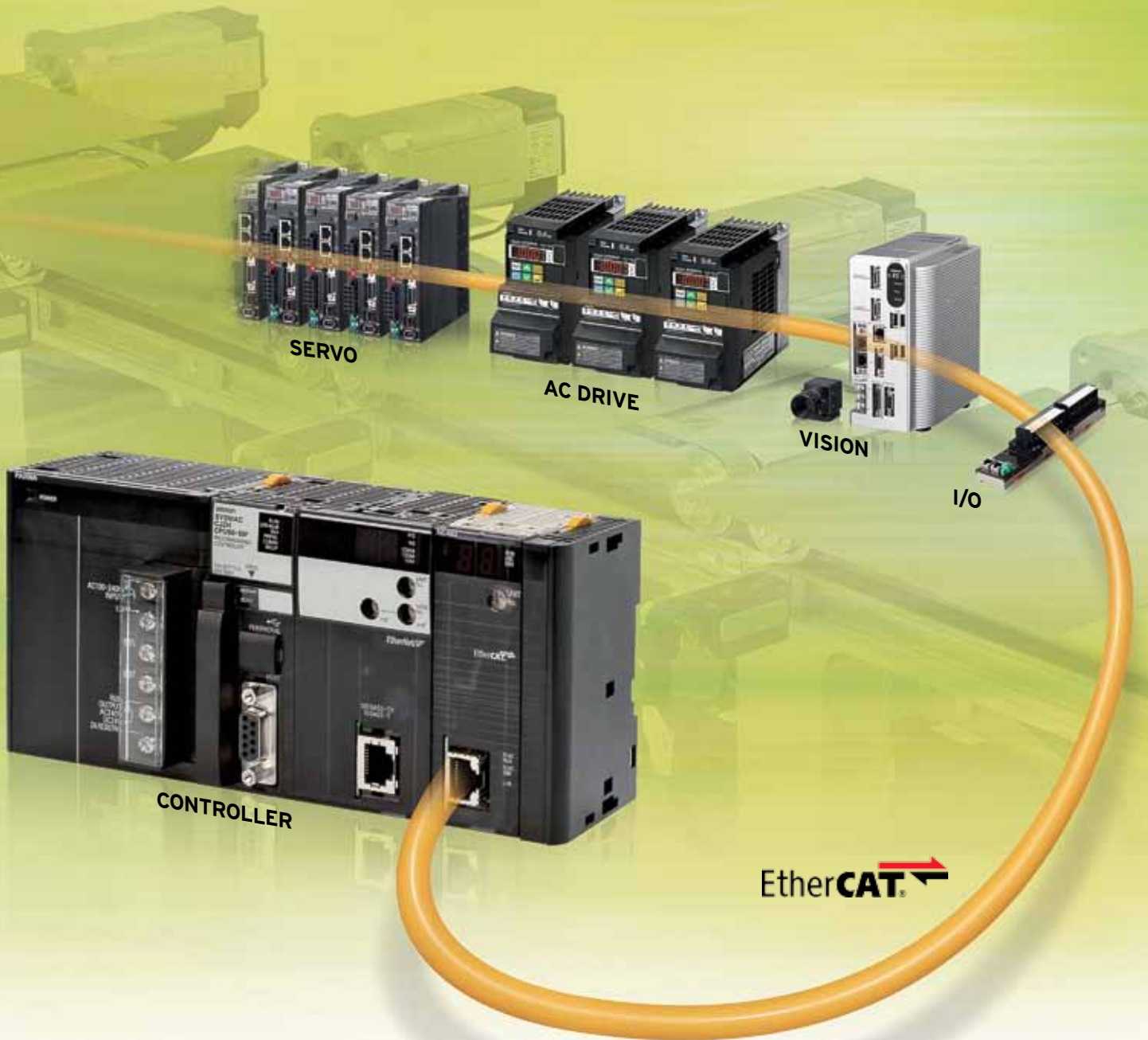


One Fieldbus Network EtherCAT[®]



EtherCAT[®]

One Network at the Core of Machine Automation

Ethernet for Control Automation Technology: EtherCAT®

Tired of the network trade-offs you had to make in the past:
Distance for speed, number of devices for performance, precision for ease-of-use?

We heard you. Now you can change those compromises to gain flexibility and operating efficiency.

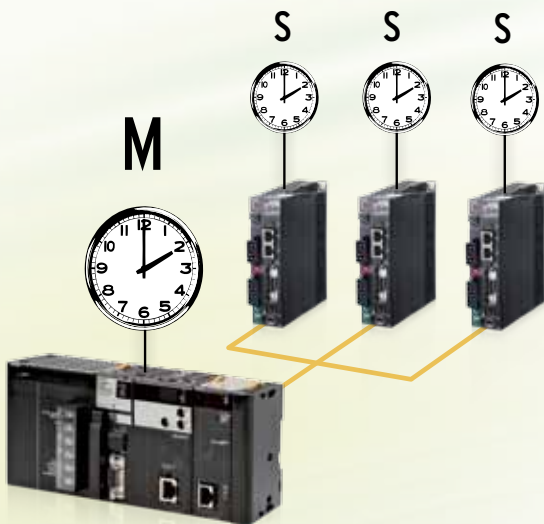
Omron Industrial Automation now introduces EtherCAT as the premier machine control network with a full line of automation products that delivers unparalleled network performance (capable of updating 40 axis in 276 microseconds), using standard Ethernet cables and supported by over 1,300 companies world-wide.

Installation is finally back to basics with no routers, no switches, and no hubs. EtherCAT is capable of Line, Star, Ring topologies; 100 meters between nodes; and possible expansion at each node all contribute to maximum network flexibility for machine design.

At full-duplex and over 90 percent bandwidth, EtherCAT delivers nearly double the performance of the closet network competitor.

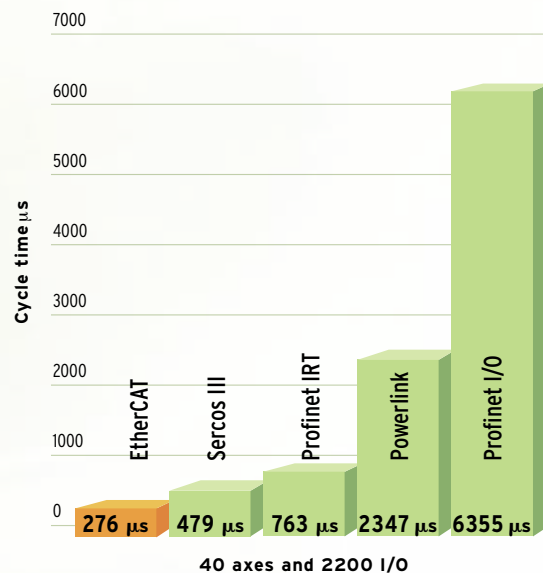
Distributed clock synchronization

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



Ethernet optimized for machine control

» EtherCAT is a real-time Ethernet based network optimized 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

One Network Delivers a New Control Foundation

Omron Industrial Automation Past Reflects The Future

More than 50,000 machine builders worldwide have first-hand experience with Omron's commitment delivering first-class machine automation. Over 50 years, Omron built a solid reputation for long-lasting product quality, ease of use, simplicity of integration and operation, and exceptional value.

Amazing results are no accident. It comes as a result of phenomenal execution and tireless dedication making your automation project a success. When we claim your machine works, it works!

EtherCAT is now available to achieve your highest expectations on precision, performance and consistency. Limited only by your imagination, the network will NOT become the bottleneck of your next machine design. Choices include an integrated scalable PLC platform or a stand-alone version for machine control.



Works as Designed, Delivers as Promised.



Complete and compact machine controller

Logic and motion control integrated in the CJ2 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 up to 64 axes with advanced functions including registration, cams and gearing. Intuitive and easy to program or debug applications

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

PLC-based Position Control with EtherCAT

Complete and compact machine controller

In a compact form, you can have a complete and powerful position control system when combining the Omron CJ2 PLC, the CJ1W-NC□8□ (EtherCAT) unit and the G5 servo drives with EtherCAT built-in. This solution controls up to 16 servo axes in independent and coordinated motion such as linear and circular interpolation, as well as control of up to 64 I/O devices which includes I/O, AC Drives, vision for complete automation system.



EtherCAT

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
- AC Drive
- Vision system
- Distributed I/O



Complete Omron Architecture Solutions - operator interface to EtherCAT

This full solution includes the NS-Series Operator Interface Terminals, available with pre-made templates for EtherCAT communication to I/O, Servo, Vision, and Drives.

These templates can be dropped into user projects and scaled or customized, providing an instant interface for system troubleshooting and maintenance, minimizing development time.



EtherCAT Node Status



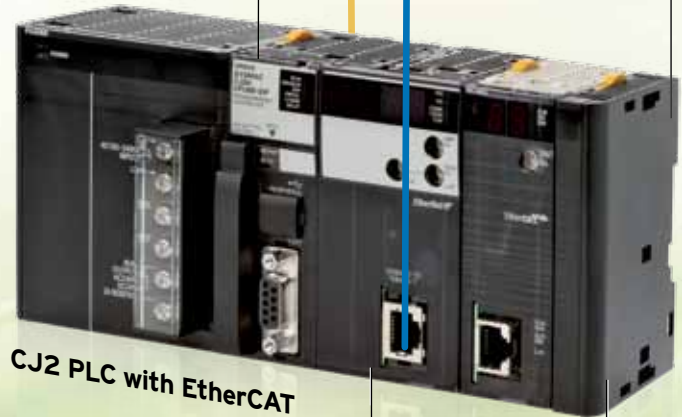
G5 Servo Template



MX2 AC Drive Template



FZM1 Vision Template



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
- Up to 4 parallel tasks can run on the NC, each can have up to 500 steps.
- This local sequencer reduces PLC complexity and increases motion performance





PLC-based Position Control with EtherCAT

- Position controller supporting up to 16 servo axes
- 64 nodes includes I/O, AC Drives, and vision devices
- Compact unit compatible with CJ2 PLCs
- Circular and linear interpolation
- Linear and infinite axes
- Position registration capture
- 3 zone outputs (cam outputs or PLS) per axis
- Certified PLCopen motion control function blocks: Part 1 and 2
- Support for servo, AC drive, vision system and I/O in a single EtherCAT network
- Ladder logic programming
- Programmable sequences
- Comprehensive diagnostics

Ethernet Network Cables

EtherCAT Connector (RJ45 to RJ45)

Length	Model
0.3 m	XS5W-T421-AMD-K
0.5 m	XS5W-T421-BMD-K
1 m	XS5W-T421-CMD-K
2 m	XS5W-T421-DMD-K
3 m	XS5W-T421-EMD-K
5 m	XS5W-T421-GMD-K
10 m	XS5W-T421-JMD-K
15 m	XS5W-T421-KMD-K

SOFTWARE NOTES: Versions required for EtherCAT functionality

* CX-DRIVE requires v2.3 or higher

** CX-ONE requires v4.1 or higher (includes CX-DRIVE, CX-Programmer)

Software for CJ2 and NC□8□ - CX-Drive, CX-ONE

Category	Applicable Products	Description	Model
Drive software	G5 servos and MX2 AC drives	CX-DRIVE V2.□ Software for Pro*	CX-DRIVE-V2X
Automation software	CJ2 PLCs and TJ2 motion controller	CX-ONE V4 DVD, 1 license, DVD** (NC□8□ uses CX-Programmer v9.31 or higher)	CXONE-AL01D-V4

Reference List

PLC CPU item description	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	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	Model
Refer to Omron247.com 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.



EtherCAT 



Superior visualization with simplified functionality

- Operator interface terminals from 5.7 to 15-inch TFT/CFT or LED
- Superb resolution up to 1024 x 768

Powerful motion control

- Single axis moves and multi-axes interpolation
 - Electronic cams and gearboxes
- Control of SCARA and Delta robots

Ethernet

One machine network

- Servo
- AC Drive
- Vision system
- Distributed I/O



Trajexia with EtherCAT

Intuitive and powerful programming

- Motion BASIC programming
- Dedicated motion commands

Stand-alone and scalable motion controller

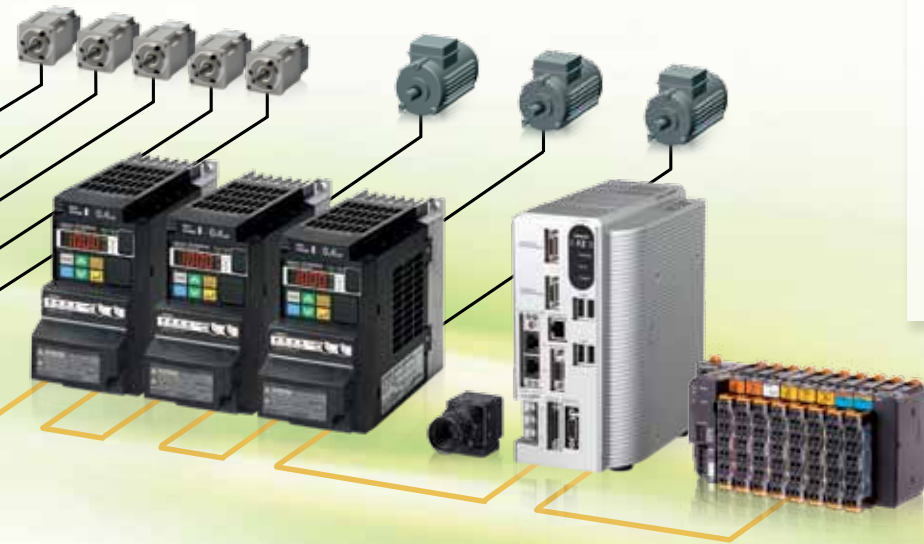
- Freedom to choose the machine PLC
- Scalability with EtherCAT masters for 4, 16 and 64 axes
- Built-in EtherNet/IP

trajexia

**EtherNet/IP**

Trajexia with EtherCAT Features

- Powerful control of 64 axes
- Scalability provided by the 3 versions of EtherCAT masters; 4, 16 and 64 axes
- 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, AC Drive, vision system and I/O in a single EtherCAT network



SOFTWARE NOTES: Versions required for EtherCAT functionality

* CX-DRIVE requires v2.3 or higher

** CX-ONE requires v4.1 or higher (includes CX-DRIVE, CX-Programmer, and CX-MotionPro)

*** TJ2 Trajexia programmed through CX-MotionPro integrated tool or Trajexia Studio stand-alone tool.

Software for TJ2 Trajexia - CX-Drive, CX-ONE, Trajexia Studio Series

Category	Applicable Products	Description	Model
Drive software	G5 servos and MX2 AC drives	CX-DRIVE V2.□ Software for Pro*	CX-DRIVE-V2X
Automation software	CJ2 PLCs and TJ2 motion controller	CX-ONE V4 DVD, 1 license, DVD**	CXONE-AL01D-V4
Controller software	TJ2 motion controller	Trajexia Studio stand-alone software, V1.3.3 or higher*** (TJ2 uses Trajexia Studio v1.3.3 or higher)	TJ1-STUDIO

Reference List

Trajexia controller items description	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	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	Model
Trajexia flexible axis unit (for 2 analog or pulse 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 percent reduction in motor weight, and gain 50 percent 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 synchronization

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)
- 50 W to 15 kW
- 120, 240 and 480 VAC



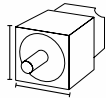
G5 Servo Features

- 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 STO SIL2 stop category 3
- Advanced tuning algorithms (Anti-vibration function, torque feedforward, disturbance observer)
- Wide range of linear and rotary servo motors
- 2 registration inputs
- Dual feedback position control (full-closed loop)

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	55	172		
			1.3 Nm	400 W	R88M-K40030(H/T)-(B)S2	R88D-KN04H-ECT				
		80x80	2.4 Nm	750 W	R88M-K75030(H/T)-(B)S2	R88D-KN08H-ECT	65			
					R88M-K1K030(H/T)-(B)S2	R88D-KN15H-ECT				
	100x100	4.77 Nm	1.5 kW	R88M-K1K530(H/T)-(B)S2	R88D-KN15H-ECT	86				
				R88M-K1K530(F/C)-(B)S2	R88D-KN15F-ECT					
	400 V	100x100	2.39 Nm	750 W	R88M-K75030(F/C)-(B)S2	R88D-KN10F-ECT	92	172	150	
				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	94	195	198	
					R88M-K2K030(F/C)-(B)S2	R88D-KN20F-ECT				
			120x120	9.55 Nm	3 kW	R88M-K3K030(F/C)-(B)S2	R88D-KN30F-ECT	130	213	250
						R88M-K4K030(F/C)-(B)S2	R88D-KN50F-ECT			
130x130	15.9 Nm	5 kW	R88M-K5K030(F/C)-(B)S2	R88D-KN50F-ECT						
			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	94	195	198
		R88M-K1K520(F/C)-(B)S2				R88D-KN15F-ECT				
		176x176		9.55 Nm	2 kW	R88M-K2K020(F/C)-(B)S2	R88D-KN20F-ECT	130	213	250
			R88M-K3K020(F/C)-(B)S2			R88D-KN30F-ECT				
	14.3 Nm	3 kW	R88M-K3K020(F/C)-(B)S2	R88D-KN30F-ECT	130	213	250			
			R88M-K4K020(F/C)-(B)S2	R88D-KN50F-ECT						
	19.1 Nm	4 kW	R88M-K4K020(F/C)-(B)S2	R88D-KN50F-ECT	130	213	250			
			R88M-K5K020(F/C)-(B)S2	R88D-KN50F-ECT						
	1500	400 V	176x176 220x220	47.8 Nm	7.5 kW	R88M-K7K515C-(B)S2	R88D-KN75F-ECT	233	334	250
				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	
			8.59 Nm	900 W	R88M-K90010(F/C)-(B)S2	R88D-KN15F-ECT	92	172	150	
	400 V	130x130	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
		176x176	43.0 Nm	4.5 kW	R88M-K4K510C-(B)S2	R88D-KN50F-ECT	233	334	250	
					R88M-K6K010C-(B)S2	R88D-KN75F-ECT				
57.3 Nm	6 kW	R88M-K6K010C-(B)S2	R88D-KN75F-ECT	233	334	250				
		R88M-K6K010C-(B)S2	R88D-KN75F-ECT							

Flange dimensions



Motor model type designation detail

H= 230 V and Incremental Encoder

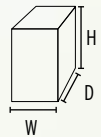
T= 230 V and Absolute Encoder

F= 400 V and Incremental Encoder

C= 400 V and Absolute Encoder

B= Motor with Brake (Blank=No brake)

Drive dimensions



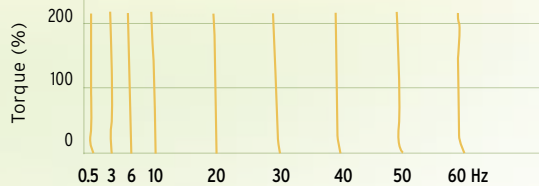
MX2 AC Drives

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 AC Drive or servo drive in suitable systems

EtherCAT

EtherCAT connectivity

- Optional EtherCAT communications module
- 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

- High speed motors up to 1000 Hz

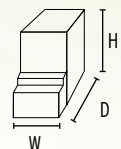
MX2 Features

- 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

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

Drive dimensions
(With Communication Module)



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 enable 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

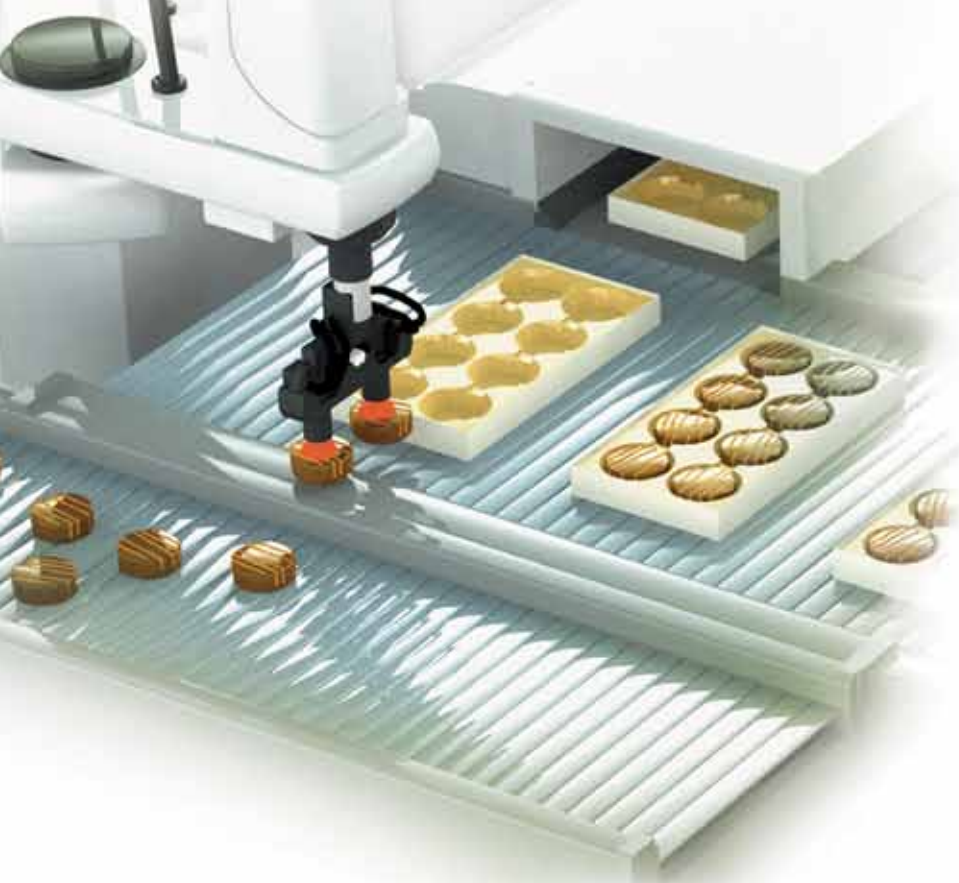
- Inspection of scratches and defects
- Detection of dirty or overlapping objects
- Edge and corner breakage inspection
- Automatic calibration for robots, XY, and UVW stages



Flexible camera installation

- Use different fields of vision
- Install at any angle





movi

Motion and Vision Convergence

The convergence of Motion and Vision is rapidly occurring in the automation marketplace. Control designers are mixing these technologies to replace manual switchover, provide a higher level of protection from improper pick-and-place and make adjustments before actuation.

The standard quality control approach of inspect and reject is still common, but for some demanding dynamic applications, it has moved to inspect and correct for the optimal solution.

Although these technologies are vastly different [Motion: Position, velocity and torque; Vision: Lighting, lensing and pattern recognition] when combined, it leads to exciting results.

EtherCAT is uniquely qualified to marry these two technologies in the same system because of the ease of integration and network performance. Omron Industrial Automation's vision offerings inspect positional details for pick-and-place and robotic applications up to 250 frames per second and will not disrupt axis control; also, motion controllers now reach 40 axes in less than 274 microseconds on the same system.

As EtherCAT unfolds as the premier fieldbus network for high-speed integration and vision/motion capabilities continue to expand, it broadens the scope of MOVi Applications in Machine Control. Omron Industrial Automation is the only vendor that brings all of these technologies together within reach of small and medium size manufacturers. Your success applying MOVi capabilities is based on manufacturing efficiencies proven in our own factories and in installations around the world.

Explore these evolving technologies for your future plans.

Shape based object positioning:

- Separation of attached objects
- Detection of partially hidden objects
- Compensation for 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
FZM1 controller with EtherCAT, Two cameras, NPN Output	FZM1-350-ECT
FZM1 controller with EtherCAT, Two cameras, PNP Output	FZM1-355-ECT
Camera and Monitor description	Model
High-speed Monochrome camera, 300000 pixels	FZ-SH
High-speed Color camera, 300000 pixels	FZ-SHC
Digital Monochrome camera, 300000 pixels	FZ-S
Digital Color camera, 300000 pixels	FZ-SC
Digital Monochrome camera, 2 million pixels	FZ-S2M
Digital Color camera, 2 million pixels	FZ-SC2M
LCD Monitor	FZ-M08

GX Series Block I/O

High-speed remote I/O terminals for CJ2

An extensive line-up of digital I/O terminals, analog I/O terminals and encoder input terminals are available for EtherCAT connectivity with all CJ2 PLCs. The wiring type of the digital I/O terminal can be either screw terminal block or e-CON formats—it's your choice.



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 μ s max.
- Digital input filter prevents malfunction when status is unstable due to chattering or noise. User-selectable 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 analog inputs, current/voltage	\pm 10 V, 0-10 V, 0-5 V, 1-5 V, 4-20 mA	GX-AD0471
2 analog outputs, current/voltage	\pm 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 analog 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.



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

Note: SmartSlice EtherCAT coupler is only supported by Trajexia

EtherCAT Primer

Category	Description	Category	Description
Name	<ul style="list-style-type: none"> Ethernet for Control Automation Technology (EtherCAT) 	Organization	<ul style="list-style-type: none"> www.ethercat.org Over 1300 members IEC, ISO and SEMI Standard Deployed since 2003 with 1000s of available products
Media	<ul style="list-style-type: none"> RJ45 Connectors; Standard CAT5, CAT5E, CAT6, CAT7 Cabling 	Address	<ul style="list-style-type: none"> EtherCAT allows 0-65535 devices to be connected. Note: Omron Products have 0-99 as a valid address.
Topology	<ul style="list-style-type: none"> Line, Star, Ring - no hubs, switches or routers; Note: Omron currently supports Line topology 	Distance	<ul style="list-style-type: none"> The Fast Ethernet physics (100BASE-TX) enables a cable length of 100 m between two devices.
Time Synchronization	<ul style="list-style-type: none"> Low jitter that meets the specifications of IEEE 1588 without additional hardware. Within 1 microsecond for accurate coordinated motion & I/O 	Applications	<ul style="list-style-type: none"> High-speed packaging, presses, molding, test bed, textile, robotics, material handling and logistics. Can be used for motion, I/O, vision, safety, AC drives
Safety	<ul style="list-style-type: none"> IEC standard 61518 describes Safety over EtherCAT (SoE). SoE meets requirements of Safety Integrity Level 3. To achieve higher safety, SoE adds in safety information to the standard EtherCAT frame. Note: Currently under development. 	Configuration	<ul style="list-style-type: none"> Set node #, connect Ethernet cable, Auto Configures Available Use ESI File Per Slave Device
Speed	<ul style="list-style-type: none"> 2 x 100 MPS Full-Duplex 1000 Digital I/O in 30 microseconds 40 Axis in 274 microseconds 2x faster than Sercos III, 3x faster than Profinet IRT 	Protocols	<ul style="list-style-type: none"> Master/Slave, Master/Master, Slave/Slave; CAN Open over EtherCAT (CoE) Standard Ethernet frames, supports HTTP, FTP, TCP/IP Note: Omron Supports Master/Slave

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