ELMO MOTION CONTROL

Company Overview
What is 3,500,000?

- The price (ILS) of a 3 bedroom 96m² apartment in Old Jaffa
- Your earnings, have you invested 750,000$ in McDonalds 20 years ago
- The population of the archipelago Puerto Rico
Over

3,500,000 Servos
Installed
30 Years of Innovation

- Inspiring motion since 1988
- Israeli HQ, designing, manufacturing & distribution
- Over 300 employees including more than 70 R&D engineering experts focused on developing advanced products and applications
- Vast Global presence with manufacturing facilities in Israel and the EU
To better meet the challenges and to respond to our customers needs, we are in charge of the whole product chain:

1. R&D: Innovation
2. Engineering: Design
3. Marketing & Sales
4. Manufacturing
5. Field Support
5 Commandments to for “Smarter Machine”

Cutting edge motion control technologies

Fast & simple machine’s development process

Contribute to customer’s competitiveness

Stable, accurate with highest throughput

Lasting high quality & reliability

Taking Machines Beyond Their Limits
Out 10 Commandments

- Perfect Servo & Motion Control
- Smallest & Lightest
- Ultra Efficient Power Conversion
- Highest Power & Intelligence Density
- Ruggedness

- Negligible EMI (Electro Magnetic Interferences)
- Utmost Reliability
- Easy to Integrate, Simple to Operate
- Precise & Efficient Networking
- Top Safety.
Where motion matters.

- Printing
- Machine tools
- Medical equipment
- Semiconductors
- Solar
- Electronics
- Lab Automation
- Unmanned vehicles
- Military & Aerospace
- Robotics
- Packaging
- Wood processing
- Material handling
- Navy & Avionics
- Sorting
ONE harmonious orchestra creating perfectly tuned and coordinated motion control symphony

Motion Symphony
EASII
the ultimate software tool for fast & easy motion implementation

Perfectly Tuned Servo Drives
Powerful, Smartest, Smallest & Simplest

Brilliant Maestro
Advanced EtherCAT multi-axis controller
Great Things Come in Small Packages

*Best results with Any Servo Load *Wide bandwidth (>5 KHz) *Fast & accurate PI Vector Control *Safety Feedback, Advance commutation (>3KHz) *Smart Phase advancing *High current dynamics 2000:1 *60us current loop *Current Loop Gain Scheduling *60us Velocity loop *Velocity Loop Gain Scheduling *60us Position loop *Position Loop Gain Scheduling *Selecttable 1:1:1 or 1:2:2 Servo control *60us Velocity loop *60us Position loop *High order filters on different control loop segments *Low Pass filters *High Pass filters *Notch and Anti-Notch filters *Lead Lag filters *Filters on references

*Functional Safety (IEC 61800-5-2; SIL-3): STO, SOS, SLS, SS1, SS2, SLT, SBC, SLA, SAB... *FIR Glitch *LPF *High order general bi quad filters *Scheduled filters *Unlimited Control Numerical values *Automatic calibration Procedures *Commutation alignment *Phase sequencing *Current loop offset adjustment *Current loop gain tuning *Current gain scheduling *Velocity loop offset adjustment *Velocity gain tuning *Velocity gain scheduling *Position gain tuning * and much servo capabilities *Any Feedback on the market support *Absolute serial * Incremental Quadrature

*Incremental Quadrature + Halls

*Digital Halls only *Analog Halls (single turn sin-cos) *Serial Single and Multi Turn *Resolver with wide frequencies support *Analog Sin-Cos Encoder *8192 internal multiplier reaching 500,000,000 counts/revolution *SAFE I/O *Encoder Emulation outputs *PWM (Pulse Width Modulation)

Emulation, Quadrature Emulation *Current and velocity PWM Emulation *Wide reference inputs *Quadrature reference


PWM Follower* Fast Event Capture Inputs

*Wide Homing methods *two advanced independent motion profilers *2

Analog inputs supports current, velocity, position loop *By the Book *standardized

IEC61158 EtherCAT

On the tip of your finger
Servo Drives

P-Lion
Motion Controller

Eagle
650A/80A
550A/100V

Eagle
430A/80V
360A/100V

Eagle
100A/900V

Eagle
150A/100V

Hawk
100A/100V

Hornet
50A/100V

Bee
160A/80V
140A/100V
80A/100V
Multi Axis Control

Gold Maestro

P-MAS I/O

Platinum Maestro

P-Lion

P-BLM P-MAS
Board level (embedded)
All the multi-axis capabilities a machine could ask for


Intensive Environmental, Safety and EMC testing according to the STDs
Elmo has “In house” capabilities to the perform most of the required tests.
Standard Compliance

Functional Safety

The GOLD Line Servo Drives are the Smallest to comply to the STO (Safety Torque Off), SIL3 & Category 3, PL e,

<table>
<thead>
<tr>
<th>Safe Torque Off (STO)</th>
<th>Item</th>
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<tr>
<td>IEC 61800-2-2:2007 SIL 3</td>
<td>Adjustable speed electrical power drive systems</td>
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<tr>
<td>EN ISO 13849-1:2008 Cat 3, PL e</td>
<td>Safety requirements – Functional</td>
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<tr>
<td>EN 61508-1:2010 SIL 3</td>
<td>Functional safety of electrical/electronic/programmable electronic systems</td>
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Safety Compliance

The GOLD Servos meets the most severe STDs

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<th>Specification</th>
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<tr>
<td>Recognized UL61800-5-1</td>
<td>Adjustable speed electrical power drive systems</td>
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<td></td>
<td>Safety requirements – Electrical, thermal and energy</td>
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<tr>
<td>Approved IEC/EN 61800-5-1</td>
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<td>Safety requirements – Electrical, thermal and energy</td>
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<tr>
<td>Conformity with CE 2006/95/EC</td>
<td>Low-voltage directive 2006/95/EC</td>
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Environmental Compliance

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<td>Approved IEC60068-2-78</td>
<td>Environmental testing – Dump heat, steady state</td>
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<td>Approved IEC60068-2-26</td>
<td>Environmental testing – Vibration (accelerated)</td>
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<td>Approved IEC60068-2-2</td>
<td>Environmental testing – Dry heat</td>
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<td>Approved IEC60068-2-27</td>
<td>Basic environmental testing procedures - Shock</td>
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EMC Compliance

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<tr>
<td>Approved IEC/EN 61800-3</td>
<td>Adjustable speed electrical power drive systems</td>
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<tr>
<td>In compliance with EN 55011 Class A with EN 61000-6-2: Immunity for industrial environment, according to: IEC 61000-4-2</td>
<td>Electromagnetic compatibility (EMC)</td>
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<tr>
<td>IEC 61000-4-3</td>
<td>criteria A</td>
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<td>IEC 61000-4-4</td>
<td>criteria B</td>
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<tr>
<td>IEC 61000-4-5</td>
<td>criteria B</td>
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<tr>
<td>IEC 61000-4-6</td>
<td>criteria A</td>
</tr>
<tr>
<td>IEC 61000-4-8</td>
<td>criteria A</td>
</tr>
<tr>
<td>IEC 61000-4-11</td>
<td>criteria B/C</td>
</tr>
<tr>
<td>Approved IEC 61326-3-1</td>
<td>Electrical equipment for measurement, control and laboratory use. Standard required for STO.</td>
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DOUBLE GOLD TWITTER
160A/80V
10000W

GOLD TWITTER
80A/80V
5000W