MOTION
CONTROLLER
XMC-E32A

LSIS

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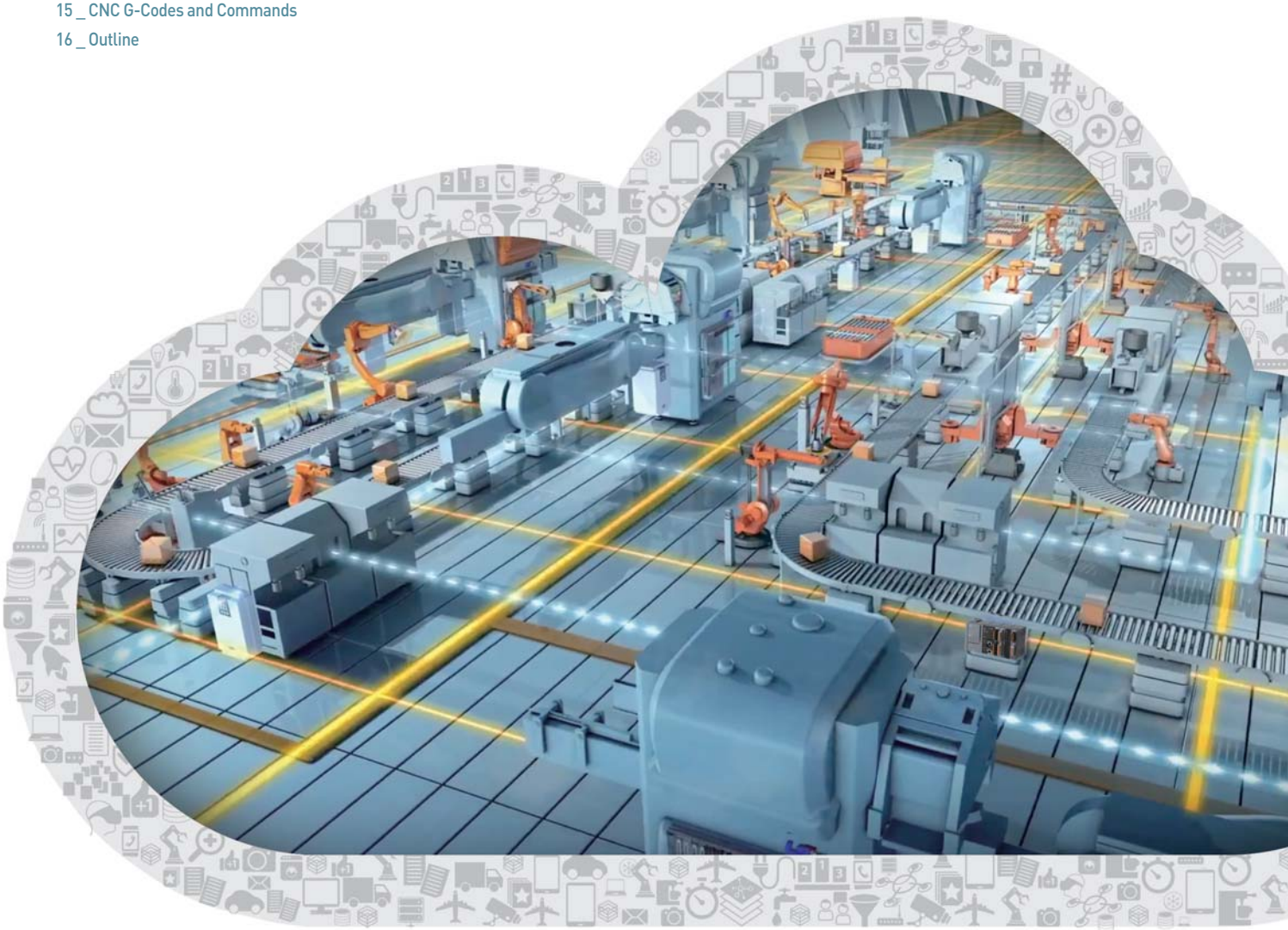


MOTION CONTROLLER

XMC-E32A

True Realization of Smart Factory Automation We Have Dreamed of!
Innovative Motion Control Solution to Introduce Future of Factory Automation

The XMC-E32A programmable motion controller realizes automation of manufacturing industries with a cost-effective yet easy and user friendly engineering solution.
The XMC-E32A delivers high performance EtherCAT-based motion control functions along with a variety of embedded functions and high-tech capabilities specialized for numerical control and robots. In addition to LSIS PLC, HMI and servo products, the XMC-E32A will help you create an even better and optimal solution.

Feature

Take Your First Step into New Future of Smart Motion

Innovation of the 4th Industrial Revolution, Innovation of smart motion that leads to innovation and new future, LSIS Motion Controller

Professional

- CAM control: Up to 32 CAM profiles (32,768 points / 32 CAM profiles)
- Supports G-code
- Robot control: Delta3, Delta3R, Linear Delta and etc.

Productivity

- High-speed program processing: 6.25ns (Basic command)
- EtherCAT-based high speed cycle times: 0.5/1/2/4ms (Same as main task's cycle time)
- Built-in Digital and Analog IO

Efficiency

- Integration with a variety of EtherCAT devices
  - Servo Drive (Up to 32 axes), Remote I/O (Up to 32 I/Os), AC Drives, Robots and etc.
- Various built-in functions
  - 8 digital inputs / 16 digital outputs, Analog inputs (2 ch) / Analog outputs (2 ch), Encoder inputs (2 ch), Ethernet

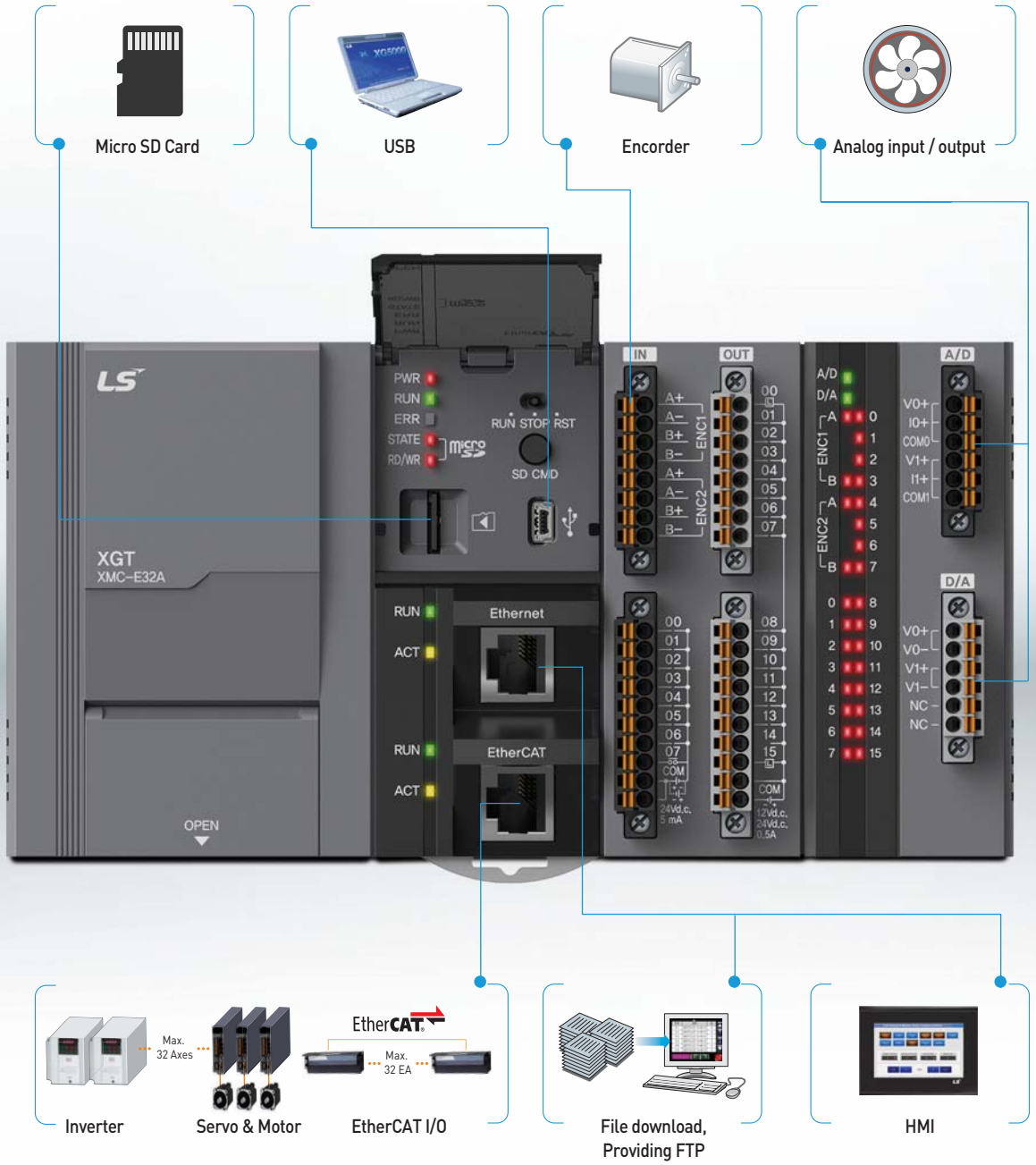
Convenience

- XG5000 software for programming and monitoring
  - Sole, integrated architecture for programming, diagnosing and simulating for both motion controller and PLC
  - IEC standard Motion Function Blocks
- SD card slot (SD card not included)
  - Saving and executing programs, Data Logging

System Configuration

EtherCAT-based Motion Control System Ensures Efficient System Environment

XMC-E32A delivers an optimized solution to a system that has a need for motion control. With 8 digital inputs / 16 digital outputs, analog inputs (2ch) / analog outputs (2ch), encoder inputs (2ch) and EtherCAT port, all can be connected rapidly and easily.



Specification

General Specification

Item	Specification				Related specifications
Ambient temperature	0~55℃				-
Storage temperature	-25 ~ +70℃				-
Ambient humidity	5~95RH (Non-condensing)				-
Storage humidity	5~95RH (Non-condensing)				-
Vibration resistance	Ocasional vibration			-	-
	Frequency	Acceleration	Amplitude	How many times	IEC61131-2
	$5 \leq f < 8.4$Hz	-	3.5mm	10 times each directions (X, Y and Z)	
	$8.4 \leq f \leq 150$Hz	9.8m/s^2(1G)	-		
	For continuous vibration				
	Frequency	Acceleration	Amplitude		
	$5 \leq f < 8.4$Hz	-	1.75mm		
	$8.4 \leq f \leq 150$Hz	4.9m/s^2(0.5G)	-		
Shock resistance	Peak acceleration : 147 m/s^2 (15G) Duration : 11ms Half-sine, 3 times each direction per each axis				IEC61131-2
Noise resistance	Square wave Impulse noise	AC: ±1,500 V DC: ±900 V			LSIS standard
	Electrostatic discharge	Voltage : 4kV (contact discharging)			IEC61131-2 IEC61000-4-2
	Radiated electromagnetic field noise	80 ~ 1,000MHz, 10 V/m			IEC61131-2, IEC61000-4-3
	Fast transient /bust noise	Segment	Power supply module	Digital/analog input/output communication interface	IEC61131-2 IEC61000-4-4
		Voltage	2kV	1kV	
Environment	Free from corrosive gasses and excessive dust				-
Altitude	Up to 2,000m				-
Pollution degree	Less than equal to 2				-
Cooling	Air-cooling				-

Power Specification

Item		Specification			Remark
Input	Rated input voltage	AC100V ~ AC240V			
	Input frequency	50/60Hz			
	Input current	0.7A or less			AC110V
		0.4A or less			AC240V
	Inrush current	120Apeak or less			AC240V, Phase 90 degree
	Leakage current	3mA or less			
	Efficiency	65% or more			
	Permitted momentary power failure	10ms or less			
Output	Output voltage	Voltage	Output voltage ripple range	Current	
		+5V	4.90~5.20V	4A	
		+24V	21.1~26.9V	0.4A	
	Ripple & Noise	Voltage	10ms or	Noise	
		+5V	100mVpp or less	200mVpp or less	
		+24V	400mVpp or less		
	Protecting overcurrent	Voltage	Current		
		+5V	4.4A or more		
		+24V	0.44A or more		

Perfomance Specification

Item			Specification
Operation method			Main task/Periodic task: Fixed cyclic operation, repetitive operation. Initial task: Only once at the time of entering the RUN
Control period			Main task cyclic time: 0.5ms, 1ms, 2ms, 4ms Periodic task cyclic time: Multiple setting of main task
I/O Control method			Synchronized update with main task cycle (Refresh method)
Program language			Ladder Diagram (Function block), Structured Text, G-Code
Number of instruction	Operator		18
	Basic function		202
	Basic function block		174
	Special function block		97
Processing speed	Basic		6.25ns or more (General point/coil)
	Move		5ns or more (Word type)
	Arithmetic		30ns or more (Word type)
Program	number		Max. 256
	Capacity		10MB (Motion program), 10MB (NC program)
External I/O (Remote I/O)			Max. 64 Slaves of Remote I/O (Max. 32 Slaves in case of 32-Axes (Servo, INV) Control)
Data area	Symbolic variable (A)		4.096KB (Retain setting available up to 2,048KB)
	Input variable (I)		16KB
	Output variable (Q)		16KB
	Direct variable (M)		2,048KB (Retain setting available up to 1,024KB)
	Flag variable	F	128KB
		K	18KB
		U	1KB
Timer			No limit in number of I/O points, Time range: 0.001~4,294,967,295sec (1,193hour)
Counter			No limit in number of I/O points, Counter range: 64 bit range
Program			Initial program, Main task program, Periodic task program, NC program
Operation mode			RUN, STOP
Restart mode			Cold, Warm
Self-diagnosis function			Task cycle error, Task time occupancy rate exceed, memory abnormal, power abnormal, etc.
Back-up method			Retain area setting in basic parameter or retain variable setting.
Number of control axis			32axes (Real/Virtual axis), 4 axes (Virtual axis), 64 Slaves (Included,real/virtual axis)
Communication			EtherCAT (CoE: CANopen over EtherCAT, FoE: File Access over EtherCAT)
Communication/Control period			0.5ms, 1ms, 2ms, 4ms (Same with main task period)
Servo drive			EtherCAT servo drive which supports CoE
Control unit			Pulse, mm, inch, degree
Control method			Position, Velocity, Torque (Servo drive support), Synchronous, Interpolation
Range of position / velocity			±LREAL, 0
Torque unit			Rated torque % designation
Acc./Dec. profile			Trapezoidal, S-curve(Regarding Jerk value set by function block)
Rage of Acc/Dec			±LREAL, 0
Manual operation			JOG operation
CAM operation			Up to 32CAM profiles (32, 768 points / 32 CAM profiles)
Absolute System			Available (When using absolute encoder type servo drive)
Encoder input	Channel		2 channels
	Max.input		500kpps
	Input method		Line drive input (RS-422A IEC specification), Available open collector output type encoder
	Input type		CW/CCW, Pulse.Dir, Phase A/B

Specification

Perfomance Specification

Item		Specification
Input / Output	Digital input / output	8 point / 16 points (Tr. output)
	Analog input / output	Channels: 2ch In, 2ch Out Input/Output Voltage Range: -10~10V / 0~10V / 1~5V / 0~5V Input Current Range : 4~20mA / 0~20mA Max, resolution : 14bit (1/16000), Accuracy: 0.2% (25℃), 0.3% (0~55℃) Conversion speed: 0.5ms / channel Absolute maximum input: Voltage 15 VDC, Current 30mADC
Coordinate Systems	Applicable Robot	Cartesian, Delta
	Settings	XG5000
	Control Language	Function Block
SD memory	Type	Micro SD/SDHC
	File system	FAT32
	Capacity	Max. 32GB installation (Memory over 8GB can use only 8GB of overall area)
	Service	Program back-up/Restoration, Booting operation , Data log
Embedded Ethernet	Communication Speed	Auto/10Mbps/100Mbps
	Communication Port	1 port
	Communication Distance	Max. distance between nodes: 100m
	Service	Loader Service (XG5000) XGT Protocol (LS protocol), Modbus TCP FTP Server: Able to Read/Write SD Memory Files from Other Devices SNTP Client: Network time Synchronization with Server
USB	Performance	USB 2.0, 1 port
	Service	Loader service (XG5000)
Error indication		Indicated by LED
Weight		790g

Communication Specification

Item	Specification
Communication protocol	EtherCAT
Support specification	CoE (CANopen over EtherCAT)
Physical layer	100BASE-TX
Communication speed	100Mbps
Topology	Daisy Chain
Communication cable	Over Cat. 5 STP (Shielded Twisted-pair) cable
Number of maximum slave	64 (Able to mapping Max. 32 drive to motion axis)
Communication period	0.5ms/1ms/2ms/ 4ms
Synchronous Jitter	Under 1us
Synchronous Communication	PDO (Process Date Object) Mapping through CoE
Non-Synchronous communication	SDO (Service Data Object) Communication through CoE
Communication setting	Set the Communication configuration using XG5000

Motion Solution

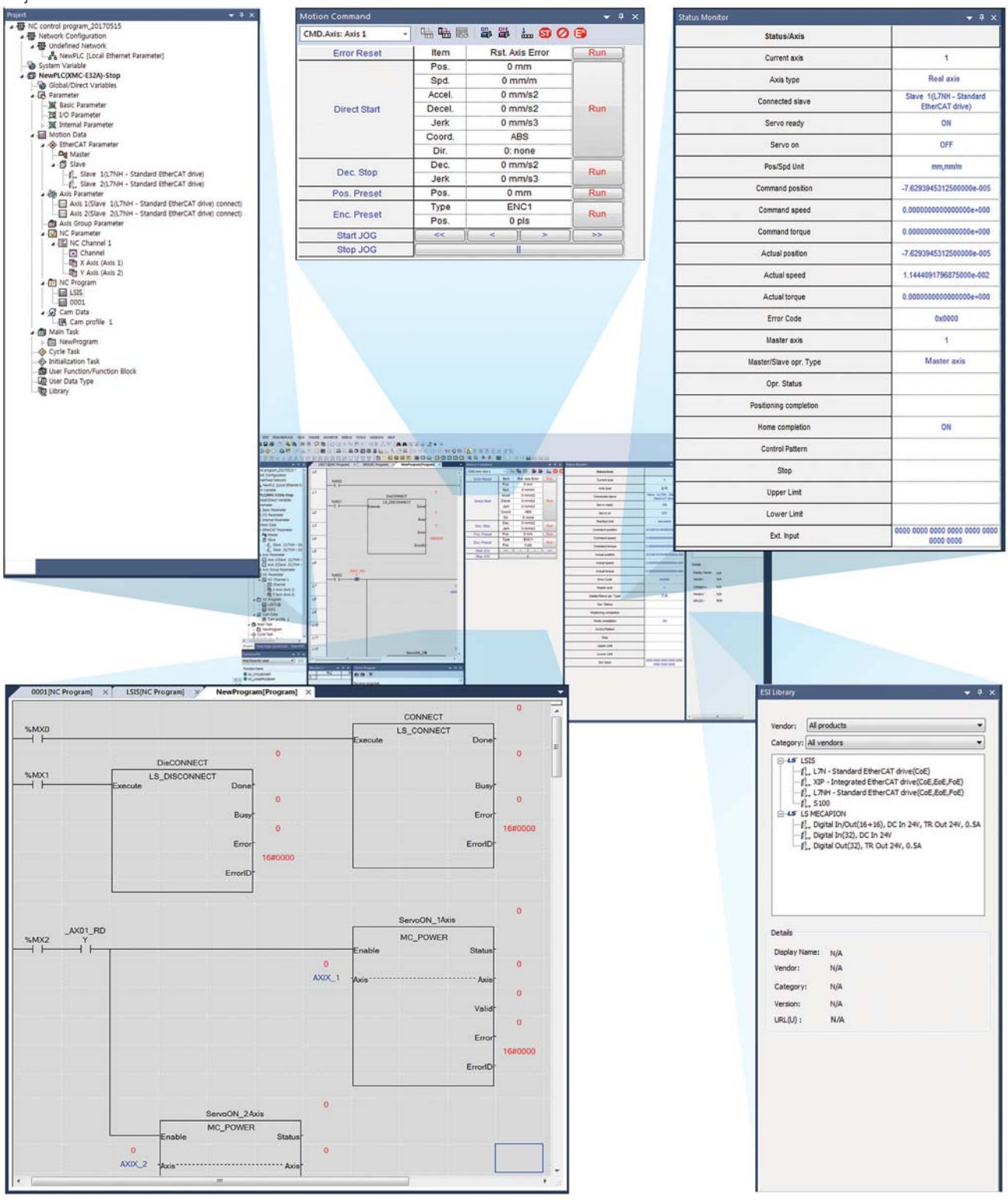
XG5000: All You Need for both PLC Programming and Motion Control

All the control windows, that is, project, program editor, motion control commands and status monitor, are implemented in a single tool, XG5000.

Project Tree

Motion Command

Status Monitor



Program Editor

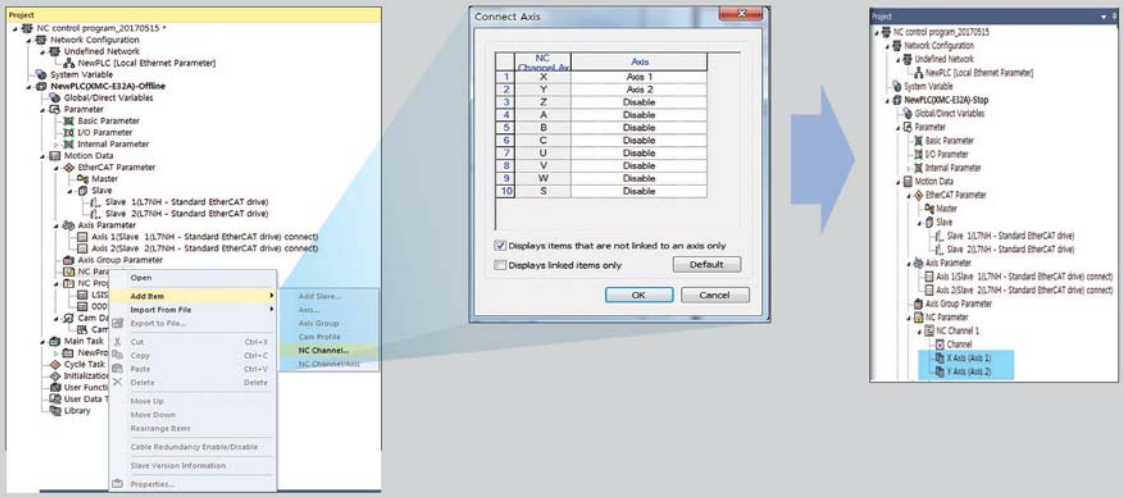
ESI Library

Motion Solution

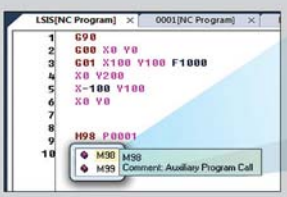
G-code Commands Available for Controlling CNC Equipments

Control CNC equipments such as packing machine and cutting machine easily with G-code commands.

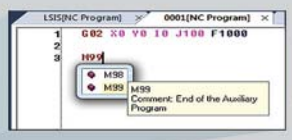
Choose NC channel & axis



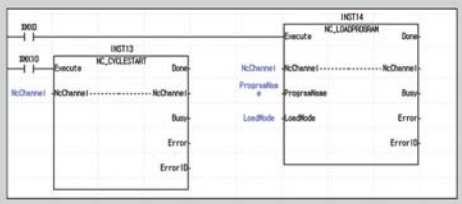
NC programming by G-code & M-code



Main program



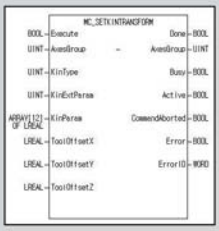
Sub program



NC program control by NC Function Block
(NC_LOADPROGRAM, NC_CYCLESTART)

Robot Control: Innovative Control Function for Smart Solution

With the support of group motion in coordinate system, it is possible to control various types of robots such as Cartesian, Delta3, Delta3R and Linear Delta.



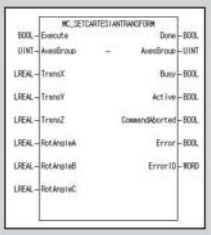
or

Coordinate system configuration		
	Coordinate system Type	0: None
	Coordinate system parameter1	
	Coordinate system parameter2	
	Coordinate system parameter3	
	Coordinate system parameter4	
	Coordinate system parameter5	
	Coordinate system parameter6	0

0: None
1: XYZ
2: Delta3
3: Delta3R
4: LinearDelta3
5: LinearDelta3R

Coordinate system and tool setting via
MC_SETKINTRANSFORM
(Set in axis group parameter)

XYZ/Delta3/Delta3R/Linear Delta

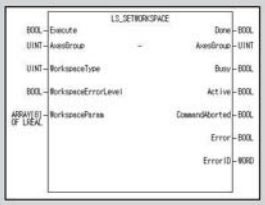


or

PCS Configuration		
	X-axis feed amount	0 mm
	Y-axis feed amount	0 mm
	Z-axis feed amount	0 mm
	X-axis rotation	0 deg
	Y-axis rotation	0 deg
	Z-axis rotation	0 deg

PCS setting via
MC_SETCARTESIANTRANSFORM
(Set in axis group parameter)

Indicate the position of the machine by moving or rotating based on the product coordinate system



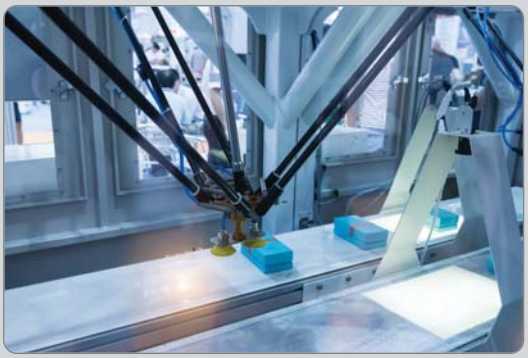
or

Workspace configuration		
	Workspace type	0: Rectangle
	Workspace error check	0: Disable
	Workspace Parameter1	170 mm
	Workspace Parameter2	-170 mm
	Workspace Parameter3	170 mm
	Workspace Parameter4	-170 mm
	Workspace Parameter5	-380 mm
	Workspace Parameter6	-580 mm
	Workspace Parameter7	0
	Workspace Parameter8	0

Work space setting via
MC_SETWORKSPACE
(Set in axis group parameter)

Safe workspace setting to prevent safety accidents

Starting operation by coordinate system dedicated command such as
MC_MOVECIRCULARABSOLUTE2D, LS_MOVELINEARTIMEABSOLUTE, etc.

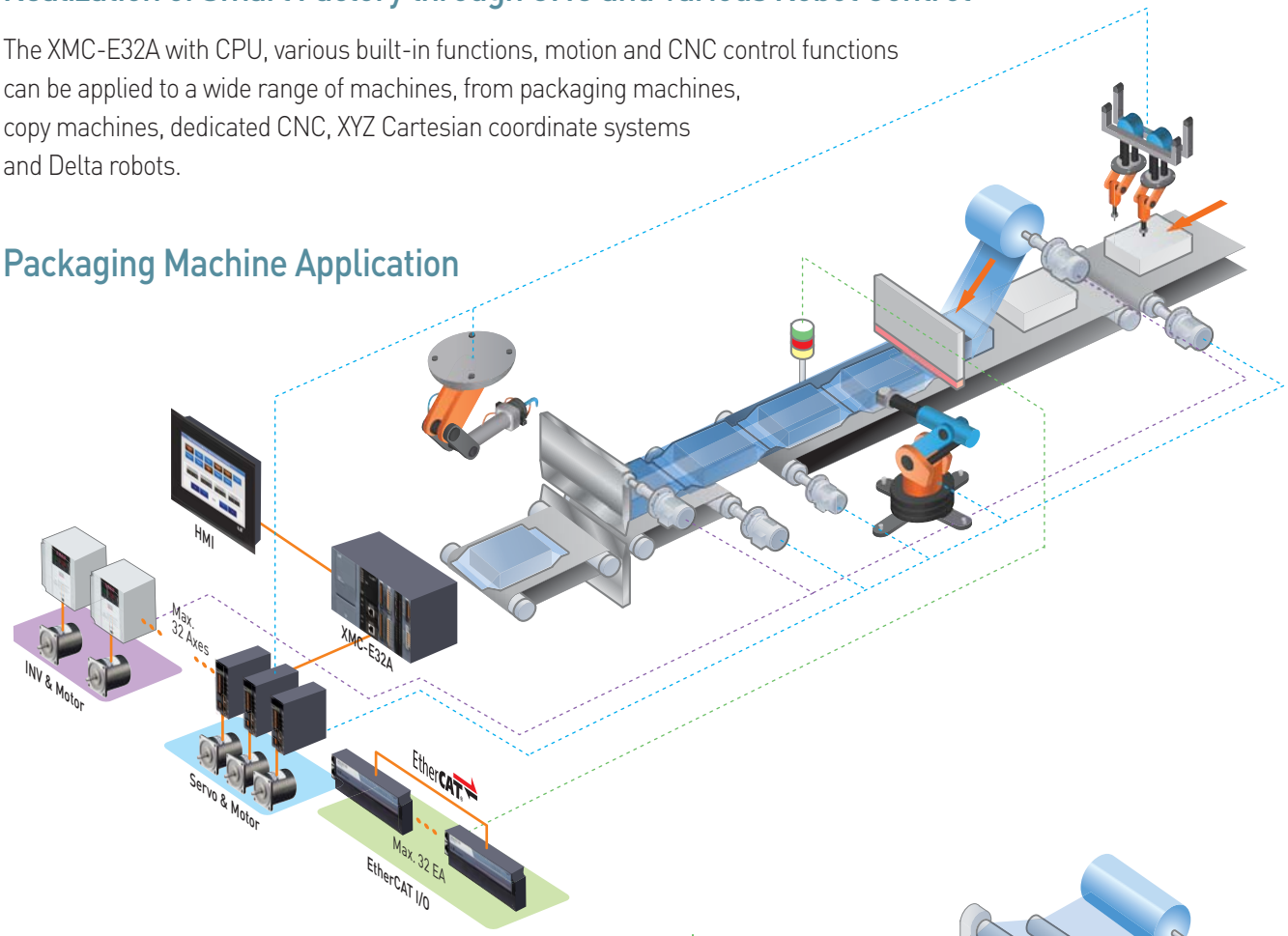


Application

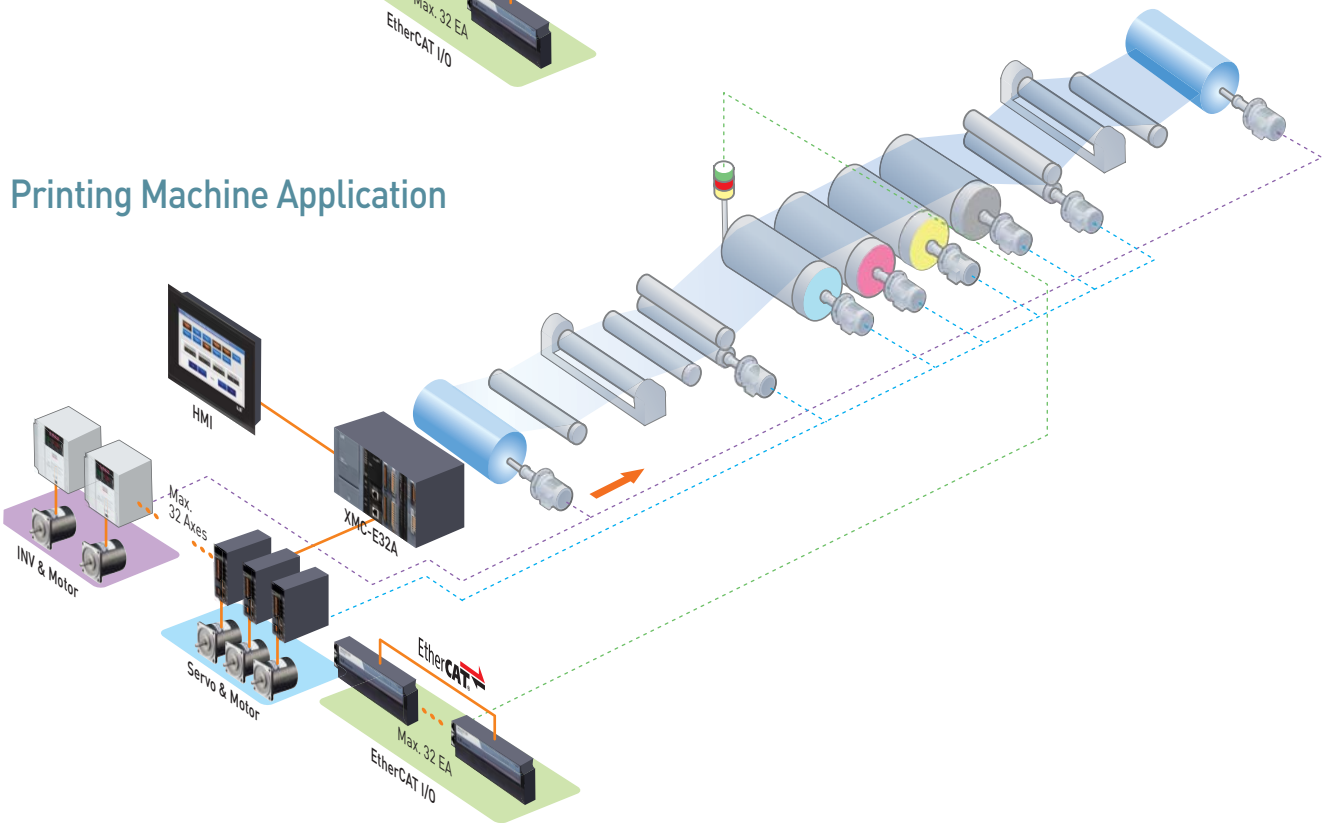
Realization of Smart Factory through CNC and Various Robot Control

The XMC-E32A with CPU, various built-in functions, motion and CNC control functions can be applied to a wide range of machines, from packaging machines, copy machines, dedicated CNC, XYZ Cartesian coordinate systems and Delta robots.

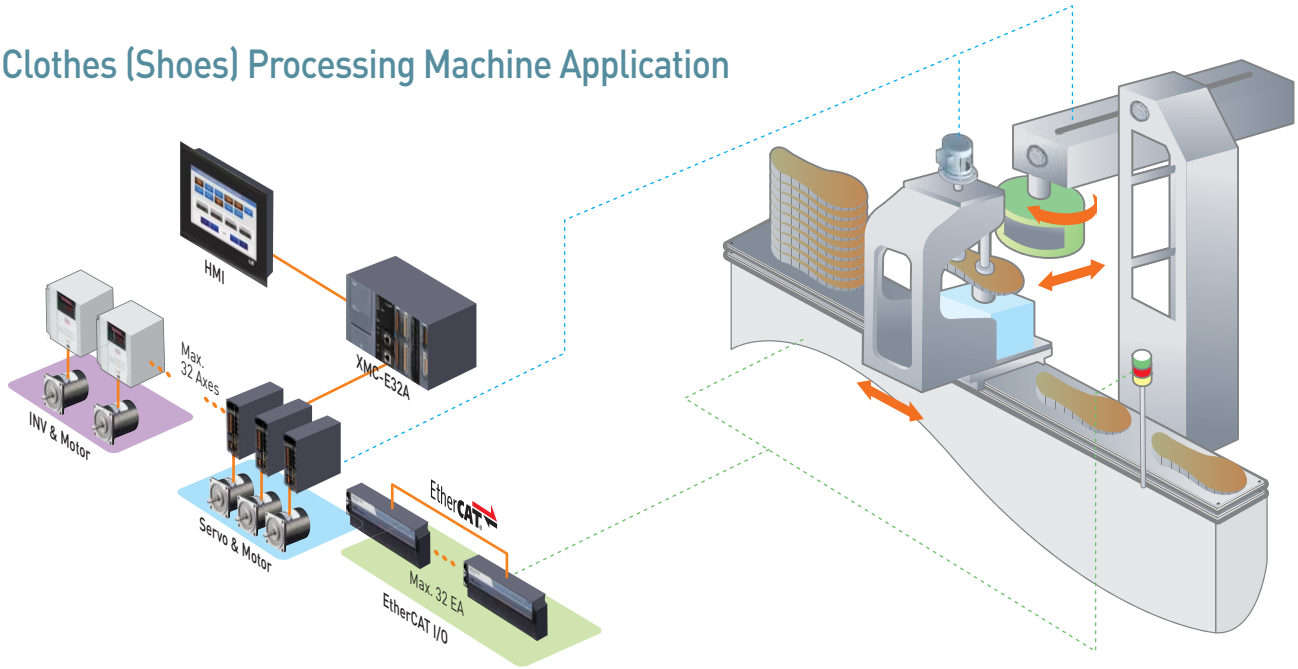
Packaging Machine Application



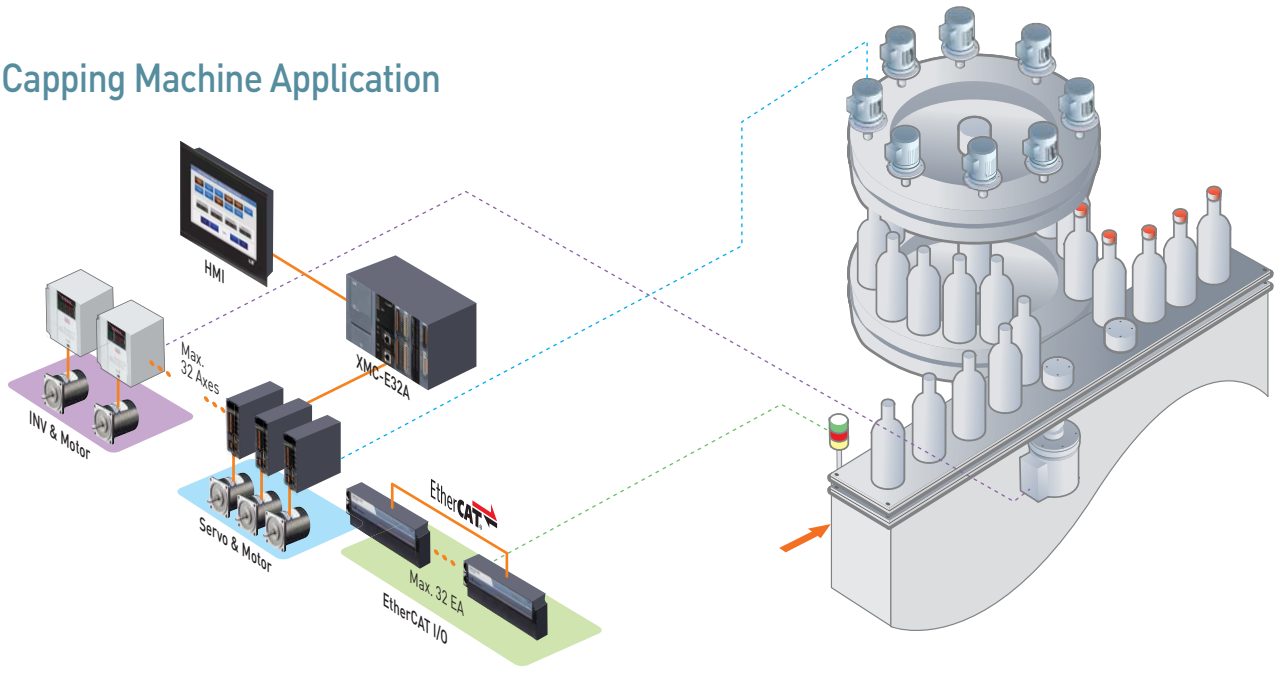
Printing Machine Application



Clothes (Shoes) Processing Machine Application



Capping Machine Application



※Refer to LSIS servo drive/motor catalogue and LSIS planetary gearbox catalogue for further details.

Motion Function Block

Single-axis Command_21

Single-axis command	Function
MC_Power	Servo On/Off
MC_Home	Perform the search home
MC_Stop	Stop immediately
MC_Halt	Stop
MC_MoveAbsolute	Absolute positioning operation
MC_MoveRelative	Relative positioning operation
MC_MoveAdditive	Additive positioning operation
MC_MoveVelocity	Specified velocity operation
MC_SyncMoveVelocity	Velocity control (CSV)
MC_MoveContinuousAbsolute	Absolute position operation ending with specified velocity operation
MC_MoveContinuousRelative	Relative position operation ending with specified velocity operation
MC_TorqueControl	Torque control
MC_ReadParameter	Read Parameter
MC_WriteParameter	Write Parameter
MC_Reset	Reset axis error
MC_TouchProbe	Touch probe
MC_AbortTrigger	Abort trigger events
MC_MoveSuperImposed	SuperImposed operation
MC_HaltSuperImposed	SuperImposed operation halt
MC_SetPosition	Setting the current position
MC_SetOverride	Velocity/Acceleration override

Group Command_20

Group command	Function
MC_AddAxisToGroup	Adds one axis to a group in a structure AxesGroup
MC_RemoveAxisFromGroup	Removes one axis to a group in a structure AxesGroup
MC_UngroupAllAxes	Removes all axes from the group AxesGroup
MC_GroupEnable	Changes the state for a group from GroupDisabled to GroupEnable
MC_GroupDisable	Changes the state for a group to GroupDisabled
MC_GroupHome	The AxesGroup to perform the search home sequence
MC_GroupSetPosition	Sets the Position of all axes in a group without moving
MC_GroupStop	Stop a Group immediately
MC_GroupHalt	Stop a Group
MC_GroupReset	Reset a group error
MC_MoveLinearAbsolute	Absolute positioning linear interpolation operation
MC_MoveLinearRelative	Relative positioning linear interpolation operation
MC_MoveCircularAbsolute	Absolute positioning circular interpolation operation
MC_MoveCircularRelative	Relative positioning circular interpolation operation
MC_SetKinTransform	Machine information setting
MC_SetCartesianTransform	PCS setting
MC_MoveCircularAbsolute2D	Circular interpolation operation for absolute position of coordinate system
MC_MoveCircularRelative2D	Circular interpolation operation for relative position of coordinate system
MC_TrackConveyorBelt	Synchronization setting of the conveyor belt
MC_TrackRotaryTable	Synchronization setting of the rotary table

Multi-axis Command_6

Multi-axis command	Function
MC_CamIn	Camming run
MC_CamOut	Camming stop
MC_GearIn	Electrical gearing run
MC_GearOut	Electrical gearing disengage
MC_GearInPos	Electrical gearing by specifying the position
MC_Phasing	Phase compensation

LS Command

LS command	Function
LS_Connect	Connect servo drives
LS_Disconnect	Disconnect servo drives
LS_ReadSDO	Read SDO
LS_WriteSDO	Write SDO
LS_SaveSDO	Save SDO
LS_EncoderPreset	Encoder preset
LS_Jog	JOG operation
LS_ReadCamData	Read CAM data
LS_WriteCamData	Write CAM data
LS_ReadEsc	Read ESC
LS_WriteEsc	Write ESC
LS_CamSkip	Skip CAM
LS_VarCamIn	Variable CAM operation
LS_VarGearIn	Variable gear operation
LS_VarGearInPos	Variable positioning gear operation
LS_ReadCAMtableSlavePos	Read the slave location of the CAM table
LS_InverterWriteVel	Write inverter speed
LS_InverterReadVel	Read inverter speed
LS_InverterControl	Write inverter control word
LS_InverterStatus1	Read inverter status 1
LS_InverterStatus2	Read inverter status 1
LS_SyncMoveVelocity	Speed control operation (csv mode)
LS_SetWorkSpaceTransform	Work space setting
LS_MoveLinearTimeAbsolute	Time- linear interpolation operation for absolute position of coordinate system
LS_MoveLinearTimeRelative	Time- linear interpolation operation for relative position of coordinate system
LS_RobotJOG	JOG operation of the coordinate system
LS_SetMovePath	Set path operation data
LS_ResetMovePath	Delete path operation data
LS_GetMovePath	Read path operation data
LS_RunMovePath	Perform path operation

CNC Control Codes and Commands

G-code

G-code	Function
G00	Rapid positioning control
G01	Linear interpolation feed control
G02	Clockwise circular / helical interpolation
G03	Counter clockwise circular / helical interpolation
G04	DWELL function
G09	Exact Stop
G17	Select the circular interpolation plane (XY plane)
G18	Select the circular interpolation plane (ZX plane)
G19	Select the circular interpolation plane (YZ plane)
G21	Metric input
G22	Stroke check function ON
G23	Stroke check function OFF
G27	Homing check
G28	Automatic homing
G29	Return at the auto-origin
G30	Automatic 2nd and 3rd homing
G40	Cancel compensation of tool diameter
G41	Compensate the tool diameter to the left
G42	Compensate the tool diameter to the right
G43	Compensate the tool length in the direction of +
G49	Cancel compensation of the tool length
G52	Set the local coordinate system
G53	Select the machine coordinate system
G54	Select the workpiece coordinate system 1
G55	Select the workpiece coordinate system 2
G56	Select the workpiece coordinate system 3
G57	Selecting the workpiece coordinate system 4
G58	Selecting the workpiece coordinate system 5
G59	Selecting the workpiece coordinate system 6
G60	Single direction positioning
G90	Absolute command
G91	Incremental command
G92	Set the workpiece coordinate system
G94	Feed mode command per minute
G95	Feed mode command per revolution
G107	Cylindrical interpolation mode setting
G112	Interpolation mode of the polar coordinate ON
G113	Interpolation mode of the polar coordinates OFF

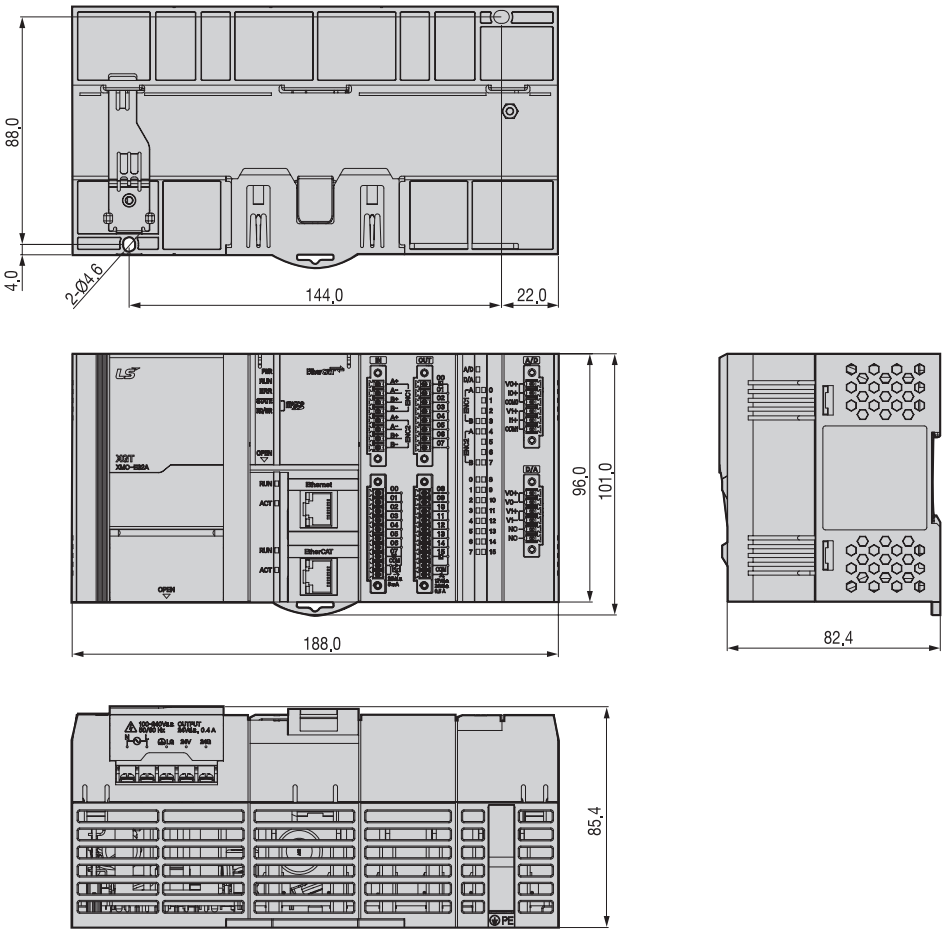
M-code

M-code	Function
M00	Program stop
M01	Optional stop
M02	Program END
M03	Forward rotation of the main axis
M04	Reverse rotation of the main axis
M05	Main axis stop
M06	Tool change
M08	Coolant ON
M09	Coolant OFF
M30	End of the program
M98	Auxiliary program call
M99	End of the auxiliary program

NC Command

NC command	Function
NC_LoadProgram	Specify NC program
NC_CycleStart	Start automatic operation
NC_BlockControl	Specify Block operation
NC_FeedHold	Feed Hold
NC_Emergency	Emergency stop
NC_Reset	reset
NC_RapidTraverseOverride	Rapid traverse override
NC_CuttingFeedOverride	Cutting feed override
NC_SpindleOverride	Spindle override
NC_Home	Homing
NC_McodeComplete	M Code operation completed
NC_ScodeComplete	S Code operation completed
NC_TcodeComplete	T Code operation completed
NC_ReadParameter	Read NC parameters
NC_WriteParameter	Write NC parameters

Outline



Safety Instructions

- For your safety, please read user's manual thoroughly before operating.
- Contact the nearest authorized service facility for examination, repair, or adjustment.
- Please contact qualified service technician when you need maintenance. Do not disassemble or repair by yourself.
- Any maintenance and inspection shall be performed by the personnel having expertise concerned.

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Specifications in this catalog are subject to change without notice due to continuous product development and improvement.