC, 6 mA, 3-wire connection | GRT1-ID4-1 |
| 8 NPN inputs | 24 VDC, 4 mA, 1-wire connection + 4xG | GRT1-ID8 |
| 8 PNP inputs | 24 VDC, 4 mA, 1-wire connection + 4xV | GRT1-ID8-1 |
| 4 AC inputs | 110 VAC, 2-wire connection | GRT1-IA4-1 |
| 4 AC inputs | 230 VAC, 2-wire connection | GRT1-IA4-2 |
| 4 NPN outputs | 24 VDC, 500 mA, 2-wire connection | GRT1-OD4 |
| 4 PNP outputs | 24 VDC, 500 mA, 2-wire connection | GRT1-OD4-1 |
| 4 PNP outputs with short-circuit protection | 24 VDC, 500 mA, 3-wire connection | GRT1-OD4G-1 |
| 4 PNP outputs with short-circuit protection | 24 VDC, 2 A, 2-wire connection | GRT1-OD4G-3 |
| 8 NPN outputs | 24 VDC, 500 mA, 1-wire connection + 4xV | GRT1-OD8 |
| 8 PNP outputs | 24 VDC, 500 mA, 1-wire connection + 4xG | GRT1-OD8-1 |
| 8 PNP outputs with short-circuit protection | 24 VDC, 500 mA, 1-wire connection + 4xG | GRT1-OD8G-1 |
| 2 relay outputs | 240 VAC, 2 A, normally-open contacts | GRT1-ROS2 |
| 2 analogue inputs, current/voltage | ±10 V, 0-10 V, 0-5 V, 1-5 V, 0-20 mA, 4-20 mA | GRT1-AD2 |
| 2 analogue outputs, voltage | ±10 V, 0-10 V, 0-5 V, 1-5 V | GRT1-DA2V |
| 2 analogue outputs, current | 0-20 mA, 4-20 mA | GRT1-DA2C |
| 2 Pt100 inputs | Pt100, 2-wire or 3-wire connection | GRT1-TS2P |
| 2 Pt1000 inputs | Pt1000, 2-wire or 3-wire connection | GRT1-TS2K |
| 2 Thermocouple inputs | Types B, E, J , K, N, R, S, T, U, W, PL2, with cold junction compensation | GRT1-TS2T |

Note: SmartSlice EtherCAT coupler is only supported by Trajexia

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