

# Epsilon - The Easy Servo

## Description

The Epsilon Series is a compact range of servo drives and despite its size it delivers all the performance, reliability and convenience you expect from a product designed and built by Control Techniques. It's also been designed to fit into a 200mm deep enclosure... with cables connected.

The Epsilon Series consists of three ratings, and having two unique configurations that focus the drive toward specific applications.

### Eb Epsilon Base

### Ei Epsilon Indexing

### Easy Set Up - No PID!

The Epsilon drives are stand-alone, fully digital brushless servo drives designed and built to reliably provide high performance and flexibility without sacrificing ease of use.

The use of State-Space algorithms make tuning very simple and forgiving, no PID needed. The drives are designed to operate with up to 10:1 inertia mismatch right out of the box. Higher (50:1 and more) inertia mismatches are possible with two simple parameter settings.

Complete diagnostics are provided for quick troubleshooting. A diagnostic display on the front of the drive informs the user operational or fault status. The last 10 faults are stored in non volatile memory along with time stamp for easy recall.

### Performance Matched Motors

The Epsilon Servo Drive is matched with the EZ series of Servo Motors (0.6 Nm to 6 Nm) which have 2048 ppr fitted as standard. An ultra-high specification offer is available, NT - New Technology motor shorter frame, lower profile, high torque/inertia ratio. Epsilon's 20 kHz switching frequency means smoother and quieter operation with EZ and NT motors.

### Operator Interfacing

Operator terminals can be easily interfaced to the Epsilon series drives. The wide array of parameters available through the serial port makes the operator interface a window into the drive for easy diagnostics and adjustments. Most of the parameters need no scaling or translation to be usable so the data can be displayed as is, further simplifying your interfacing effort.



## General Features

- Power requirement:-
    - 90 - 264 Vac single phase
    - 47 - 63 Hz
  - Continuous output current
    - Eb/Ei 202 1.8A
    - Eb/Ei 203 3.0A
    - Eb/Ei 205 5.0A
  - Peak current 200% for 2 seconds
  - 20 kHz switching frequency
  - IP20 protection, convection cooling
  - Logic backup 24 Vdc, 2A
  - Ambient temperature 40°C (50°C with derate)
- Master encoder supply 5V @ 250mA
  - Master encoder input:-
    - Differential 8 MHz count in quadrature
    - Single ended 4 MHz count in quadrature
  - Encoder emulation output scalable (200-2048 ppr)
  - Drive status display for diagnostics
    - 9 diagnostic codes
    - 14 trip codes
  - RS232/RS485 Modbus protocol with 32 bit extension
    - 9600 or 19200 baud
  - 5 Modes of operation (for Eb version)
    - Analogue velocity command ( $\pm 10$  Vdc, 14 bit)
    - Analogue torque command ( $\pm 10$  Vdc, 14 bit)
    - Pulse follower
      - CW/CCW pulses
      - Frequency and direction
      - Encoder quadrature

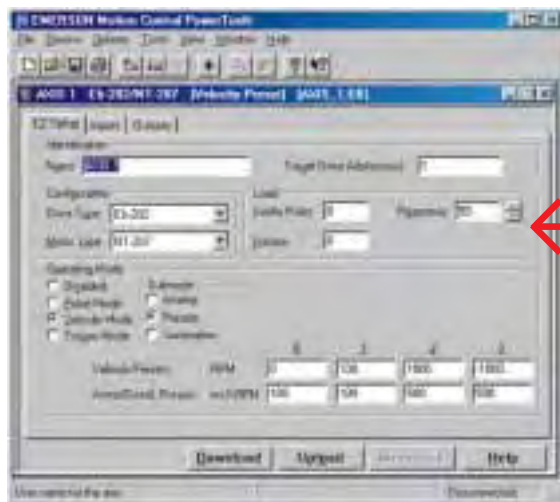


OIT 3165  
Operator Interface

# Powertools™ - Set Up Made Simple

## Powertools™ Base User Interface Software (for Eb version)

The PowerTools™ user interface software works on any PC using Windows 95/98™ or Windows NT™ 4.0. The software enables the user to upload and download configuration parameters into the Epsilon Series Drive. The screen shown is a sample of the configuration screen of the Eb Base Epsilon Series drive.



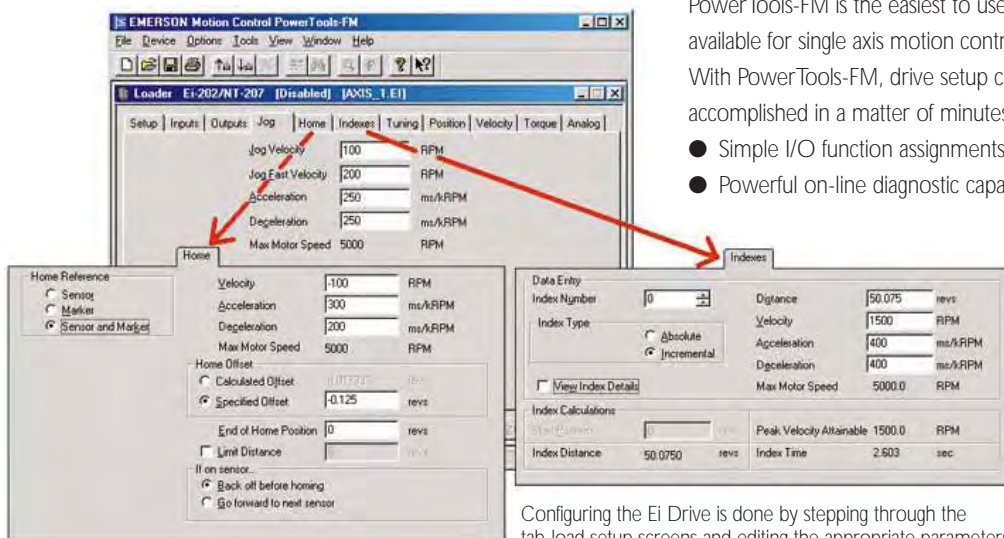
**No PID! Just Set...**

- Inertia ratio
- Friction
- Response

## Powertools-FM Software (for Ei indexing)

PowerTools-FM is the easiest to use software available for single axis motion controllers. With PowerTools-FM, drive setup can be accomplished in a matter of minutes.

- Simple I/O function assignments
- Powerful on-line diagnostic capabilities



Configuring the Ei Drive is done by stepping through the tab-load setup screens and editing the appropriate parameters



# Epsilon - The Easy Servo

## Eb (Base) Version

### Description

The Epsilon Series Eb (Base) Drive is a compact drive that is ideal for use with single and multi-axis controllers and PLCs. The analogue torque and velocity modes can be used with classic servo controllers using analogue outputs and encoder inputs. The pulse mode is ideal for use with low cost PLC stepper controllers and for upgrading stepper applications where stepping motors cannot deliver the required performance. This drive works in a variety of applications where a host control provides a command signal determining the desired motion profile. The Eb Drive is configurable for five flexible modes of operation.

### INPUTS

Five current sourcing compatible input lines (Active "high") are available for interfacing. Four of the input lines are user programmable and one or more of the input functions can be assigned to each of them. The fifth input is a dedicated Drive Enable input, which imposes hardware control over the output Power Stage to help ensure safety. Input functions available are:

- Stop
- Reset
- Travel Limit (+)
- Travel Limit (-)
- Torque Limit Enable
- Torque Mode Enable
- Velocity Presets
- Brake Release
- Brake Control

### OUTPUTS

Three user programmable, current sourcing output lines (active "high") are available. Each is capable of sourcing 30 volts at up to 150 mA. Output functions available are:

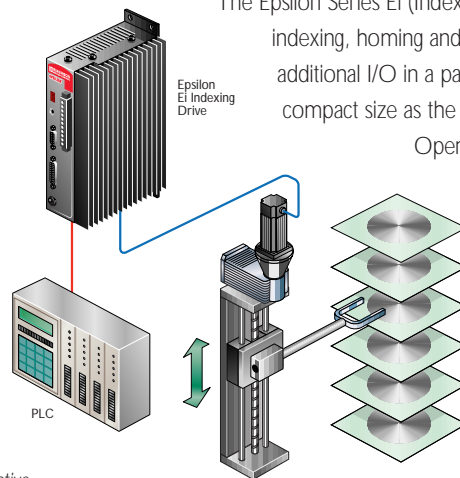
- Drive OK
- At Velocity
- Travel Limit (+)
- Travel Limit (-)
- Foldback Active
- In Motion (+)
- In Motion (-)
- Power Stage Active
- Torque Limit Active
- Velocity Limiting
- Fault
- Brake
- Shunt Active
- Torque Level 1 Active
- Torque Level 2 Active

## Ei (Indexing) Version

### Description

The Epsilon Series Ei (Indexing) Drive offers indexing, homing and jogging, and additional I/O in a package that is the same compact size as the the Eb Epsilon Drive.

Operating information is setup via a PC.



**Absolute positioning speeds up disk retrieval**

### INPUTS

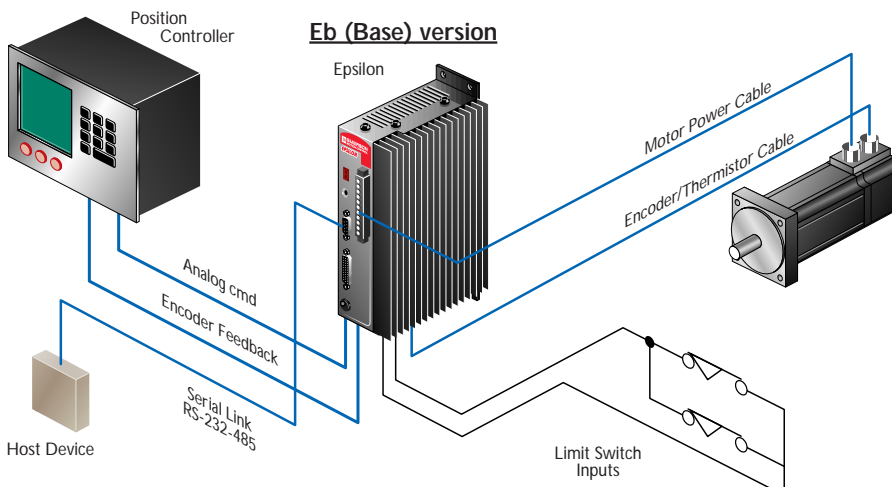
Twelve general purpose digital inputs (10-30 VDC, active-high, optically isolated) are available for interfacing. One or more of the 18 input functions can be assigned to each input. The dedicated Drive Enable input imposes hardware control over the Power Stage to help assure safety.

- Index Initiate
- Index Select 0
- Index Select 1
- Index Select 2
- Index Select 3
- Home Initiate
- Home Sensor
- Stop
- Zero Position
- Jog +
- Jog -
- Jog Fast
- Travel Limit +
- Travel Limit -
- Brake Control
- Brake Release
- Reset
- Torque Limit Enable

### OUTPUTS

Seven general purpose digital outputs (10-30)VDCm active-high, optically isolated) are available. Each is capable of driving relays without another interface layer. One or more of the 18 output functions can be assigned to each output.

- Absolute Position Valid
- End of Index
- End of Home
- At Velocity
- In + Motion
- In - Motion
- Drive OK
- Fault
- Brake
- Travel Limit +
- Travel Limit -
- Foldback Active
- Shunt Active
- Torque Limit Active
- Home Limit Distance Hit
- Torque Level 1 Active
- Torque Level 2 Active
- Power Stage Enabled



# Performance Matched Motors

## EZ Series Brushless AC Servo Motors

The EZ series delivers excellent motor speed control and highly accurate positioning capability demanded by automated machinery industries.

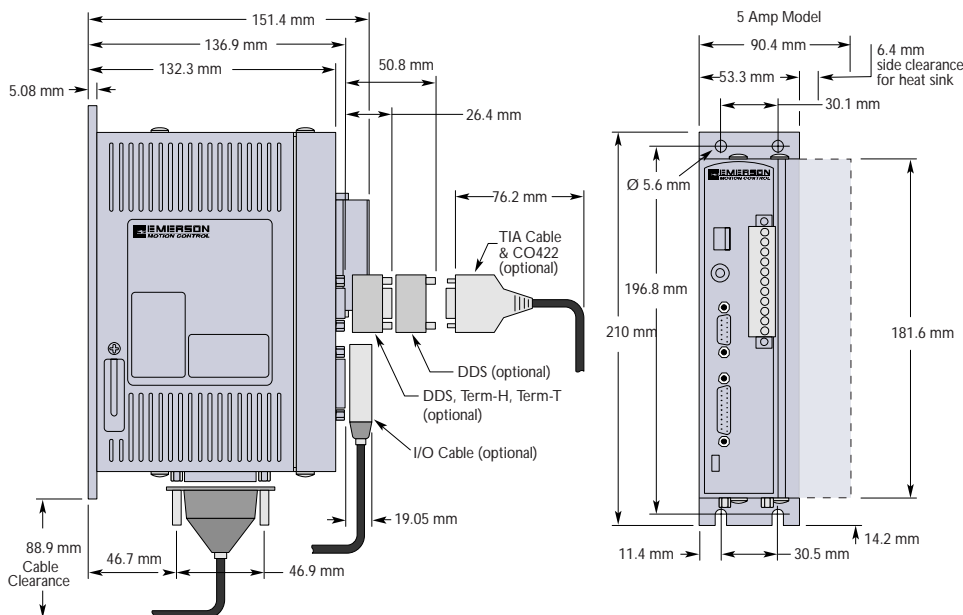
The EZ series of motors provide high torque with minimal cogging torque. Incremental encoder feedback and commutation results in excellent speed and position control. The use of specially developed coil wire gives ultimate reliability and quality. All these design criteria combined with high energy magnets mean EZ motor's performance is truly dynamic.

## The NT Series Motors

Emerson's new NT series motors, suitable for ultra dynamic applications, deliver very high power to size ratios. We accomplished this with the use of the latest motor design and production technology that achieves a high motor slot fill along with high-energy Neodymium-Iron-Boron magnets. The NT motors and Epsilon drives are a natural combination where small size and high performance are needed.

Motor	Epsilon Model	Epsilon Amps	Stall Torque Nm	Peak Torque Nm	Stall Current amps	Rated Speed rpm	Inertia kgcm <sup>2</sup>	Weight (no brake) kg
55EZA500	Eb/Ei-202	1.8	0.65	1.9	1.4	5000	0.12	1.1
55EZB500	Eb/Ei-203	3	1.1	2.8	2.3	5000	0.22	1.6
55EZC500	Eb/Ei-203	3	1.4	2.8	3	5000	0.32	2
75EZB400	Eb/Ei-203	3	2.1	4.2	3	4000	1	3.7
75EZC300	Eb/Ei-203	3	2.7	5.5	3	3000	1.5	4.4
55EZB500	Eb/Ei-205	5	1.1	4.4	2.3	5000	0.22	1.6
55EZC500	Eb/Ei-205	5	1.4	4.8	3.0	5000	0.32	2
75EZD400	Eb/Ei-205	5	3.5	7	5	4000	1.9	5.1
95EZB300	Eb/Ei-205	5	4.2	9.3	4.5	3000	2.5	6.1
95EZC300	Eb/Ei-205	5	4.6	9.3	5	3000	3.6	7.2
115EZC250	Eb/Ei-205	5	6	12	5	2500	7.8	9.9
NT207	Eb/Ei-202	1.8	0.82	1.72	1.6	5000	0.106	1.4
NT212	Eb/Ei-202	1.8	1.04	2.03	1.8	5000	0.185	1.8
NT212	Eb/Ei-203	3	1.41	3.05	2.7	5000	0.185	1.8

All performance data has a tolerance of  $\pm 10\%$



## Fault Detection Capability

Low DC bus; High DC bus;  
 Power Stage fault; Logic power;  
 Encoder state; Encoder line break;  
 Drive overtemperature;  
 Motor overtemperature; Overspeed;  
 Travel limit (+); Travel limit (-);  
 Pulse mode position error;  
 Watchdog timer; Power-up self test failure; Non-volatile memory invalid

## Options Available

- RFI Filter range available
- External dynamic brake (RSR-2) for higher braking duty
- Cable assemblies

Weights: Epsilon 202, 203, 205: 1.5kg, 1.5kg, 1.7kg Nett