PRODUCT LINE
IIS Emerald Technology

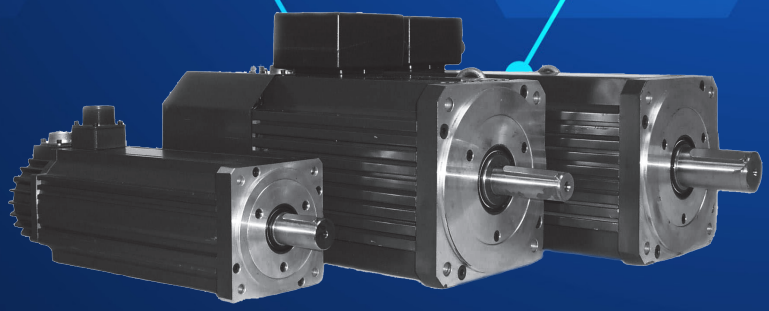
Industrial Indexing Systems, Inc

At-A-Glance

- √ *Designed to control high speed multi-axis production machinery.*
- √ *Ideal for web control, synchronized cut-off, form-fill-seal, cut and seal, punching and forming applications.*
- √ *For use in the manufacture of metal, plastic, paper, and film products.*
- √ *Control up to 32 servo axes using SERCOS II, a deterministic Ethernet device network with scan rates of 500 µsecs minimum.*
- √ *Select from a wide power range of servomotors and inexpensive matching servo drives.*
- √ *Access and control up to 512 digital and analog I/O points.*
- √ *Industrial Ethernet TCP/IP Connectivity*
- √ *DeviceNet Connectivity*
- √ *Serial Communication Ports*
- √ *Inexpensive software tools for application development and system commissioning.*

SERCOS II Controller

SERCOS II Drive



Select from a wide range of Servo Motors

Call us today at (585) 924-9181 to discuss our product line in greater detail

626 Fishers Run, Victor, NY. 14564 ~ info@iis-servo.com ~ www.iis-servo.com

Emerald Automation Controller

Overview
The Emerald Automation Controller is an open architecture high performance multi-axis motion controller designed for demanding applications that require close synchronization of up to 32 servo axes, I/O and auxiliary equipment. The Emerald Automation Controller is powerful enough to execute all of the control functions required in a production environment, thus eliminating the need for additional control devices such as a PLC.

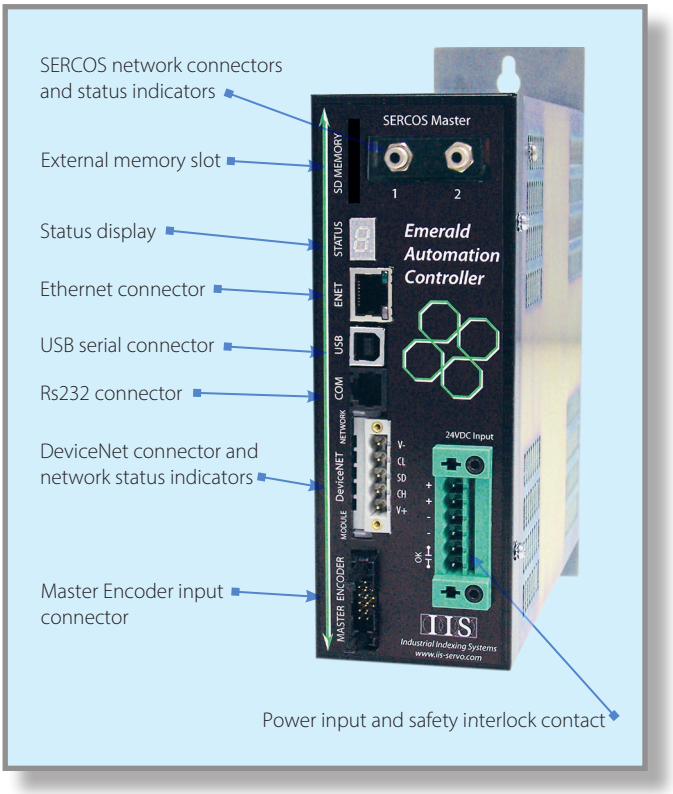
Emerald motion control technologies include indexing, positioning, complex motion trajectories, high speed registration, electronic gearing, electronic cams and programmable limit-switch functions.

Emerald Motion Language™(EML) developed specifically for high performance automation systems, along with the Emerald Development Environment™ (EDE) programming tools, provide all that is needed to produce quality application programs for today's advanced systems.

Real-time Process Environment
Now designers can setup their own real-time configuration for their application using powerful "Event Interrupts." The Emerald Automation Controller defines events as the real-time response to changes of a device state. During the controller configuration process, events are mapped to application software routines designed to perform an immediate action to satisfy the needs of the event. An event can be the result of any change in the state of any input or output device, servo drive status, timers and internal flags.

Motion Functions

- ❖ Positioning -- absolute and relative
- ❖ Indexing -- linear and rotary
- ❖ Synchronizing motion to a registration mark
- ❖ Homing or search for the home position mark
- ❖ Jogging in the CW or CCW direction
- ❖ Acceleration/deceleration profile shapes (trapezoidal, S-curve, or a custom profile)
- ❖ Electronic gear ratio between a master encoder and motor, or motor to a motor.
- ❖ Versatile slave to master locking methods that are analogous to a mechanical clutch, but are programmable.



Programmable Limit Switches (PLS)
Any digital output can be configured as a programmable limit switch. A programmable limit switch is defined as an output that will turn off and on at the required angle positions of a master rotating source such as a motor or encoder. Once configured and enabled by the application, the PLS function operates as an independent process in a real-time environment. Up to eight PLS engine-tasks can be operating simultaneously, each PLS engine controlling up to 16 outputs.

Master/Slave Lock and Unlock Functions
Multiple methods are available for locking a slave function to a master position vector. Slave functions include electronic cams, electronic gear ratio, and the PLS.

External Memory
For convenient machine configuration and setup, the Emerald Automation Controllers use SD and SDHC memory cards to hold backup files for the operating system firmware and application programs.

Ethernet Connectivity
Standard TCP/IP port for Ethernet communication with various industry protocols provide a high speed link to factory networks, PLCs, and HMI devices.

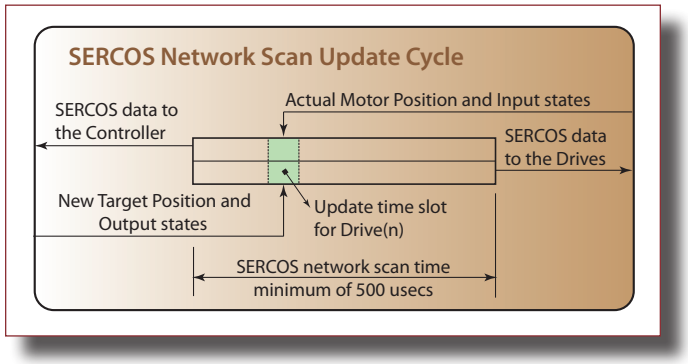
Emerald Specifications

Master Encoder Input Connector
Digital input port provides line shaft encoder interface for synchronizing the entire automation system.

- ❖ Two quadrature A and B channel inputs, with a Z-index input, will interface to industry standard encoder devices.
- ❖ An additional high speed input, to access the position trap circuit for sensing a registration mark position, is standard.

DeviceNet
Universal connectivity network for interfacing to auxiliary devices ranging from simple temperature sensors and controls to sophisticated robotic systems. DeviceNet slave interface is standard, master is optional.

Rs232 Comm Port
Serial interface port available to the application program to access external text displays and color touchscreens.

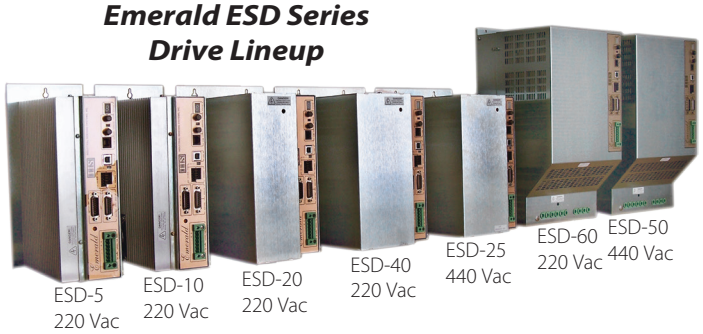


USB 2.0 Port
Executive Serial Port for software development and firmware updates from a PC.

Status Indicator
Seven segment display provides a quick visual indication of real-time operating status.

- ❖ **SERCOS II Automation Network** -- A fiber optic cable network option is available for compatibility with our Emerald Drive series of servo products. Users of a SERCOS II network will see an increase in processing power over the legacy EMC-2005 controller model.

Emerald ESD Series Drive Lineup



Specifications

Size and weight	150 x 40 x 100 mm, 1.2 kg
Power requirements	24 Vdc, 500 milliamps
Operating environment	-10º to 55º C Ambient 10% to 90% RH Non -Condensing
Storage environment	-10º to 65º C
Processor and memory	
Processor	756 Mips, 32 bit bus
External memory,	SD card slot up to 4G bytes
Internal memory,	8 Mbytes of DRAM w/NOR flash
Interfaces	
SERCOS II	16 Mhz, 32 devices
Ethernet	100 Mhz, TCP/IP
USB / Rs232	115,000 / 38,400 Baud
DeviceNet slave	500 kbaud, 64 devices
DeviceNet master*	500 kbaud, 64 devices
Master encoder	4 Mhz input, quadrature
Indicators	
Visual	Built-in 7 segment display, Network status indicators
History view	31 Diagnostic states with alarm storage history

I/O capacity

Digital points	256 Inputs, 256 Outputs
Analog points	32 Inputs, 16 Outputs

Ordering Guide

SERCOS II controller	EMC-2100S2
SERCOS II controller/DeviceNet master	EMC-2100S2S
SERCOS II network cable	C-753001.5
Ethernet Cat5 cable (1 meter)	ECC-ENA101
USB A/B cable (1 meter)	ECC-USB101
Rs232 comm cable	C-987010
PC comm 9-pin adapter	C-822000
Master Encoder (2048 ppr)**	THA-2-2048
Master Encoder (4096 ppr)	THA-2-4096
Encoder Cable (YYY is length)	C-300YYY
Interface Adapter	INT-810
Memory Card	EMM-SD2G
Development Software	EDE v3.06 or later

** DeviceNet master is optional, ** Other line counts are available*

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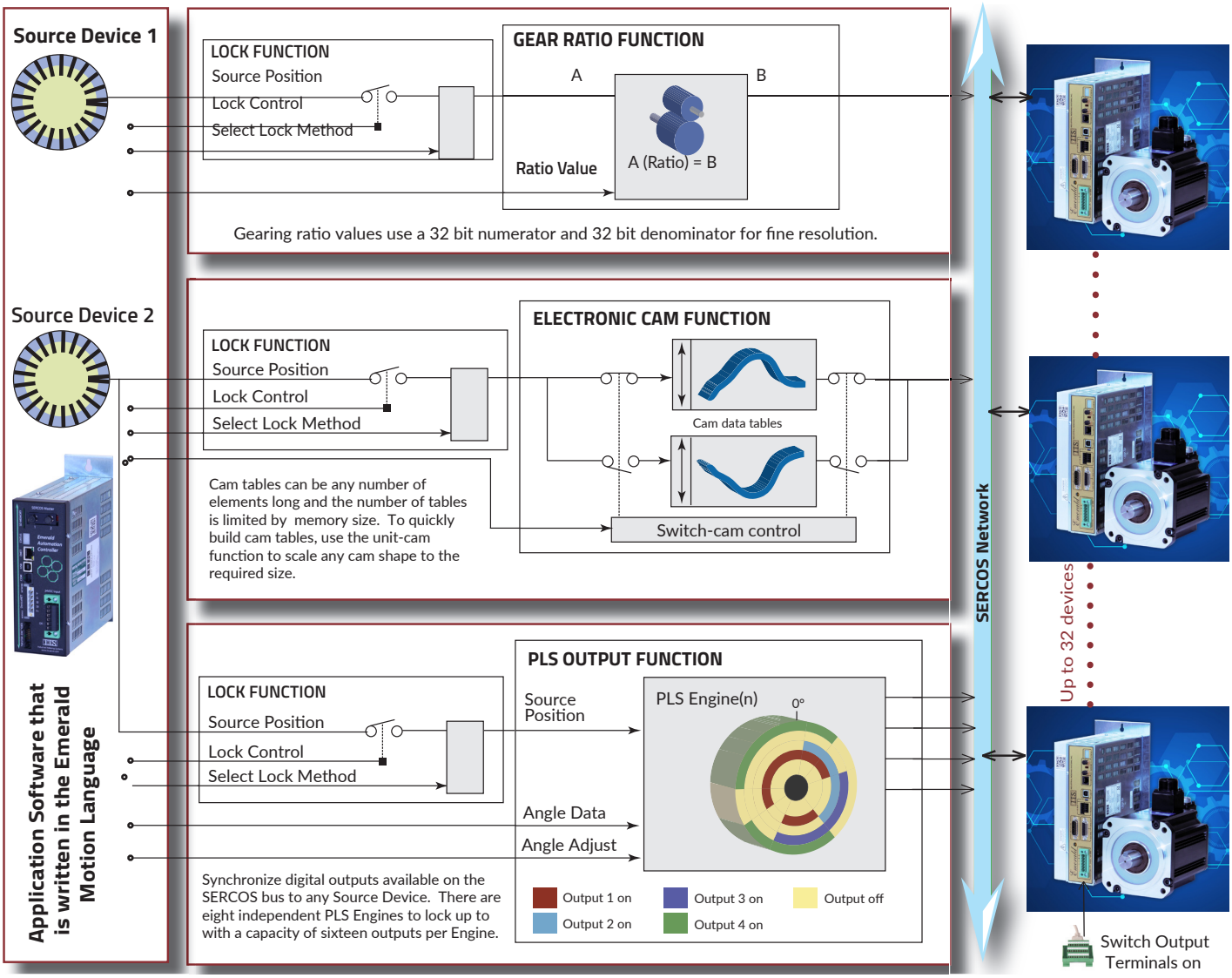
Emerald Motion Technology Overview

The heart of a multi-axis automation system is the ability to synchronize the motion of multiple motors to a designated "master" source device. Depending on the machine application, a source device may be an encoder device measuring web travel, position feedback from another motor that is driving a feed roll, or an Emerald Virtual (software) Motor. A Virtual Motor provides a software-configured internal master source with control over its virtual distance, speed and acceleration.

Synchronization between the source device and a servomotor is achieved using the Emerald electronic gear ratio or electronic cam motion functions. The process starts by locking the master source device to the slave servomotor. How the source device gets locked to the servomotor is critical especially when the source is running. The Emerald Automation Controller provides eight lock methods for smooth and accurate transition regardless of the speed of the source. The source device and the lock method are specified first. Then, the lock control is enabled to start the synchronization process.

Digital outputs are synchronized to a master source using the programmable limit switch (PLS) function. Up to eight independent PLS engines can be enabled with each engine controlling the action of sixteen outputs. Digital outputs can be located on the servo drive or on the SERCOS network using 3rd party I/O interface blocks.

Emerald Automation Controller Functions for Multi-Axis Synchronization



Emerald technology is a universal motion technology that combines real-time functions in a unique software based mechanical / electrical environment

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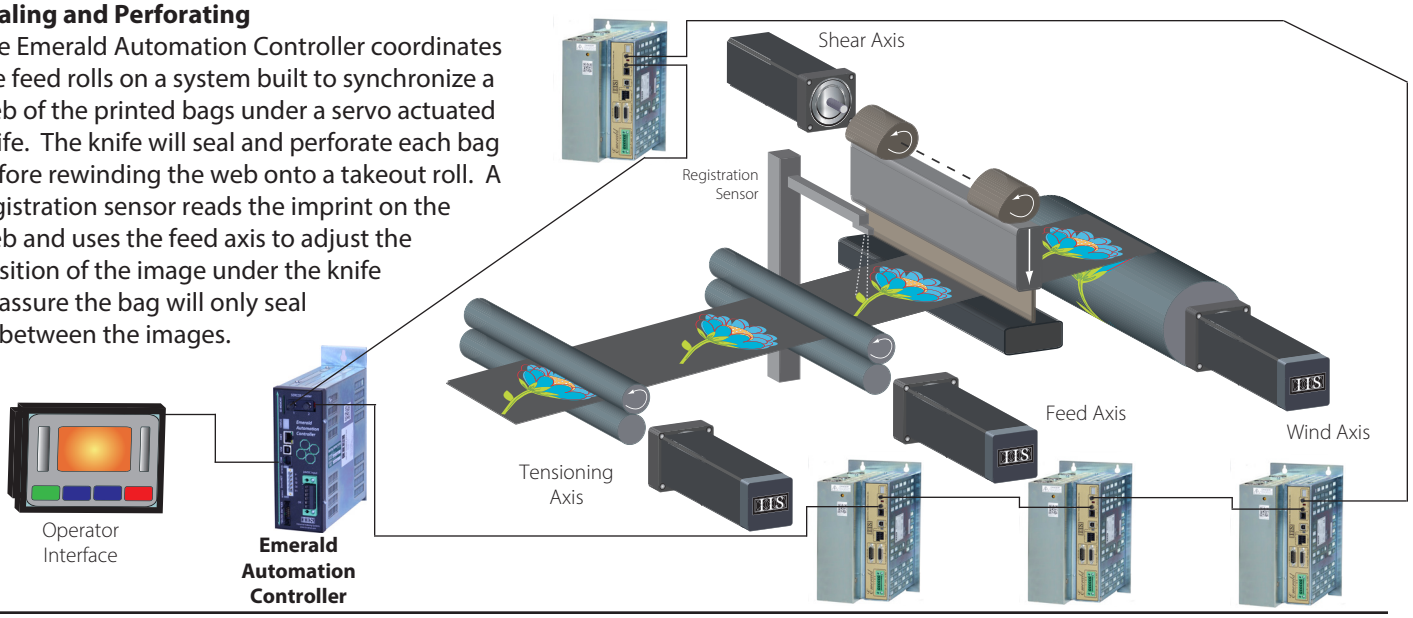
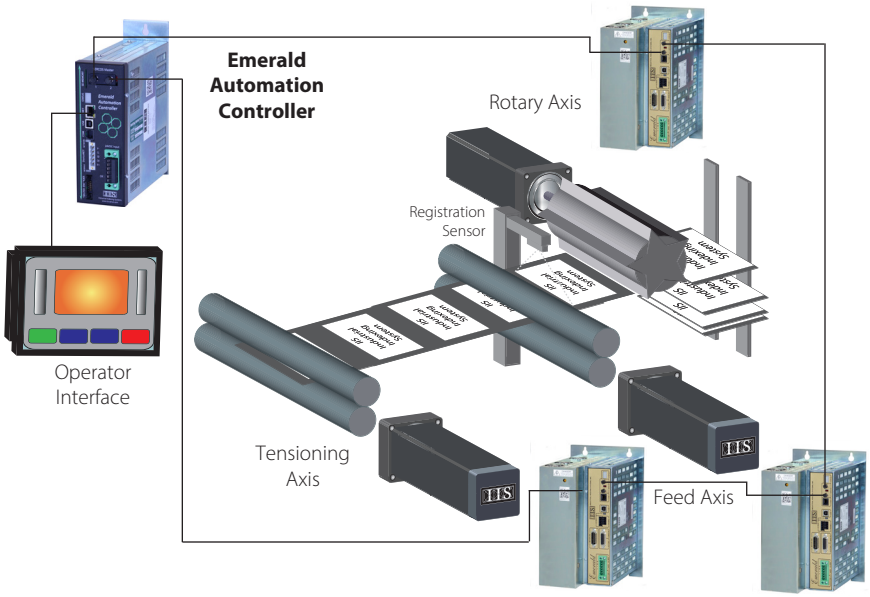
System Application Highlights

Sealing and Perforating

The Emerald Automation Controller coordinates the feed rolls on a system built to synchronize a web of the printed bags under a servo actuated knife. The knife will seal and perforate each bag before rewinding the web onto a takeout roll. A registration sensor reads the imprint on the web and uses the feed axis to adjust the position of the image under the knife to assure the bag will only seal in-between the images.





Rotary Knife Cutting

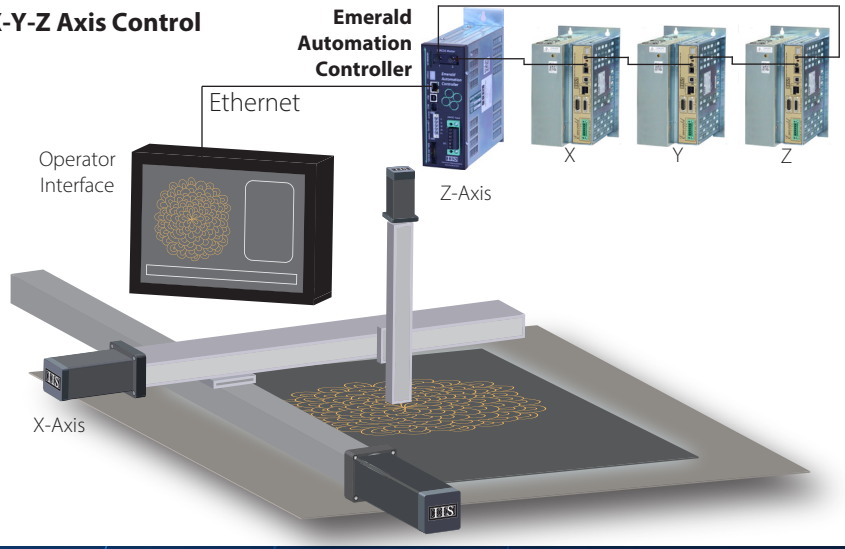
Feed rolls move a ribbon of sheet metal with printed labels under a rotary knife to be cut into individual sheets with the labels centered. A double cut action is performed using switched cam functions available in the Emerald Automation Controller. The registration sensor connected to the high speed trap input measures the label position relative to the knife edge. An electronic cam table is adjusted accordingly, either to advance or retard the knife's position for the first cut. The cam table is switched for the second knife cut that determines the exact length of the sheet.

X-Y-Z Axis Control

The Emerald Automation Controller provides all the necessary functionality to preform contoured cutting or marking with a G-Code conversion utility using DXF file information to produce electronic cam tables for the X and the Y axis.

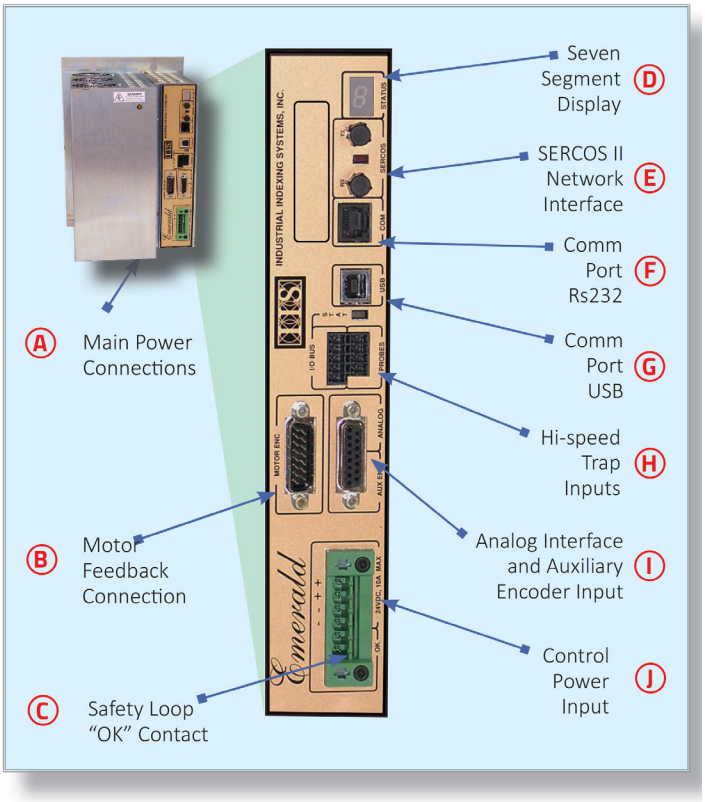
Using a Virtual Motor as a master source to synchronize cam tables for the X and Y axis, patterns are produced on the x-y plane of a Cartesian assembly. The Z axis is used to control the instrument for marking, cutting, perforating, or sewing a variety of materials.

The operator interface is a PC with CAD programming software for pattern development teamed up with a Visual Basic program using the DLL provided by IIS to connect to the Emerald Automation Controller.



Emerald SERCOS II Drive Overview

Signal Interface Features for the Emerald SERCOS II Drive



The Emerald Series servo drives and motors use the latest servo technology to bring cost effective solutions to the automation market. The wide range of sizes and feature rich functions make the Emerald servo drive the most versatile servo system in today's automation market. State of the art software minimizes hardware cost while maximizing features and performance.

The Emerald servo drive is a certified SERCOS II drive designed to integrate with any industry standard SERCOS II controller. The SERCOS II standard forms a fiber optic isolated network and when interfaced to the IIS Emerald Automation Controller, this drive is part of a network of up to 32 servo drives or I/O devices with a minimum 500 µsecs scan rate.

The Emerald Servo Drive is available in 7 size ranges: 5, 10, 20, 40 and 60 amp @ 220 VAC and 25 and 50 amp @ 440 VAC. Emerald servo motors are available from 400W to 21kW, 1500 to 3400 RPM rated speeds with low and medium rotor inertia versions. And is designed to operate at temperatures of up to 55C° at full rated power.

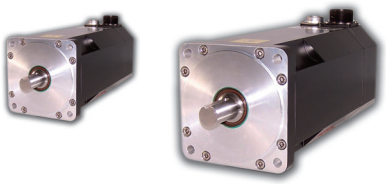
A	"Quick Connect" Main Drive Power Connections
B	Motor Feedback Connector
C	Safety Loop "OK" Contact for external shut-down control
D	Seven Segment Display
E	SERCOS Network Interface
F	Communication Port RS232
G	Communication Port USB for easy interfacing to laptop PC for drive diagnostic and setup procedures.
H	Hi-Speed Traps for storing encoder position relative to a sensor to provide web or product registration functions.
I	Analog Interface and Auxiliary Encoder Input
J	Controller Power Input

IIS Servo Motor Overview

Type	Frame Size	Shaft Dia.	Pilot Dia.	Power	Speed Rated	Torque Rated	Speed Max	Torque Max	Inertia	Matching Drive	Servo Motor
	mm	mm	mm	watts	rpm	Nm	rpm	Nm	kg-m2 x10^{-4}	ESD-#	ESM#
C	60	14	50	400	3000	1.27	4000	3.8	0.40	5/AEP	60A
	85	14	30	400	2000	1.9	4000	5.7	2.44	5/AEP	85A-C
	85	16	30	600	2000	2.48	4000	9.0	3.34	5/AEP	85B-C
	85	16	50	750	2000	3.53	4000	10.6	4.20	5/AEP	85C-C
	85	16	50	1000	2000	4.8	4000	11.5	5.10	10/AEP	85D-C
A	125	19	70	750	2000	3.6	4000	10.8	6.66	5/AEP	125A(I)
	125	22	70	1000	2000	4.8	4000	14.4	10.10	5/AEP	125B(I)
	125	24	80	1500	2000	7.2	4000	21.6	14.40	10/AEP	125C(I)
	125	24	80	2200	2000	10.5	4000	31.5	20.35	20/AEP	125D(I)
	125	28	80	3000	2000	14.3	4000	42.9	27.25	20/AEP	125E(I)
	125	28	110	4000	2000	19	4000	48.7	35.90	20/AEP	125F(I)
	125	22	110	1000	1500	4.8	4000	14.4	10.10	5/AEP	125B(II)
	125	24	110	1500	1500	7.2	4000	21.4	14.40	5/AEP	125C(II)
	125	24	110	2200	1500	10.5	4000	31.5	20.35	10/AEP	125D(II)
	125	28	110	2300	1500	14.3	4000	42.9	27.25	10/AEP	125E(II)
	125	28	110	2600	1300	19	4000	48.7	35.90	10/AEP	125F(II)
	130	22	110	1800	3400	5.09	4000	11.2	6.00	10/AEP	130-1800/34E
	130	22	110	3700	3400	10.5	4000	28.6	11.60	20/AEP	130-3700/34E
	130	26	110	5700	3400	15.9	4000	47.7	17.20	40/AEP	130-5700/34E
	130	26	110	5700	2000	15.9	4000	45	17.20	20/AEP	130-5700H/34E
	142	24	130	5100	2400	20.2	4000	62.6	23.7	20/AEP	142-5100/24E
	142	24	130	9100	2800	31	4000	109.2	32.4	40/AEP	142-9100/28E
B	145	32	130	4000	2000	19	4000	48.7	66.48	20/AEP	145B(I)
	145	32	130	5600	2000	26.7	4000	80.1	91.15	40/AEP	145C(I)
A	180	32	114.3	7500	2000	35.8	3000	88	57	40/AEP	180-7500/20E
D	180	34.925	216.28	18300	2000	92	4500	278	160	50/CEP	180-18.3KW/20EF
	190	38	114.3	6000	1500	39	4000	97.5	102.7	25/CEP	190B(II)
	190	38	114.3	7500	1500	48	4000	144	139.8	25/CEP	190C(II)
	190	42	114.3	11000	1500	71.5	4000	188	177.4	50/CEP	190D(II)
	190	42	114.3	15000	1000	95	2000	200	214.5	60/AEP	190E(II)
	190	34.925	114.3	10300	2000	51.6	3000	144	84.7	40/AEP	190-10.3KW/20E
	190	32	180	13000	3000	41.8	3000	110	84.7	60/AEP	190-13KW/30E
	190	34.925	114.3	15400	2000	62.1	3000	172.8	84.7	60/AEP	190-15.4KW/20E
A	190	32	180	11900	3600	31.6	4000	135.6	48.8	50/CEP	190-11.8KW/36E
D	190	48	180	21400	2400	85.5	3000	298.3	122.2	50/CEP	190-21.5KW/24E
	210	41.275	216.28	9300	1200	86.7	4500	569	347	50/CEP	210-9.3KW/12E

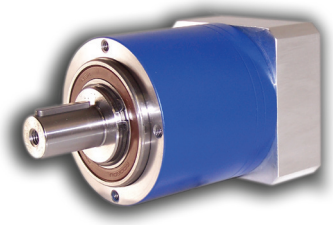
Type A Low inertia, high torque motors for quick response and frequent repetitive motion.
Type B Medium inertia motor for applications that require stable velocity and rigid shaft control.
Type C Compact motors with small weight and quick response.
Type D Heavy-duty motors with maximum torques of 298 Nm up to 2400 rpm.

NOTE: *Additional motor sizes and styles are available but are not listed in the table above. Please call or e-mail us if you have other requirements like wash-down, explosion-proof, and stainless servo motors. Servo rated gearboxes are available for any servomotor we offer.*



Emerald System Accessories

Servo-rated Gearboxes



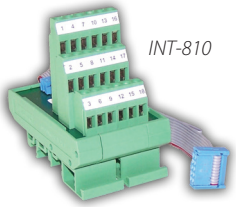
Our pre-sales support team will help specify servo-rated gearboxes for light duty or heavy duty applications that will match the servo motor for the best system performance, guaranteed.

DNET-104

Adjustable Speed Drives with an interface adapter (DNET-104) for the DeviceNet network.

THA-2-4096 w/cable

INT-810



Encoders, cables and breakout assemblies are available for the Master Encoder interface port on the Emerald Automation Controller. The THA-2-4096 encoder with cable and the INT-810 terminal breakout are shown. Various encoder line counts are in stock.

IPS-24

The IPS-24 is a 24 volt dc power supply for I/O and controllers are available in various capacities.

Standard communications cables with 9-pin PC adapters used for all controllers, amplifiers, and drives for programming and configuration are always in stock.

Various I/O blocks are available for a full complement of digital and analog inputs and outputs for the SERCOS II Network.

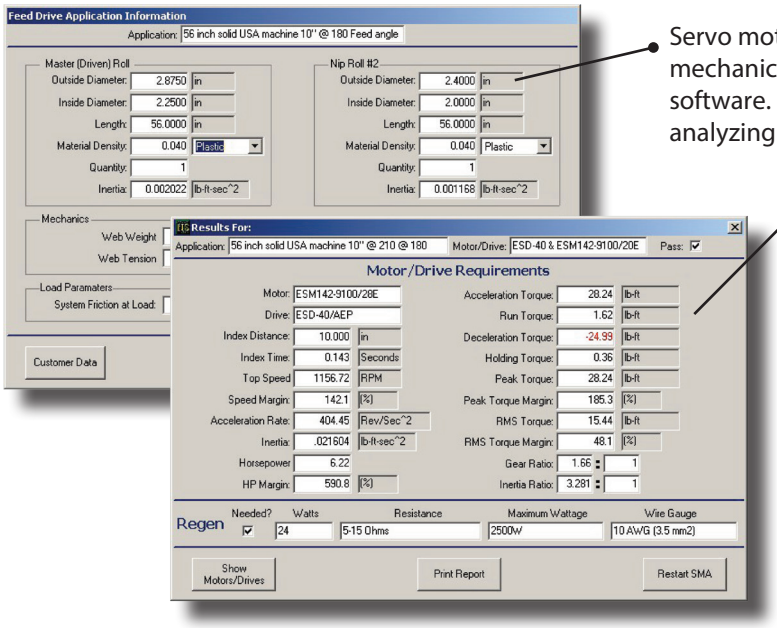
Our servo motors are for complex environments such as food production, medical applications, oil refining, explosive liquid, dust and vapor atmospheres, and submersible assemblies. Agency standards: UL, cUL, ATEX, IECEx and FDA (rated and certified).

*The ESD-ACE and the ESD-ACR modules are used to provide position loop control for analog interface drives on the **SERCOS II network**. Mainly used to replace position loop functionality of the legacy MSC-250 and MSC-850 controllers, the DIN-rail mountable ESD-ACR modules are used in new designs where a resolver is used as a master source device or where an interface to an adjustable speed drive is required on the network. For encoder feedback position loops, use the ESD-ACE module.*

The ESD-ACE and the ESD-ACR modules also include the hi-speed position trap input, a holding register for registration applications, and a general purpose 12 bit analog output.

Automation Software Tools

Servo Motor Sizing



Servo motor selection starts with a complete description of the mechanical system entered to the Servo Mechanical Analysis (SMA) software. Menus for the basic types of systems are provided for analyzing ballscrew conveyor, chain, and feedroll systems.

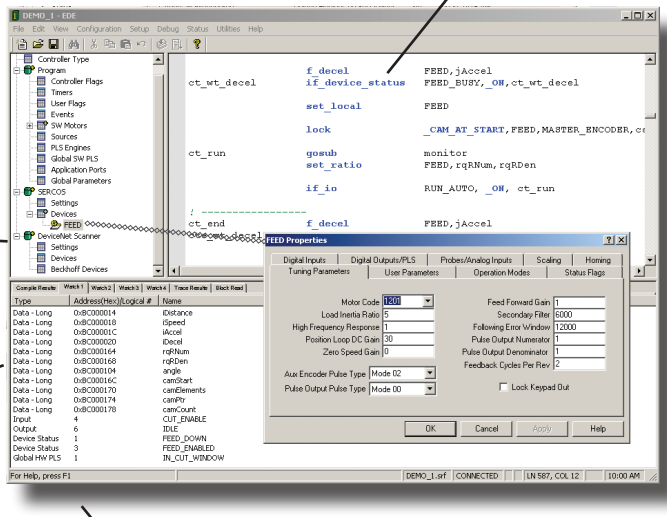
The resulting analysis shows all performance data for the motor and drive package selected from our database. Free pre-sales support is always available to assist you in the selection of the motor and drive.

The EDE program code editor is content sensitive and easy to use. The Emerald Motion Language (EML) is a straight forward language that uses a standard structure with mature functions tailored to the real-time aspects of motion control.

Application Development

The Emerald Development Environment (EDE) provides project management utilizing a system component configuration window to manage all the drives, I/O devices and files used in an automation system.

The EDE provides a debugging window for program development support. Watch data values, trace the program flow and view network device status in real-time.

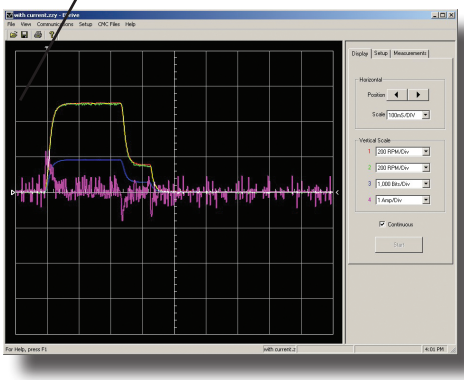


Commissioning Support

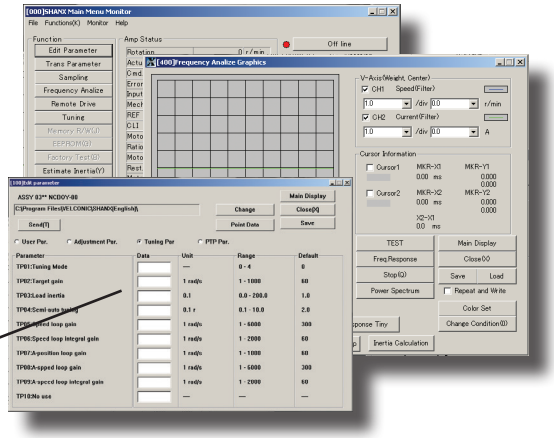
Two software tools are available for setup and tuning the motor-drive system. ShanX for the SERCOS III Toshiba drives and eDrive for the SERCOS II Emerald series drives.

Menus from the configuration window allow you to select and configure all the devices in your system for fast and easy setup.

Real-time scope functions display the motor velocity and torque responses to assure the required motor response is achieved.



Once the motor and the drive are installed you can fine tune the motor's response by adjusting the servo loop parameters for maximum performance.



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INDUSTRIAL INDEXING SYSTEMS, INC

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Team IIS

Our objective is to bring state-of-the-art servo system products to practical use on the factory floor. Whether it is a complete turnkey system or servo components, IIS' commitment to quality products and personalized support is unsurpassed. Our business philosophy is pretty simple. We take responsibility for everything we sell. By doing that we make a long-term commitment to our customer's success.

Headquarters in Victor NY

To accommodate the steady growth we've enjoyed over the years, our facility has been expanded several times to its present 17,000 square foot capacity. This location houses all critical departments - Sales, Marketing, Applications Engineering, R&D, Production, Warehouse, Panel Shop, Quality Control and Customer Support. Having everything under one roof speeds communications and provides better service to our customers.

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Culpepper Solutions Group

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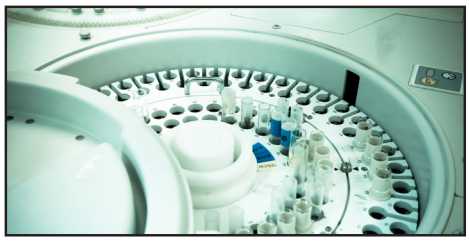
Arizona	Kansas	North Dakota
California	Michigan	Oregon
DC	Minnesota	Puerto Rico
Guam	Missouri	South Dakota
Hawaii	Montana	Virgin Islands
Idaho	Nebraska	Washington

If you would like to discuss the opportunity of becoming a Sales Representative for our organization, drive brand awareness, and develop business relationships with new and existing clients, please contact Mike Hupf, Sales Manager at (585)924-9181



Ready to elevate the efficiency, consistency, and repeatability in your operations? Call us today at (585)924-9181 to discuss your application needs