

The **LEGEND** Motion Control System For The Complete Automation Solution With Comprehensive Software

Economical, State-of-the-Art Performance From The **LEGEND** Digital Torque Amplifier

More than just a cost-effective amplifier solution, the **LEGEND** delivers the kind of performance and reliability you expect from the world's number one supplier of AC servos. As a component used with other controls or as part of a complete Yaskawa system, the **LEGEND** is an exemplary product.

100% Digital Design
From the encoder to the amplifier outputs, this design eliminates 'drift,' makes setup virtually automatic, and provides comprehensive diagnostics.

Yaskawa Quality
The world's leading TQM culture insures consistent operation to specification, whether you purchase one or a thousand units, all at once or one at a time.

- 4 Amplifier Sizes
- 30 Motors to 1.5kW
- Universal Input Voltage
- Sinusoidal Commutation

Intelligent Serial Encoder
The key to Plug-and-Play operation, this proven digital link is also easy to wire using industrial USB connectors. Incremental encoders need only 4 wires to enable automatic setup, protection, and operation for all motors.

Full Features
Dynamic braking is built in. Operation on single-phase or three-phase power with a wide AC and DC input range makes it easy to use, worldwide. Simple switch settings for motor direction, input filter, and encoder scaling completes the package for most applications. Four amplifier sizes (100W-1,500W) and 23 motor choices cover a wide range of needs.

Ethernet Motion Control Functionality From The **LEGEND-MC**

The new **LEGEND-MC** is an optional, snap-on motion control card for **LEGEND** torque amplifiers, providing a complete motion solution. The **LEGEND-MC** motion control module adds the functionality and features required by more demanding motion control applications. Beyond 1 axis of motion control functionality, the **LEGEND-MC** also offers virtual point-to-point, multi-axis motion control capability up to 4 axes.

Ethernet Connectivity
The built-in connection enables connectivity to other **LEGENDS**, clients, and Ethernet I/O.

Field-Upgradable Firmware
You can take advantage of new technology easily! Future product enhancements and upgrades will be made available via a network download or from your PC into flash memory.

Plug-and-Play
Just snap-on the **LEGEND-MC** to the

LEGEND amplifier and you have powerful motion control capabilities. All the required interface signals and DC power are connected when you snap the modules together. Seamless integration reduces installation time, reduces documentation, and speeds up troubleshooting.

Programming Structure
A basic programming language-like format helps you build complex machine logic.

Modes of Motion
Jogging, point-to-point, electronic gearing, and electronic camming. Create your own custom cam formulas using the comprehensive, built-in math functions.

Integrated Functionality Between Amplifier & Controller
Integration is seamless. The **LEGEND** amplifier and **LEGEND-MC** controller share a common interface which will minimize troubleshooting time.

World Class Reliability Only Sigma II Motors Can Deliver

Known for its rock-solid performance and reliability, the Sigma II series of motors enjoys an incredible 2,000,000 hours MTBF.* Its compact design and lightweight, rugged construction serve the universal design needs of machine builders to minimize space and weight considerations, yet maximize output.

Exceptional Low Speed Performance
Unique physical design features minimize cogging.

High Overload Capacity
Tolerant of dynamic loads, the Sigma II series of motors can deliver the torque you need in peak load situations - up to 300% for three seconds for superior

productivity. In excessive situations, the **LEGEND** amplifier will automatically detect the problem and protect the system before any damage is caused.

Motors with NEMA Flanges
NEMA 23 and 34 flanges available to 800 watts.

Choose from four NEMA sizes:
 • 100W with NEMA 23 Adapter Flange
 • 200W & 400W with NEMA 23 Motor Flange
 • 800W with NEMA 34 Motor Flange

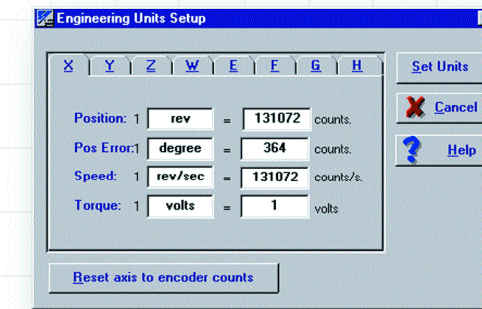
Linear Motors are Easy
Three styles of linear motors up to 1200 N peak force expand your choices.

* Based on Field Performance

YTerm Software: An Intuitive Programming Package For The **LEGEND-MC**

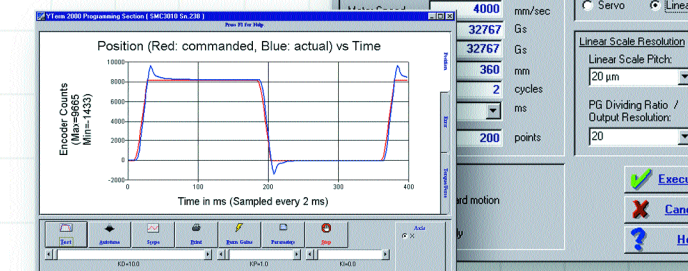
Designed to facilitate programming and problem solving, YTerm is the front-end software package for the Yaskawa series of **LEGEND-MC** motion controllers.

A user-friendly, Windows interface is used for design, development, and debugging of motion control applications. The software package consists of three easy-to-use main sections:

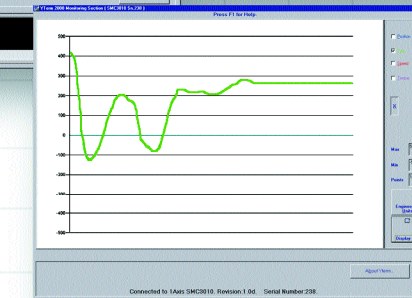


Programming Section
Edit, transfer, and monitor programs for the motion controller

Tuning Section
Tune the **LEGEND-MC's** axis and test the servo system's performance using a four-channel scope to graph performance data



Monitoring Section
Monitor motion and I/O on the controller

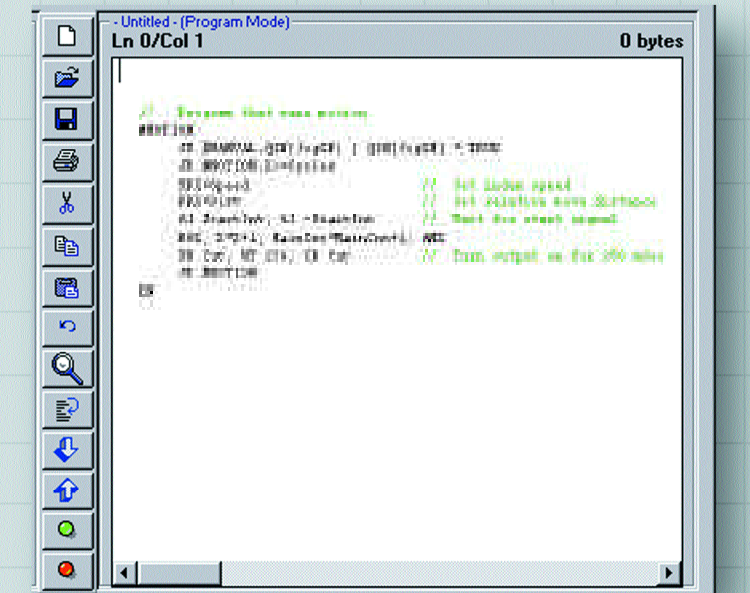


YTerm Motion Control Command Examples

Motion	Control Filter Settings
38 Commands Used to specify modes and parameters	14 Commands Set up loop variables and options
AB Abort Motion	FA Acceleration
BG Begin Motion	FF Feed Forward
EA Select Master Cam Axis	DV Dual PID Loop
GR Gear Ratio	IL Integrator Limit
	NF Notch Filter

Program Flow	Status
29 Commands Used to control program sequencing	18 Commands Interrogates the system in operation
AI After Input	RP Report
IF If Statement	Command
JS Jump to Subroutine	Position
TW Timeout for In-position	TD Tell Dual Encoder
XQ Execute Program	TV Tell Velocity

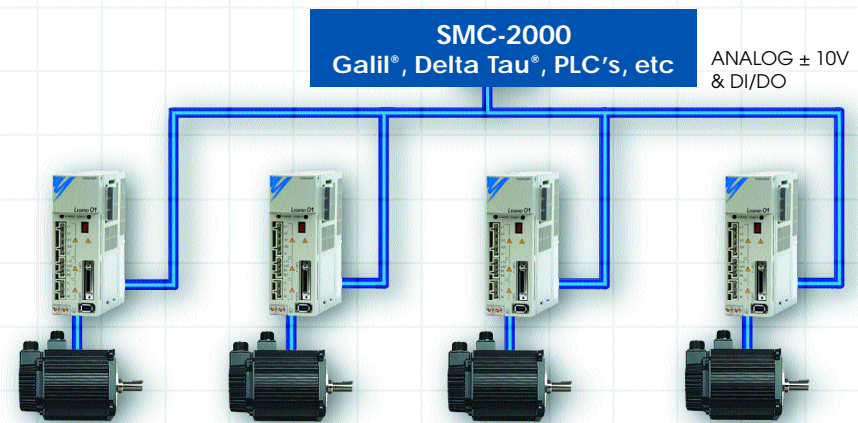
General Configuration	Errors and Limits
31 Commands Sets variables and controls unit functions	4 Commands Sets system limits
AL Arm Latch	BL Reverse Software Limit
BP Burn Program	OE Off on Error
DA Dimension Arrays	
MT Motor Type Define	
II Interrupt Input	



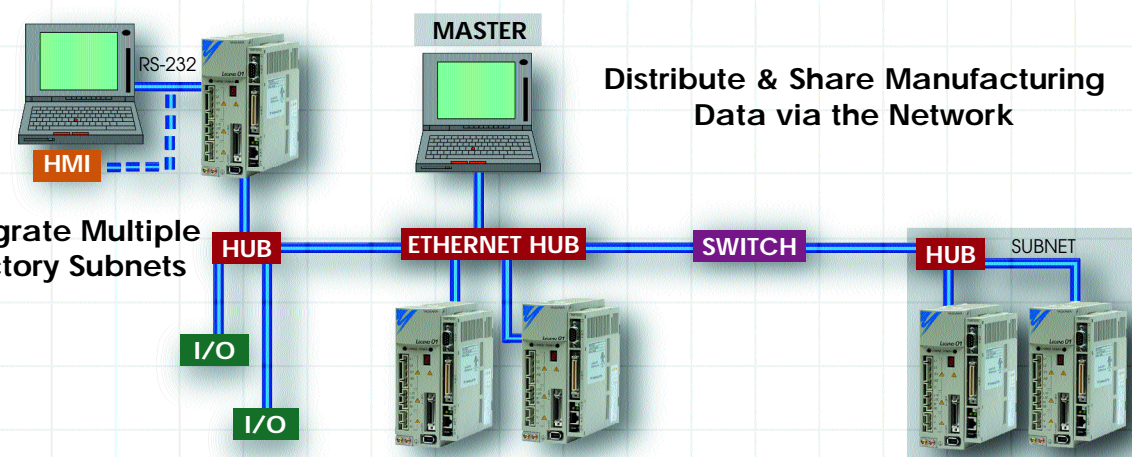
Harnesses The Power Of Ethernet Connectivity

From the boardroom to the shipping dock, Ethernet has become a leading industry standard in enterprise networking. With the **LEGEND-MC** motion controller, you can take full advantage of the convenience, flexibility, and power of Ethernet connectivity. This page illustrates only a few scenarios of how the **LEGEND** series can be utilized in an Ethernet network scheme or with regular controllers.

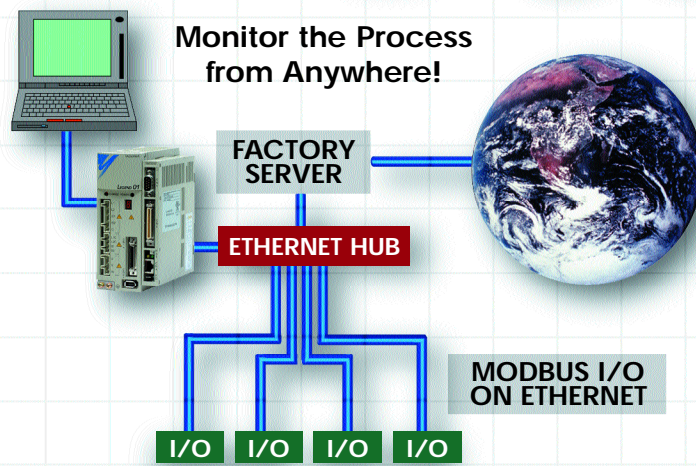
Conventional Motion Controller



Distribute & Share Manufacturing Data via the Network

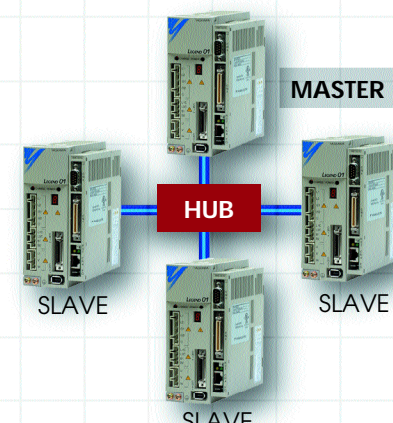


Integrate Multiple Factory Subnets



Expand Your System Using Commercially Available I/O

All Programming in the Master



Point-to-Point Four Axis Control via Ethernet



LEGEND Amplifier Models & Motor Summary

BASIC SPECIFICATIONS	Main Circuit Power	Single-Phase: 90 - 253VAC or Three-Phase: 90 - 253VAC or 127 - 357VDC
	Control Power	Single-Phase: 90 - 253V
I/O SIGNAL	Control Method	IGBT Sinusoidal PWM Modulation
	Feedback	Incremental Serial Encoder
	Operating/Store Temperature	0 to 55°C / -20 to 85°C
	Operating/Store Humidity	Less than 90%RH (Free from condensation)
	Mounting	Base Mounted
	Anti-Vibration/Anti-Shock	4.9m/s ² / 9.8m/s ²
BUILT-IN FEATURES	Torque Reference Input	±10V, 16-Bit Resolution
	Digital Inputs, Optically Isolated	12V - 24VDC and TTL (Servo Amplifier Enable, Dynamic Brake Enable)
	Digital Outputs, Optically Isolated	12V - 24VDC and TTL (Alarm, Run)
	Encoder Dividing Output	Phase A, Phase B, Phase C Line Driver (Dividing function is available)
SMC3010 MOTION CONTROLLER SPECIFICATIONS	Speed Monitor	1V/1000rpm
	Torque Monitor	5V/Max. Torque
	Regenerative Energy Dissipation	100W: Built-In Capacitor 400W: Built-In Circuit, External Resistor
	Error Detection	Overcurrent, Overvoltage, Undervoltage, Regenerative Error, etc. (12 total)
	Display	Main Circuit Power Charge LED, Control Power LED, 7-Segment LED Status Display
	Digital Inputs, Optically Isolated	8 Programmable, 5 dedicated, +24VDC
	Digital Outputs, Optically Isolated	4 Programmable, 2 dedicated, +24VDC
	Analog Inputs	2 Inputs, +/- 10V, 12-Bit Resolution
	Analog Output	1 Output, +/- 10V, 16-Bit Resolution
	External Encoder Input	1 External Encoder Input, Up to 12MHz; A, B Channel
Power Output	5.15V ± 5% (500mA) ± 12V ± 5% (60mA)	
Serial Communication	1 RS-232 Port, 9600 or 19200 Baud	
Ethernet Communication	1 Port, 10 Base-T, ASCII and Modbus Protocols Supported	
Programming Features	YTerm Software, Multi-Tasking, Math Functions, Simple Command Structure	
Program Memory Size	500 Lines X 80 Characters of Program Code	
Physical Dimensions	5.6" (142mm)H X 0.8" (20mm)W X 5.1" (130mm)D	

Amplifier Model: SGDG	01	04	10
Servomotor Model: SGMAH	A3A	A5A	01A
Rated Output	0.03	0.05	0.1
Rated Torque	0.85	1.41	2.81
Maximum Instantaneous Torque	2.53	4.22	8.45
Rotor Inertia	0.147	0.195	0.322

Amplifier Model: SGDG	01	04	10	15
Servomotor Model: SGMPH	01A	02A	01B	02B
Rated Output	0.1	0.2	0.1	0.4
Rated Torque	2.81	5.64	2.81	5.64
Maximum Instantaneous Torque	8.45	16.90	8.45	16.90
Rotor Inertia	0.43	1.71	0.43	1.71

Amplifier Model: SGDG	10	15
Servomotor Model: SGMGH	03 B	05 A
Rated Output	0.3	0.45
Rated Torque	25.14	78.95
Maximum Instantaneous Torque	63.46	122.14
Maximum Rotation Speed	2000	3000
Rotor Inertia	64.08	64.08

Amplifier Model: SGDG	10	15
Servomotor Model: SGMSh	10 A	15 A
Rated Output	1.0	1.5
Rated Torque	28.15	43.37
Maximum Instantaneous Torque	84.44	130.11
Rotor Inertia	15.40	21.88

Motor Enclosures: SGMPh, SGMGH, SGMSh: IP67
SGMAH: IP55
Max. Rotation Speed: SGMAH, SGMPh, SGMSh: 5000 rpm
SGMGH: 3000 rpm

See full catalog for complete information

A full line of linear motors is available for your application success. Ask your Yaskawa Sales Representative for information on the solutions we can provide, or visit us at www.yaskawa.com.



Yaskawa Electric America
2121 Norman Drive South
Waukegan, IL 60085
1-800-YASKAWA
www.yaskawa.com

Yaskawa Electric Europe
Am Kronberger Hang 2, 65824
Schwalbach, Germany
49.6196.569.300
www.yaskawa.de

Yaskawa Electric Corporation
New Pier Takeshiba
South Tower, 1-16-1 Kaigan
Minatoku, Tokyo 105 Japan
81.3.5402.4511
www.yaskawa.co.jp



Breaking Through All The Barriers

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