EMERSON™
Industrial Automation

Epsilon EP

"Motion Made Easy"™

230V Servo Drive Systems

CONTROL TECHNIQUES

www.emersonct.com

Epsilon EP is *"Motion Made Easy"*

Epsilon EP, the compact and easy to use servo drive, is scalable from a simple amplifier to a completely programmable 1.5 Axis motion controller. The Epsilon EP comes in three flexible models, and five drive sizes — 2.2A, 4.0A, 6.5A, 9.0A and 16.0A, able to deliver over 355 lb-in of torque at the rated motor speed.

New features and benefits

Listening to their motion control customers, the engineers at Control Techniques have incorporated several advanced features and capabilities in the Epsilon EP family to make these drives more powerful and easier to use.

Real-Time Programs

A Real-Time Program (RTP) is a user program that executes in a set number of servo update periods. RTPs allow for synchronous execution of external I/O updates, communications routines, or external PI control loops. They even can be used for creating motion profile modifications while the application is running.

Camming

Programming electronic camming has taken a huge step forward with Control Techniques's easy-to-use camming function, which can execute a variety of cam profiles without a single line of program code. For advanced capabilities, user programs can access a wealth of cam information for unprecedented flexibility. Cam motion can be dynamically monitored and easily modified on-the-fly.

Modbus Master

Modbus Master creates a whole new level of machine control capability. No longer limited to the drive's on-board I/O, the Modbus Master can manage a very large number of I/O and communicate updates to any Modbus slave device, giving machine builders extensive control options.

Position Tracker™

Analog Position Control and Fieldbus Position Control allow the Epsilon EP to replace an expensive PLC motion control module with a simple, low-cost analog signal or fieldbus register. With Postion Tracker™, the closed loop feature of the position controller has been brought into the drive itself. The user simply sends the drive an analog or fieldbus signal that is proportional to the absolute motor/actuator position. Advanced features, including Teach functions, speed the set up.

Timers

Built-in Timers provide a simple and accurate way to trigger an action based on a previously initiated time delay. Select from up to seven different Timer types to match your needs.

Ethernet programming

The EP-P drive uses common Ethernet protocols for all levels of networking – To setup and monitor your application, communicate to PLC's via EtherNet/IP, or connect to an operator panel using Modbus TCP/IP.

c UL us LISTED CE RoHS* Compliant 2 YEAR Digital Drive Warranty 5 YEAR Extended Warranty

**RoHS-compliant models available.*

Choose your "*Motion Made Easy*" ™ solution

Three functional configurations

Base: Epsilon EP-B

This base drive is ideal for servo applications utilizing an external motion controller. It accepts an analog command signal and sends out position feedback. The EP-B has the unique capability of combining an analog command with a preset velocity for trimming or advance/retard operations. The EP-B drive is an excellent choice for stepper replacements or centralized control systems.

Indexer: Epsilon EP-I or EP-IDN

The EP-I drive is a highly capable position controller that provides Home, Index, and Jog motion profiles. The EP-I holds up to 16 unique indexes that also can be chained together to create complex motion profiles. The EP-I has a unique alternate mode feature whereby it can perform an Index or Home function, and then switch to an alternate mode such as analog toque, analog velocity, or pulse follower mode on the fly! This compact indexing drive is a cost-effective solution for countless applications.

Programming: Epsilon EP-P, EP-PDN and EP-PPB

The EP-P drive provides the highest level of control by allowing the user to create complete user programs to sequence the motion control along with other machine functionality. The EP-P can be used to solve the most complex motion applications and still be easy-to-use because of the PowerTools Pro configuration software. PowerTools Pro uses simple drag-and-drop and fill in the blank screens that make setup a snap. User programs are created using a text based motion language that is as easy to read as it is to program. If you don't know the command, just drag it in from the drop down box and PowerTools Pro will assist you with the syntax. With intuitive software and plenty of online help, programming this servo drive is easy; in fact it is ***"Motion Made Easy!"***

Feature Matrix	EP-B	EP-I	EP-P
Velocity Summation	✔		✔
Analog Position	✔	✔	✔
Analog Velocity	✔	✔	✔
Pulse Follower	✔	✔	✔
Analog Torque	✔	✔	✔
Preset Velocity / Jog	✔	✔	✔
Torque Limits	✔	✔	✔
Software Travel Limits		✔	✔
Homing		✔	✔
Indexing		✔	✔
Index Chaining		✔	✔
Compound Indexing		✔	✔
Synchronized Motion			✔
Gearing			✔
Camming			✔
Timed Index			✔
Multiple Profile Summation			✔
Queuing			✔
Feedhold			✔
Feedrate Override			✔
Programmable Limit Switches			✔
Auto Tune	✔	✔	✔
Software Oscilloscope	✔	✔	✔
Software watch window	✔	✔	✔
Status Display	✔	✔	✔
User Units		✔	✔
User Variables			✔
User Programs			✔
Cyclical Programs			✔
Real-time Programs			✔
Program Multitasking			✔
Timers			✔
High Speed Position Capture			✔
Modbus RTU	✔	✔	✔
DeviceNet		Opt	Opt
Profibus-DP			Opt
EtherNet/IP			✔
Modbus TCP/IP			✔
Modbus Master			✔
Modbus Bridge/Gateway			✔
Web Page			✔
E-mail			✔

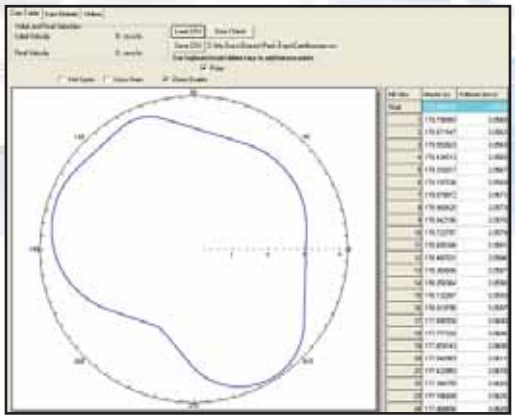
PowerTools Pro, the power behind *"Motion Made Easy"* ™

Our free PowerTools Pro software enables you to fully realize the power of the Epsilon EP servo systems. A familiar Microsoft® Windows™ interface provides operators and machine builders with the tools needed to access everything they need for complete servo control — Motion Profile Setup, User Units, Motor Auto-tune, Electronic Gearing, Network Configuration, and many other advanced features.

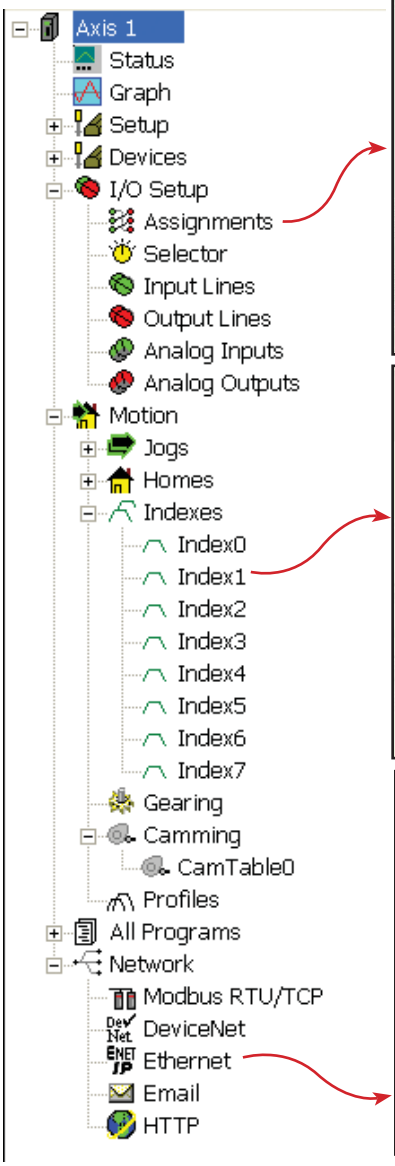
Developing applications with PowerTools Pro is an easy process that quickly gets your applications running. The process is completed "top down" from the Windows™ Explorer-like Hierarchy View—Setup, I/O Setup, Motion, Programs and Network. Some tasks may not need to be completed, as some applications, such as a "flying cutoff" neither require "programming" nor network parameters to operate.

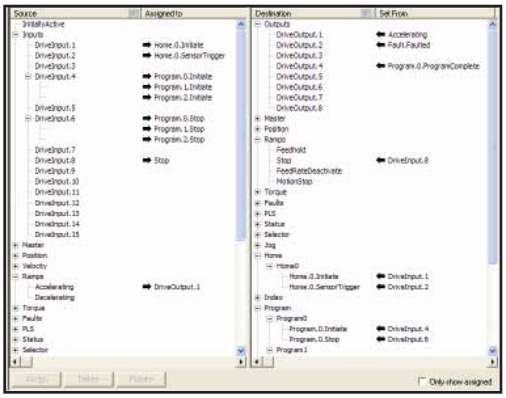
Camming made easy!

Cam data is easily entered within PowerTools Pro, and the Cam graphing tool is second to none, with multiple interpolation types available.

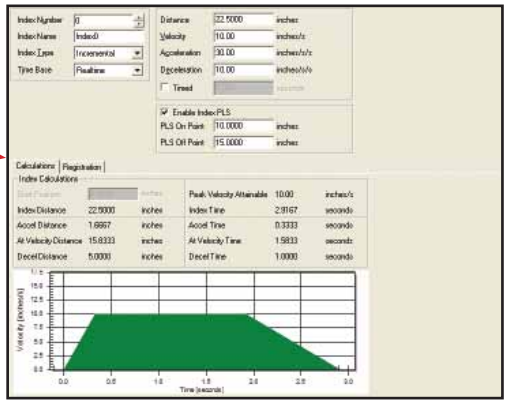


Expandable Hierarchy View

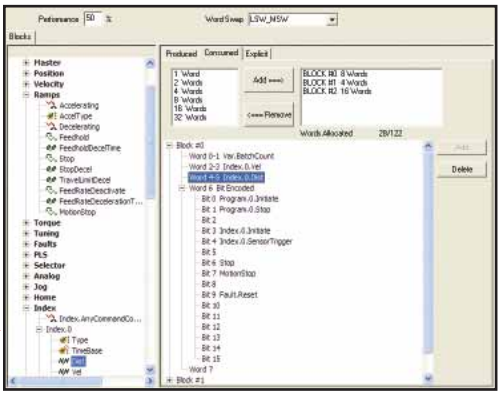




Assignments – Use our "Virtual Wiring" to create programs right out of the box, without writing a single "line of code." For example, on the assignment screen simply drag-and-drop the desired machine function onto the digital inputs and outputs.



Indexes – Setting up indexes is easily accomplished by filling in the screen's blanks to create an index profile. Select from Incremental, Absolute, Registration, or Rotary Plus and Minus types. Choose the time base of the index by selecting either real time or synchronized to a master.



Network – Whatever fieldbus you are using, setting up network communications is a snap. Fill-in-the-blank, drag-and-drop procedures are used to get your drives communicating. PowerTools Pro diagnostics couldn't be more intuitive, allowing real-time monitoring of the actual data being sent and received.

Motors to complete a *"Motion Made Easy"™* servo system

To complete a "Motion Made Easy"™ servo system, Control Techniques offers matched motor solutions and accessories, which give an unparalleled "plug and play" experience to users. The Epsilon EP works flawlessly with almost any motor to fit a wide range of motion control needs. Motor sizing is a snap with the free downloadable program, *CTSize*. A full menu of actuators and gear reducers are available through the Control Techniques "One Source" program.

XV Servo Motor

- Low cost solution for the light industrial applications
- Continuous torque ranges from 1 lb-in (.11 Nm) to 105 lb-in (11.8Nm)
- Rated speeds from 2000 to 5000 rpm
- Frame sizes 40, 60, 80 and 130mm
- IP 55 and 65 rating, UL, CE, and RoHS compliant
- 2048 line count encoder

NT Servo Motor

- Rugged motor is designed for your most stringent servo application
- Continuous torque ranges from 7 lb-in (0.79 Nm) to 55 lb-in (6.3 Nm)
- Low Interia
- Rated speeds from 3000 to 5000 rpm
- Frame sizes in English (NEMA 23 or 34) or Metric (IEC-72-1)
- Custom configurations upon request
- IP65 rating, UL and CE compliant
- 2048 line count encoder

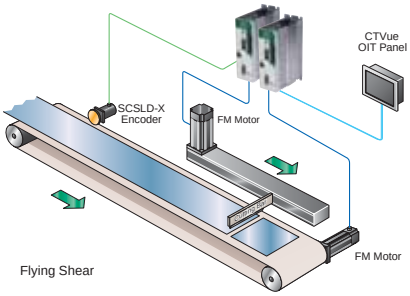
FM Servo Motor

- Highly configurable motor line
- Continuous torque ranges from 6.6 lb-in (0.75 Nm) to 646 lb-in (73 Nm)
- Rated speeds from 2000 to 6000 rpm
- Frame sizes 55, 75, 95, 115, 142, 190mm (IEC mounting)
- Configurable shaft diameters and inertia offerings
- IP65 rating, UL and CE compliant
- 4096 line count encoder

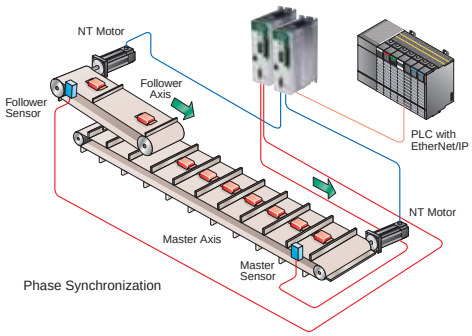
Refer to the catalog for detailed motor specifications or go to www.emersonct.com.

*The **Epsilon EP** is the perfect solution for a multitude of applications such as:*

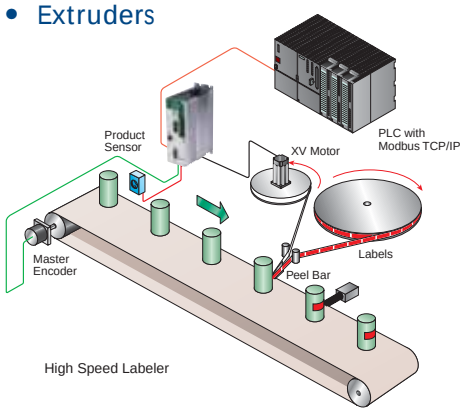
- Rotary Knife
- Flying Shear
- Pick and Place machines
- Vertical or Horizontal cartoners
- Traverse Winders
- Form-Fill-Sealers
- Packaging systems
- Conveyor controls
- High speed labeling
- Random Infeed – Smart belt.
- Phase Synchronization
- Extend-Retract
- Gluing Applications
- Auger Filler with analog weight check
- Semiconductor wet bath
- Dancer Arm Loop control
- Extruders



Flying Shear



Phase Synchronization



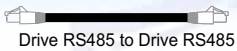
High Speed Labeler

Note: Application tools are available on-line at www.emersonct.com as pre-configured solutions to many common motion control applications.

Performance matched motors and accessories

CTVUE-303L,
-303M, -306A,
-306C, -308A,
or -310C

CTVUE HMI to Drive
CTVUE-EP-485-xxx

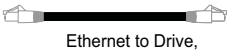


Drive RS485 to Drive RS485
DDC-RJ45-xxx

PC RS232 to Drive RS485
Serial Interface Cable, CT-COMMS

PC USB Port to Drive RS485
Serial Interface Cable
CT-USB-CABLE

Windows 98, NT 4.0, 2000
XP (32-bit) or Vista (32-bit)
Compatible Computer
(Customer Supplied)



Ethernet to Drive,
ETH-PATCH--xxx

Ethernet 8-port Switch,
ETH-S8

Epsilon EP I/O Cable,
EIO26-xxx

CT-MME-POWER-CD

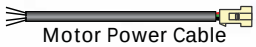
Contains ***PowerTools Pro***

FREE Software

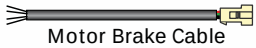
STI-24IO

Braking Resistor,
SM-Heatsink DBR1

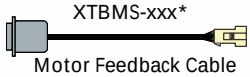
Drive Brake Relay
BRM-1



Motor Power Cable
XTMDS-xxx*

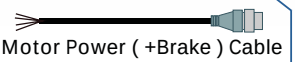


Motor Brake Cable
XTBMS-xxx*

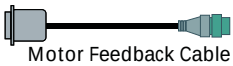


Motor Feedback Cable
XUFTS-xxx*

40, 60, 80 mm
XV Motors

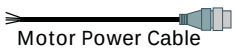


Motor Power (+Brake) Cable
XCMDS-xxx or XCMDBS-xxx*

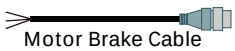


Motor Feedback Cable
XUFCS-xxx*

130 mm XV Motors



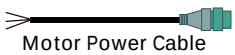
Motor Power Cable
CMDS-xxx or CMMS-xxx*



Motor Brake Cable
CBMS-xxx*

Motor Feedback Cable
UFCS-xxx*

NT Motors



Motor Power Cable
PSBAA-xxx, PBBAA-xxx**

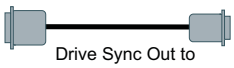
Motor Feedback
SIBAA-xxx**

FM Motors

Epsilon EP Order String

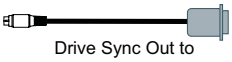
EP X XX - X XX - XX XX

- **Special Options:** 00=Standard
- **Feedback:** EN= Incremental Encoder
- **Comms:** 00=Standard; DN=DeviceNet; PB=Profibus
- **Type:** B=Base; I=Indexing; P=Programming
- **Continuous Current (A):** 02; 04; 06; 09; 16
- **Drive Voltage:** 2=240V
- **Drive Series**



Drive Sync Out to
Drive Sync In Cable,
SNCDD-915-xxx

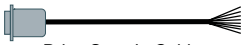
Drive Sync Out Cable,
SNCFLOA-xxx



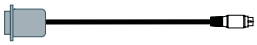
Drive Sync Out to
FM-3/4 Module In Cable,
SNCMD-815-xxx

Drive Sync Out
Breakout Board,
STI-SNCOA

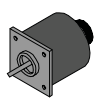
Drive Sync In to Drive Sync Out Cable,
SNCDD-915-xxx



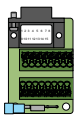
Drive Sync In Cable,
SNCFLI-xxx



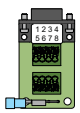
Drive Sync In from
FM-3/4 Module Out Cable,
SNCMD-89-xxx



Master
Synchronization
Encoder SCSLD



Motor Feedback Breakout Board
STI-ENC

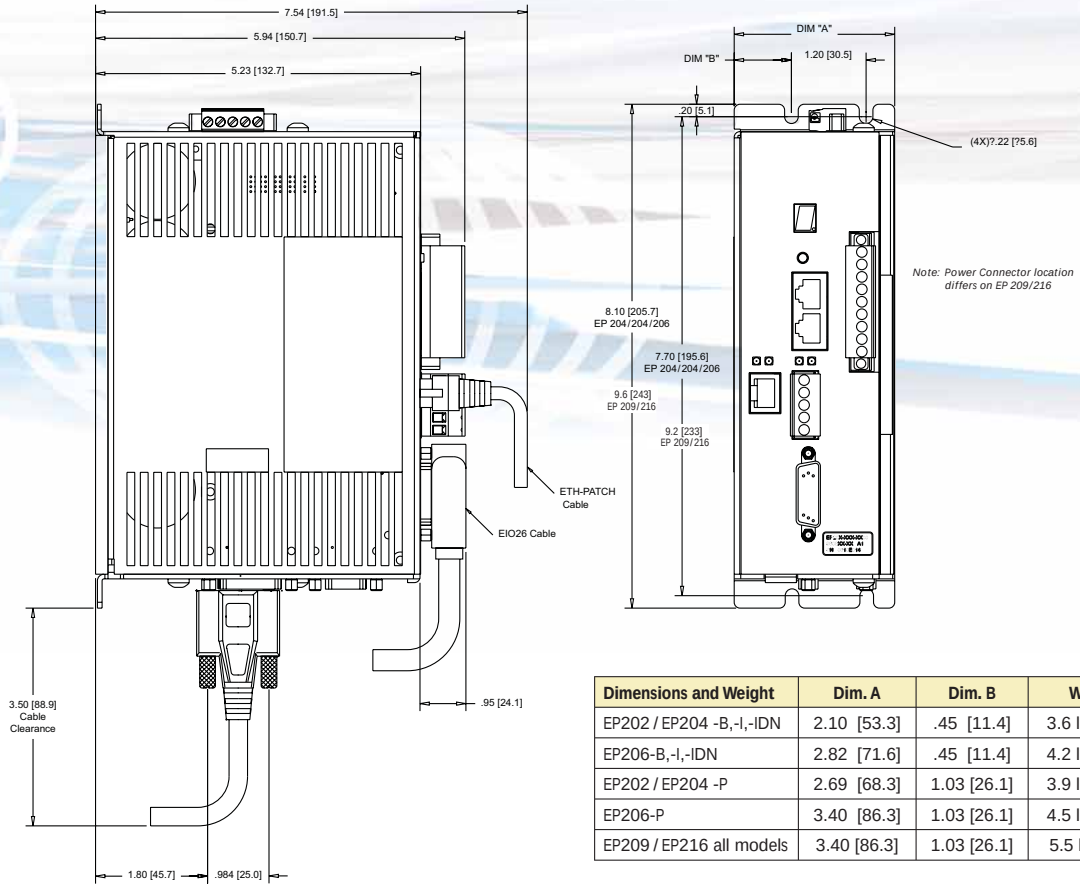


Drive Sync In Breakout Board,
STI-SNCI

Cable Notes

* Flex duty versions available
** Flex duty cable
*** Requires SM-Ethernet modul

Specifications



Dimensions and Weight	Dim. A	Dim. B	Weight
EP202 / EP204 -B,-I,-IDN	2.10 [53.3]	.45 [11.4]	3.6 lb [1.63]
EP206-B,-I,-IDN	2.82 [71.6]	.45 [11.4]	4.2 lb [1.91]
EP202 / EP204 -P	2.69 [68.3]	1.03 [26.1]	3.9 lb [1.77]
EP206-P	3.40 [86.3]	1.03 [26.1]	4.5 lb [2.04]
EP209 / EP216 all models	3.40 [86.3]	1.03 [26.1]	5.5 lb [2.49]

Power Requirements

AC Input Voltage, 47-63 Hz
EP 202/204/206: 1Ø, 20 to 264 VAC
EP 209/216: 1Ø / 3Ø, 90 to 264 VAC

(240 VAC for rated performance) SCCR 10kA

DC Input Voltage
EP 202/204/206: 10-340 VDC
EP 209/216: 140-340VDC

AC Input Current (max. continuous)
EP-202: 5.0Arms (140A for 2ms inrush)
EP-204: 8.5Arms (140A for 2ms inrush)
EP-206: 12.0Arms (140A for 2ms inrush)
EP-209: 18Arms (34A for 5ms inrush)
EP-216: 36Arms (34A for 5ms inrush)

Output Current Continuous (rms) / Peak (4 sec.)
EP-202: 2.2A / 4.4A
EP-204: 4.0A / 8A
EP-206: 6.5A / 13A
EP-209: 9.0 A / 18A
EP-216: 16.0A / 32A

Continuous Output Power
EP-202: 0.67kW
EP-204: 1.14kW
EP-206: 1.61kW
EP-209: 2.2kW
EP-216: 3.8kW

Switching Frequency 10 kHz
External Logic Supply +18 to 30 VDC @ 0.5A
Encoder Supply Output +5 VDC, 250 mA
I/O Supply +10 to 30 VDC
System Efficency 93%
Cooling Method Convection

Regeneration

Internal Energy Absorption (115V / 230V)

EP-202: 39 Joules / 8 Joules
EP-204: 58 Joules / 12 Joules
EP-206: 97 Joules / 20 Joules
EP-209: 117 Joules / 24 Joules
EP-216: 132 Joules / 28 Joules

External: Connection to external resistor, 33 Ohm min, 15 Arms, 2kW

Drive Control Inputs

Analog: (1) +/-10VDC, 14 bit, 100kOhm, Differential

Analog Max. Input Rating: Differential +/-14 VDC, Each Input with Reference to Analog Ground +/-14VDC

Digital: (16) (5 on EP-B) +10 to 30 VDC, 2.8kOhm, Sourcing, Optically Isolated

Pulse: (1) Differential RS-422, 1MHz/Channel, 50% Duty Cycle

Single Ended: (1) TTL Schmitt Trigger 500kHz/ Channel, 50% Duty Cycle

Motor Overtemperature: 0 to +5VDC, 10kOhm, single ended

Drive Control Outputs

Analog: (2) +/-10VDC, 10 bit, Single-ended 20mA

Digital: (8) (3 on EP-B) +10 to 30VDC, 150mA, Sourcing Optically Isolated

Pulse: Differential RS-422 and TTL compatible, 20mA/Channel Sink or Source

Environmental

Rated Ambient Temperature: 32° to 104°F (0° to 40°C) for rated performance

Maximum Ambient Temperature: 32° to 122°F (0° to 50°C) with power derating of 3.0%/1.8F (1°C) above 104°F (40°C)

Rated Altitude: 3280' (1000m)

Maximum Altitude: For altitudes >3280' (1000m) derate output by 1%/328' (100m)

Vibration: 10 to 2000 Hz @ 2g

Humidity: 10 to 95% non-condensing

Storage Temperature: -13° to 167°F (-25° to 75°C)

Ingress Protection: IP-20

Serial Interface

2 RS-485 connectors for multi-drop applications Modbus RTU w/ 32-bit extension, 9600 to 19.2 kBaud

Ethernet Interface (EP-P only)

1 RJ-45, Modbus TCP/IP or EtherNet/IP

DeviceNet (EP-xDN models only)

Power Consumption: 25mA
Baud Rates: 125, 250 and 500kps
Node Addresses: 00-63

Profibus-DP (EP-PPB model only)

Baud: 1.5 to 12Mb
Address Range: 00-126

Driving Technology...

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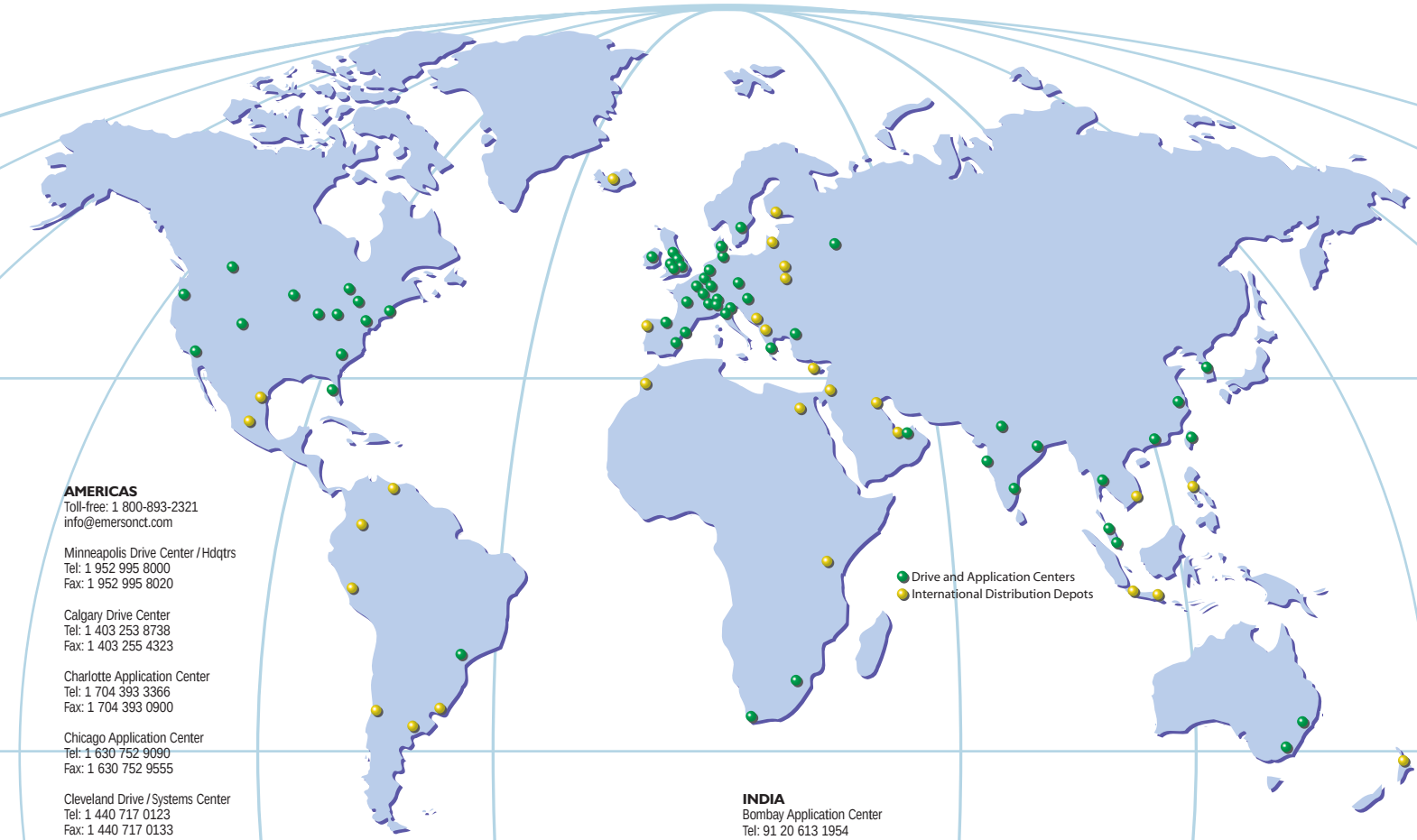

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Printed in USA

Part# EPBRO-0208