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# LSELECTRIC XMC MOTION CONTROLLER

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XGT

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LS



PWR

EtherCAT

## The XMC motion controller has it all, EtherCAT control, PLC power, and so much more!

The LS Electric XMC motion controller has numerous state-of-the-art features built into it's compact brick-style design. These controllers are optimized for advanced motion control, are available in 8- or 16-axis models, and offer a variety of high-tech capabilities for a price that can't be beat.

**XMC for Xact motion control** - XMC controllers utilize the EtherCAT highperformance protocol which is specifically designed for real-time communication and deterministic data exchange, making it ideal for motion control applications like robotics, assembly lines, and packaging machines. EtherCAT boasts incredibly low communication jitter (variations in timing), ensuring precise synchronization between devices and smooth motion control. This is crucial for applications requiring high accuracy and repeatability (*pulse/direction control is not supported*).

**XMC for EtherCAT Xpansion** - XMC controllers feature <u>full</u> EtherCAT Master capabilities, meaning they can communicate and control any EtherCAT device. This allows the XMC controller to seamlessly communicate with EtherCAT I/O, encoders, AC drives, etc.

**XMC for Xtensive automation** - Not only can XMC controllers handle numerous EtherCAT devices, they also support G-code, M-code, and programming specific to robot control including Delta3, Delta3R, Linear Delta, and more. On top of that, XMC controllers can also be used for PLC functions providing an enhanced programming environment for discrete and/or process control needs.

**XMC for blazing fast Xecution** - The XMC controllers offer extremely fast processing capabilities, not just with motion commands, but with basic PLC logic as well. Basic commands are executed with a scan time of only 6.25ns, motion commands with a 5ns scan, and arithmetic commands with a 30ns scan. EtherCAT-based high-speed communication cycle times are also 0.5/1/2/4ms.

**XMC for Xtreme value** - The XMC controller provides both highly advanced motion control with EtherCAT communication and built-in PLC functionality for a price well below the competition. By using the powerful XMC controller for your next motion control application, you could save thousands on hardware costs alone. The 8-axis XMC controllers start at \$779.00 with competitor controllers ranging anywhere from \$1,500 (Mitsubishi Q170MSCPU) to \$4,000 (Allen Bradley 5069-L320ERM) and higher! Not to mention the savings you'll get with the FREE, comprehensive XG5000 programming software and the many perks that come with being an AutomationDirect customer including FREE shipping, FREE tech support, and more.





#### VAUTOMATION DIRECT

c XMC Motion Controller

Mini B USB

Mini B USB port for easy plug-

**Encoder Inputs** 

OUT

A/D

D/A

ENC1-

LB

### The XMC motion controller is super small, lightning fast, and highly capable

**Data Logging and More** 



#### Millions of updates in the blink of an eye!

The time it takes most people to blink ranges from 100 to 150ms. Well, with the XMC controller's lighting fast execution, in that same time frame the positions of 16 servo systems AND over 8,000 discrete I/O points can be updated more than 200 times! With that kind of processing speed, the blink of an eye is an eternity to this controller. The XMC is capable of executing basic logic commands in 6.25ns and performing EtherCAT updates in as little as 0.5ms. This execution speed provides utmost positioning accuracy and precise, real-time motion control.

# Ether**CAT Modbus**<sup>®</sup>



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couplers.

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2

**VAUTOMATIONDIRECT** 

Built-in support for two external 5VDC encoders (@500kpps) for full closed-loop

A/D

V0+

10+

COMO

V1+

11+

D/A

#### **Compact Footprint**

The XMC motion controller packs all these great hardware features into a small, approximately 71/2 inch, brick style form factor.

#### 

#### Analog Inputs

Two built-in 14 bit analog input channels. Used to monitor analog sensors and devices using current or voltage signals.

#### **Analog Outputs**

Two built-in analog voltage output channels, providing dependable process control using 14 bit resolution signals.

**Convenient Status Indicators** See digital I/O and encoder signal status at a glance

#### **Digital Outputs**

16 general purpose transistor based digital outputs built in that are ideal for controlling ON/OFF devices including relays, actuators, solenoid valves, etc.

LS Electric XMC Motion Controller

# **Expansive EtherCAT Motion Control**

EtherCAT, which stands for Ethernet for Control Automation Technology offers a powerful and versatile networking solution for high-performance motion control applications. EtherCAT provides speed, accuracy, scalability, and cost-effectiveness making it suitable for complex multi-axis motion control systems. Additionally, its open communication standard allows for easy integration with numerous devices and controllers for various other industrial automation tasks.

The XMC controller is a full EtherCAT master meaning it can communicate with any EtherCAT capable device including up to 16 EtherCAT servo or stepper systems and up to 32 remote EtherCAT I/O racks. The XMC utilizes the powerful XG5000 software to configure and program all the control logic for advanced motion as well as basic PLC applications.

#### Add up to 16 Motion Axes

Add servos, steppers, or VFDs with simple Ethernet (EtherCAT) connections. Easily load configuration files in the ESI Library and jump start your project. You can also add up to 18 virtual axes to coordinate tricky multi-axis solutions.

# What is EtherCAT ?? Bre

**VAUTOMATIONDIRECT** Click the video to learn more about this impressive protocol.

#### **Fast, Accurate Motion Control**

Use EtherCAT cyclic mode to update the position of ALL axes on every EtherCAT cycle, with selectable update times of 0.5/1/2/4ms. These super-fast updates ensure highly accurate motion profiles.

# Ether CAT®

#### **Simple System Connections**

EtherCAT is a relief to anyone familiar with wiring pulse and direction based servo or stepper systems. That's because you won't have to be deal with the discrete signal wiring of the past, no sinking/sourcing concerns, no common reference voltages, totem-pole or linedriver headaches, etc. Just daisy-chain simple network cables (any Ethernet cable CAT 5 or 6) from the controller to each motion axis and I/O bus coupler as needed. It's that simple!



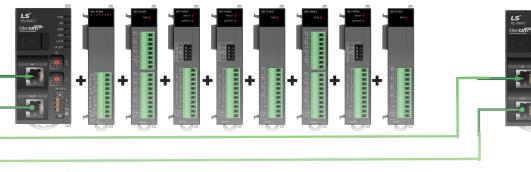
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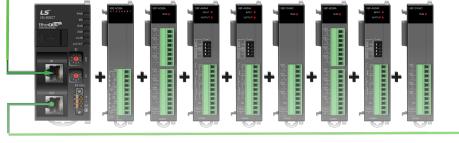
#### Add up to 32 I/O Racks

With the XEL-BSSCT bus coupler you can add thousands of additional I/O and integrate into the same XG5000 project as the XMC controller.. Up to eight I/O modules can be installed per bus coupler - that's 256 discrete or 64 analog channels per coupler! AND it's ALL updated synchronously on EVERY EtherCAT cycle.



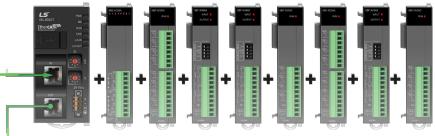




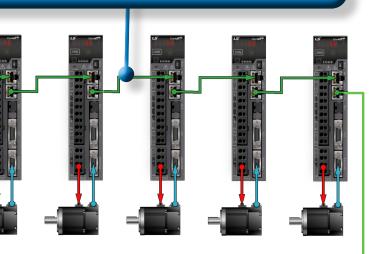


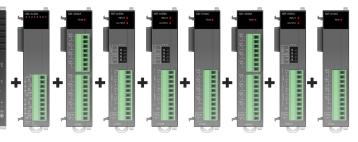


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For the latest prices, please check AutomationDirect.com.

LS

**XG**5000

PLC Programming

# The XMC controller is THE motion master

With the XMC as your primary controller, you can control a wide variety of advanced motion control systems. The FREE powerful XG5000 programming software offers IEC 61131 programming languages (Ladder, Structured Text), 64 bit data types, motion axis graphing, and numerous motion control function blocks based on the PLCopen standard for quick and efficient coding. With this dynamic hardware and software duo you can create:

• Up to 32 CAM profiles (32,769 points each)

LS

XMC

MOTION CONTROLLER

Ether car.

- Full G-code (and M-code) programs for traditional CNC machines such as mills, lathes, and router tables
- Robot control programs using Delta3, Delta3R, Linear Delta, and others
- Many other motion control programs that need to follow a complex or variable tool path:
  - Laser cutters
  - Additive manufacturing
  - Gasket/glue applicators
  - Forming/burnishing machines

#### Milling Machines, Routers, and Laser Cutters

When milling, cutting, or routing materials to match specifications, precision is key. Just the slightest misstep can cause a complete redo and wasted material. Most of these machines utilize three axes of motion (X, Y, and Z axes) and require servo accuracy that is repeatable time and time again, making these types of applications perfect for the XMC controller.

#### **Printing Machines**

Printing machines can use numerous servo drives/motors to control the feed, printing, and collection rollers of the printing process. The XMC controller can coordinate these drives to keep the required uniform tension in the printable media and ensure proper contact with the printing mechanism and a quality output. Packaging Machines

Servos control several aspects of a typical packaging machine. The

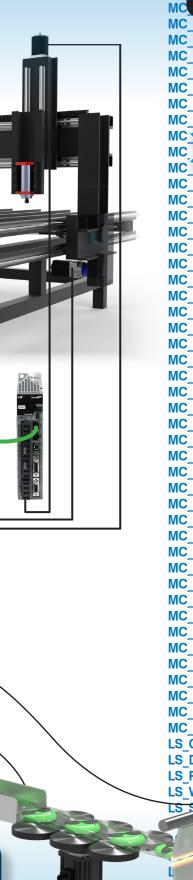
product feed servos provide adequate spacing between products,

the film wrap servo guides products through the wrapping process,

and the heat sealing servo ensures proper application of the heating

element for a complete seal. With one XMC controller, all of the

timing, staging, and conveying can be accurately controlled.



#### MC\_Stop MC Halt **MC Move MC Move** MC Mov MC Mov Numerous MC S Motion Function MC Blocks MC\_\_\_\_\_for efficient code MC\_Write development MC Reset **MC TouchProbe** MC AbortTrigger MC MoveSuperImposed MC HaltSuperImposed **MC SetPosition MC SetOverride** MC AddAxisToGroup MC RemoveAxisFromGroup MC UngroupAllAxes MC GroupEnable MC GroupDisable MC GroupHome **MC GroupSetPosition** MC GroupStop **MC** GroupHalt **MC GroupReset** MC MoveLinearAbsolute MC MoveLinearRelative MC MoveCircularAbsolute MC MoveCircularRelative MC SetKinTransform MC SetCartesianTransform MC MoveCircularAbsolute2D MC MoveCircularRelative2D MC TrackConveyorBelt MC TrackRotaryTable MC CamIn **MC CamOut** MC GearIn **MC GearOut** MC GearInPos **MC** Phasing **LS Connect** LS Disconnect LS Re LS Wr

LS Electric XMC Motion ControlleRead

LS\_InverterWriteVel

S CamSkip

LS VarCamIn

LS VarGearIn

LS VarGearInPos

# FREE software with the tools you need to succeed!

The XG5000 software is a powerful tool for programming the XMC controllers. This FREE software can be downloaded anytime from our webstore and offers many features for efficient code development whether its for basic PLC control or a high-tech motion application.

#### **Project Tree**

The XG5000's Project Tree offers a super convenient way to see all the configuration items of the current project. It also allows for easy access to the parameter files of the EtherCAT master and slave devices configured for the project and their associated axis profiles.

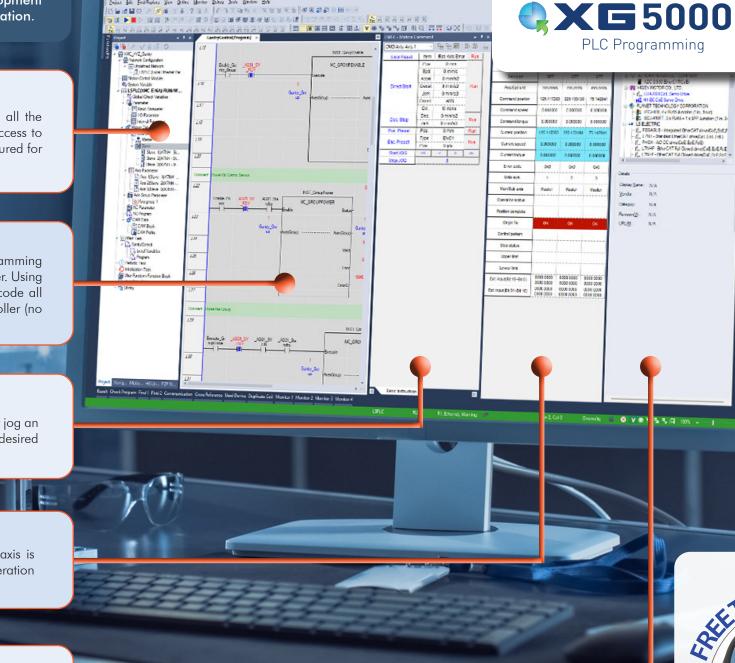
#### Program Editor

#### **Program Editor**

The Program Editor provides ladder logic or structured text programming and offers a user-friendly development window for the XMC controller. Using numerous PLCopen compliant function blocks, users can quickly code all of the many automated functions and tasks performed by the controller (no separate motion control software application required).

#### Manual Motion Commands

The Motion Command window allows user to manually start, stop, or jog an axis or to change presets, reset errors, and more. Easily select the desired motion axis from the drop-down and run the desired command.



The Status Monitor is available to give users insight into how the axis is performing with details on position, speed, torque, error codes, operation status, and more.

#### **ESI Library**

Status Monitor

The ESI Library provides easy access and organization of the various EtherCAT devices for the XMC. EtherCAT Slave Information (ESI) files are XML files used by EtherCAT masters to configure the slaves and generate network description files. The main purpose is to describe how data will be shared with the slave device, making it super simple to connect with 3rd party EtherCAT devices. LS

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Need help getting your EtherCAT axis up and running?

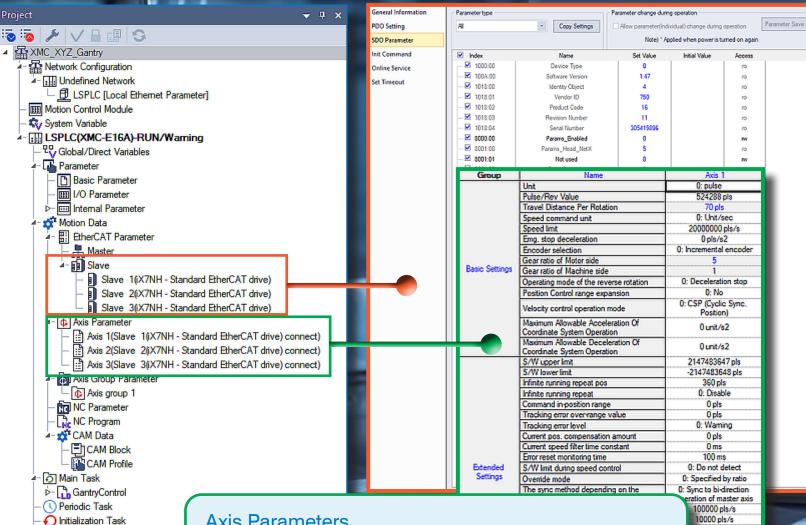
No problem, we've got your back with 100% FREE technical support. Just reach out to us at 1-800-633-0405, 9am to 6pm, Monday through Friday or submit a technical support request at our <u>Contact Support page</u> and one of our experienced technical support staff members will be glad to help.

#### **SDO/PDO Parameters**

A Process Data Object (PDO) is used for synchronous transmission of data between the master and slave nodes and is utilized by the master for input/output signals and to control the position of EtherCAT servo drives.

A Service Data Object (SDO) is used for asynchronous transmission of data between the master and slave nodes and is the method by which error information in the slave is gathered and parameter reading/writing is done.

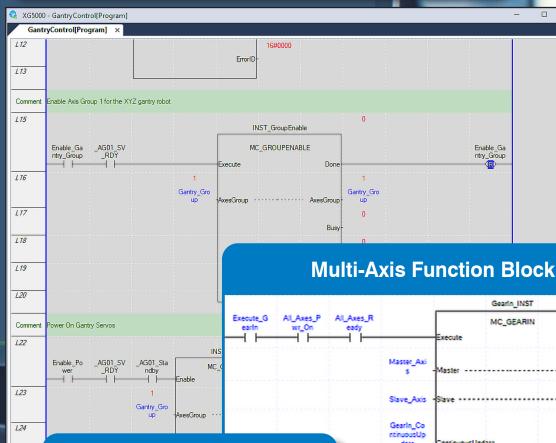
The XG5000 software offers quick access to the SDO/PDO parameters simply by clicking the device in the Project Tree of the program. From there, parameters can be viewed and modified for the slave device directly from the project.



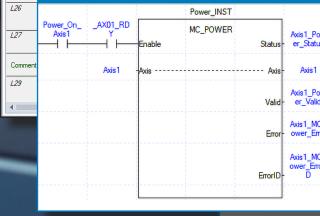
#### **PLCopen in motion**

PLCopen is a global, independent organization dedicated to standardizing control programming and application engineering to reduce costs and increase productivity. Their standards are widely used in various industries, including packaging, robotics, machine tools, automotive, and semiconductor. PLCopen has developed several standards specifically for motion control that involve function blocks for single axis control, advanced motion control functions like electronic gearing, and interpolation, and standards for homing procedures.

The XG5000 software utilizes function blocks that meet the standards of PLCopen to ensure interoperability, efficiency, and easier code development for motion applications.



#### **Single-Axis Function Block**



#### **Axis Parameters**

Buser Function/Function Block

📴 User Data Type

- 🔁 Library

The XMC controller allows for expansive configuration of each motion axis and the XG5000 programming software provides convenient access to their parameters. By clicking the desired axis from the Project Tree, all configuration options are easily viewed and can be modified as needed. Application specific parameters, in particular spindle parameters for CNC applications, are clearly listed as well.

VAUTOMATIONDIRECT

Home position driving method

Origin driving Acc/deceleration

Z-phase variable/address

inentation speed

Orientation direction

Orientation offset

NC Spindle Control Settin

Origin driving switch navigation speed

Drigin driving zero navigation speed

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000 pls/s2

Detection

0 pls/s3

0: No

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%ID0 30 Hz

0 %

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0 deg

er Drive Support

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	GearIn_Rat ioDenomin ator	-RatioDenominator	CommandAborred-	SearIn_Ab ried
	GearIn_Ma sterValue5 ource	-MasterValueSourc	Error-	Gearln_Er or
	GearIn_Acc eleration	-Acceleration	ErrorID-	Gearln_Er orID
	GearIn_De celeration	-Deceleration		
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#### Software with numerous benefits built in!

This highly developed software has been fine-tuned over the years to provide a wealth of features and capabilities, including:

- Program segmentation with different Scan programs and various Task programs
- Numerous data types including IEC standard data types (64 bit available) and 3-dimensional arrays
- Handy two-dimensional trend graph (X-Y plotter)
- Easy edits of global and local variables using MS Excel or View Variable, View Device, • View Flag, Auto-fill options in software
- Convenient program edits with unlimited Undo/Redo functions, block edits in cell units, an enhanced Find/Replace function, program execution controls, and more
- Various monitoring functions such as variable monitoring, device monitoring, system monitoring, trend monitoring, special module monitoring, etc.
- Editing, monitoring, or managing multiple interlocked PLCs included in the same project at the same time
- Online editing capabilities
- Setup data logging to record program data with many configurable options
- NC program editor for modifying G-code in a NC file (shown on right)

#### Project simulators provide huge time savings

The XG5000 software offers several convenient simulators for programmers to verify logic operations without a physical controller present. With these simulators, you can test your control logic as it is created instead of in the field for much easier startups.

XG-SIM for PLC logic simulation:

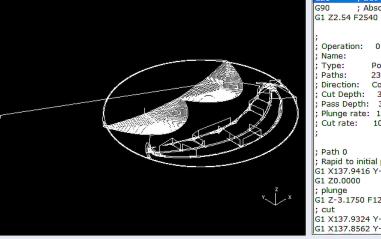
- Simulate a program created with ladder or structured text
- Use functions such as system monitor, device monitor, trend monitor, data trace, and user events as if online with a real controller
- Simulate I/O as if field devices are connected to ensure proper system-wide control

NC Profile Simulator for easy verification of advanced axis configurations for CNC machines:

- Simulate an NC program to validate G-code
- Step through profile with a visual representation of resulting tool path

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Tool Path Graph for smiley2d.nc



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mLSE-14 LS Electric XMC Motion Controller VAUTOMATIONDIRECT

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Operation: Name: Pocket Type: Paths 23

: Absolute positioning

: Move to clearance level

Convent Direction: Cut Depth: 3.175 Pass Depth: 3.175 Plunge rate: 127 Cut rate: 1016 Path 0

Rapid to initial position G1 X137.9416 Y-77.8419 F2540 G1 Z0.0000 ; plunge G1 Z-3.1750 F127 cut: G1 X137.9324 Y-77.8487 F1016 1 X137.8562 Y-77.9074

st prices, please check AutomationDirect.com.

Name: Type: Pocket Paths: 23 Direction: Conventi Cut Depth: 3.175 Plans Depth: 3.175 Plunge rate: 127 October 1026

; Cut rate: 1010

: plunge G1 Z-3.1750 F127

-77.910

-77,9335

-77 9803

Y-78.0057 Y-78.0125 Y-78.1012

-78.1507

-78,1680

-78 1743 -78.1743 -78.1891 -78.2279

-78.2244

-78 2241 -78 2220

-78.2127 -78.2102

-78.1969 -78,1942 Y-78.1787

-78 1766 Y-78.1766 Y-78.1703 Y-78.1649 Y-78.1545

-78.1472

-78.1248 Y-78.1246 Y-78.1218 Y-78.1106 Y-78.1037

-78.0877 Y-78.0834

Y-78.0476 Y-78.0463

: Path 0 : Rapid 1 G1 X13 G1 Z0.0

: Absolute positioning 4 F2540 : Move to clear

Convenient

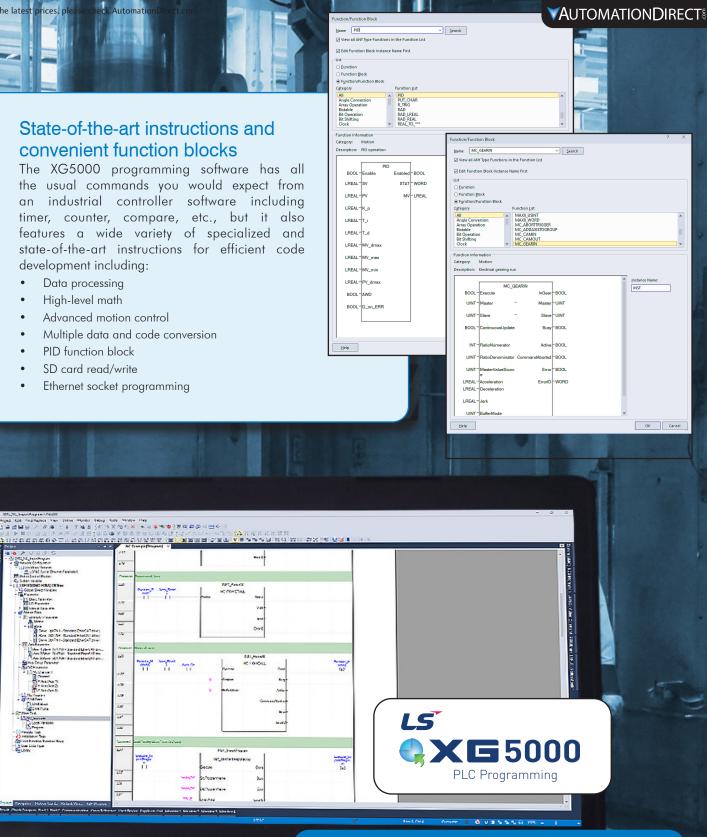
**G-CODE** editor

for easy, efficient

**CNC** coding

#### State-of-the-art instructions and convenient function blocks

- Ethernet socket programming



#### SAVE THOUSANDS IN **SOFTWARE COSTS!**

LS PLC XG5000 software is 100% FREE Download as often as you need. No license or key needed. Click here to download. mLSE-15 LS Electric XMC Motion Controller



# More than just a motion controller...

Monitor and control multiple applications

many more applications with one XMC controller.

The XMC's primary function centers around accurate motion control, but this

controller also offers PLC functionality so you can employ the XMC in more

ways than one. Along with controlling multiple EtherCAT devices, you can

use the embedded encoder inputs and discrete and analog I/O to monitor

and control several processes around your plant. And don't forget, with the

EtherCAT XEL-BSSCT bus coupler, you can install even more I/O and control

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#### **Discrete** operations The XMC controller offers several built-in discrete I/O points that

can work hand in hand with industrial object detection devices

including proximity switches, photoelectric sensors, and limit

switches. These devices are used extensively in product conveying

and sorting applications. High-speed encoder inputs (up to 500

kHz) are also built in and are available to handle the rapid pulse

trains produced by belt- or shaft- mounted encoders, often used

to track belt speeds and object positions. If more I/O is needed,

thousands more discrete I/O points can be added using the

do it all!



#### With the LS XMC controller you can also monitor and control many other processes around your facility, including those involving:



#### Looking for more PLC power? Check out the LS XGB PLC

If your application is heavy on the process /discrete control side and lighter on motion requirements, check out the LS Electric XGB PLC series. This low-cost controller uses the same FREE powerful XG5000 software but offers several additional capabilities for a more robust PLC control solution.





#### Processing and production

Using embedded and expansion analog I/O, a variety of process control functions can be reliably handled. Monitor and/or control the temperature of an oven, the level of raw material in a feed hopper, or the amount of pressure being used at your filling stations. With the XMC controller and the XG5000's super capable PID programming, you can





**CLICK HERE to learn more** 

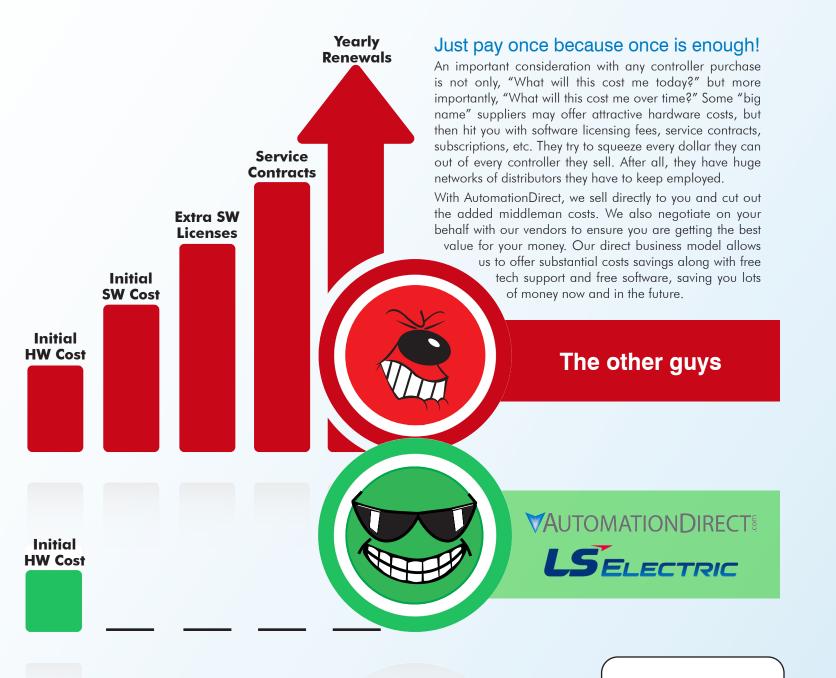
LS Electric XMC Motion Controller

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FREE Software!

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# Low prices are just the beginning!



		Download as often
XMC_NC_ImportProgram - XG5000		as you need.
Project Edit Eind/Replace View Online Monitor Debug		
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	A X NC_Example(Program) X	<u>click liefe to download</u> .
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▲ 器 XMC_NC_ImportProgram	ErrorID-	
- 🏤 Network Configuration	L18	
- III Undefined Network		
LSPLC [Local Ethemet Parameter]		
- III Motion Control Module	Comment Power on all Axes	
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LSPLC(XMC-E08A)-Offline	Events D. Ave. Part	
- Collobar Direct Variables	CXeCute_r Aves_nead MC_POWERALL	
Basic Parameter	Enable Status-	
- III I/O Parameter	L21	
⊳- Internal Parameter	Valid-	
4- ở Motion Data	122	
EtherCAT Parameter	Error	
- 📇 Master	123	
A Slave	ErrorID	
Slave 1(X7NH - Standard EtherCAT drive)	124	
mLSE-Rate Survey LS. Electric	X MC Motion Controller	800-633-0405
Avis Parameter     Avis Parameter		
Axis 1 (Slave 1)(X7NH - Standard EtherCAT driv	Comment Home all axes	
Axis 2(Slave 2(X7NH - Standard EtherCAT driv	126 INST Hans M	



#### **FREE Tech Support**

Are you tired of calling a local distributor to discover their "product expert" is not in? How about waiting hours for technical service to return a message? Or paying for phone support service and then having to be on hold waiting for it?

#### It's no accident that our Tech Team routinely demonstrates the best attitude and manners in the industry!

We send our customers surveys to score our attitude, accuracy, and timeliness, then take these scores and use them as part of the Tech Team's report card. The bottom line is that you get great service by design. Over 85% of customers who have used our service and responded to surveys say it's better than what they have been getting from other automation suppliers. 91% say we are above average to excellent in accuracy, 90% say we are above average to excellent in thoroughness, 91% say we are above average in response time, and 96% rate us above average in courtesy.

Isn't it time you got better service AND a better price? We definitely think so!



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LS Electric XMC Motion Controller

