

# *Motion Control* *Ready for the Extreme*

## 2016



**Inspiring Motion**  
Since 1988

# ExtrlQ Line

Servo Drives that Endure “Any Environment”

Extreme durability, meticulous power management and high precision of movement are essential attributes for developing high performance reliable industrial, commercial or military applications.

Elmo’s ExtrlQ is a standard “off the shelf” series of robust motion control products designed, verified, manufactured and tested for applications operating under extreme environmental conditions, such as: expanded temperature ranges, high humidity, extreme altitude, intense vibration and high mechanical shock. In addition to enduring the most extreme environment the ExtrlQ exhibits top servo performance, super compact sizes, high efficiency, negligible EMI, High Reliability and answering any servo requirement. The durability is verified by the most severe Environmental, EMC and Safety Standards.



Motion Controllers  
Ready for the Extreme

Motion Control Solutions  
for Any Mission, Any Environment



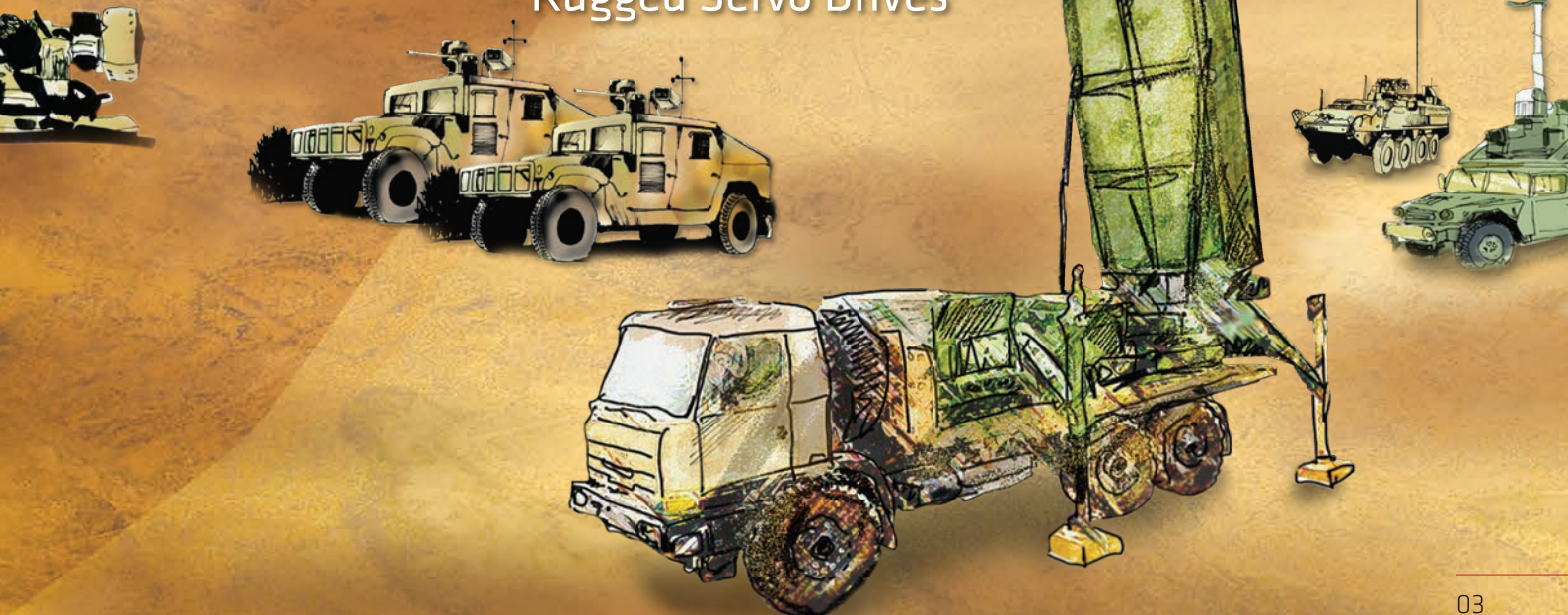
# Environmental Specifications

Our high performance field tested solutions withstand the most extreme environmental conditions like heat, cold, freeze, humidity, dryness and wind. They comply with the strictest safety, EMC, Electrical, Reliability and Environmental Standards such as 1275, 704, 1399, 810, 461, 217, UL 61800-5-1, IEC 61800-5-2(SIL3), IEC 60068-2, IEC 61800-3, and more.

Feature	Operating Conditions	Range
Ambient Temperature Range	Non-operating conditions	-50 °C to 100 °C (-58 °F to 212 °F)
	Operating conditions	-40 °C to 70 °C (-40 °F to 160 °F)
Temperature Shock	Non-operating conditions	-40 °C to 70 °C (-40 °F to 160 °F) within 3 minutes
Altitude	Non-operating conditions	Unlimited
	Operating conditions	-400 m to 10,000 m (-1,300 ft to 32,800 ft) Models for higher altitudes are available upon request
Relative Humidity	Non-operating conditions	Up to 95% relative humidity non-condensing at 35 °C (95 °F)
	Operating conditions	Up to 95% relative humidity non-condensing at 25 °C (77 °F) Up to 90% relative humidity non-condensing at 42 °C (108 °F)
Vibration	Operating conditions	20 Hz to 2 kHz, 14.6 g
Mechanical Shock	Non-operating conditions	±40 g; Half sine, 11 msec
	Operating conditions	±20 g; Half sine, 11 msec



## Rugged Servo Drives



# Elmo's Lion Family

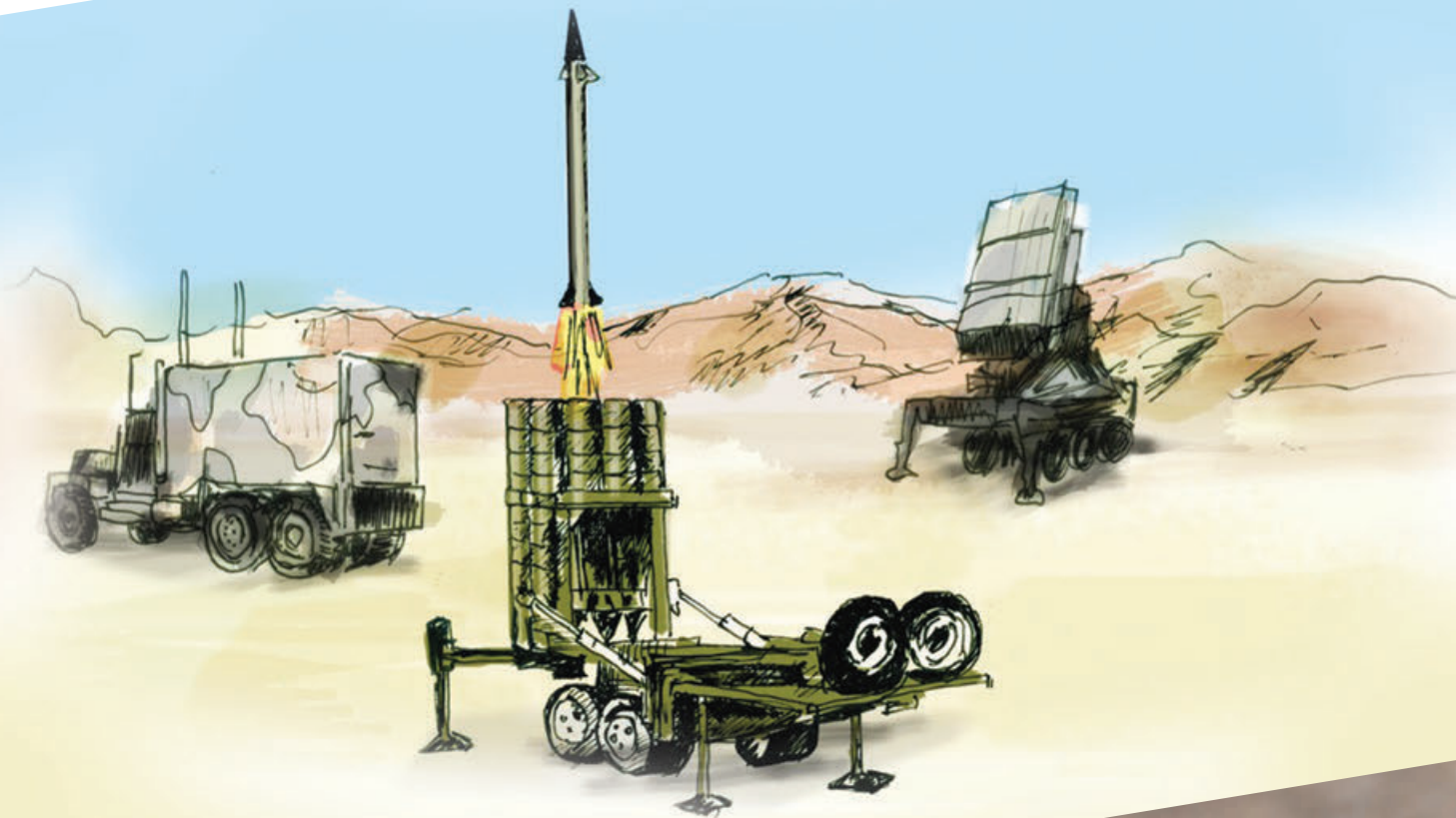
## Motion In Perfect Harmony

Elmo's Lion series of motion controllers provides the optimum solution for fast, simple, and unequalled machine operation. The Lion family, featuring world class multi-axis capabilities, are loaded with extreme processing power, memory resources, advanced motion algorithms, and complex scenarios.

These state of the art machine motion controllers combine advanced machine functionalities and most efficient network mastery. Maestros create a perfectly synchronized motion symphony when combined with Elmo's intelligent servo drives, delivering an unbeatable performance using the built-in advanced control algorithms and features of Elmo's powerful perfectly tuned drives.

As well as providing fast and efficient machine motion with cycle times down to  $250\mu\text{s}$ , The Lion also master other machine functions using standardized EtherCAT networking for best integration with the widest variety of machine peripherals like I/Os, HMI, vision and more.

Lions are designed to significantly extend and enhance motion control, connectivity, performance and ease of the use. In addition to best results they provide "Cost Cutting by Technology" with easy and cost effective integration thanks to reduced hardware and less cabling.





# ExtriQ Lion

## Multi Axis Network Motion Controller for Extreme Environments

“Design Your Own Extreme Motion Control Solution”

Elmo's Gold Lion is an advanced network based, multi-axis machine motion controller. The Gold Lion can control any multi axis scenario. From simple Point-To-Point to complete multi-axis coordinated / synchronized motion. The Gold Lion Module is a “ready to use” complete motion controller to be embedded in user's printed board, resulting high level of customization, most advance motion solution with tremendous design flexibility, richness of functionalities and huge space saving.

- Controls up to 100 axes with a high-level of synchronization and accuracy
- Reverse Kinematics Support
- Motion blending and superimposed motion
- Coordinated group motion, blending and transitions
- Polynomial motion segments, PVT and Spline support
- Real-time updates of target positions (“flying vision™”)
- 1D, 2D and 3D error correction
- EtherCAT master for distributed networking, with distributed clock management
- CANopen master for distributed networking
- Host communications and protocols:
  - Ethernet, TCP/IP, UDP (Fast Binary Protocols, Modbus, Ethernet/IP)
  - USB 2.0
- Rich, high-level, multi-axis programming environment:
  - Microsoft .NET
  - IEC 61131-3, PLCopen
  - Native C/C++ programming using the PLCopen for Motion
  - Win32 C/C++



**GOLD LION 100**  
(Rugged Package)



**GOLD LION**  
(Board Level)

# EASII Elmo Application Studio II Software

## Motion without programming Only with Elmo's Advanced tools

System implementation using innovative EASII (Elmo application Studio) software including Elmo Motion Function Blocks, EMBLs, ushers in the "Intelligence by Simplicity" revolution. Motion programming was once the domain of hard to find motion "wizards", demanding both the highest level of machine motion skills with expertise in motion programming. Now using EASII with EMBLs you can get the best performance from your machine, fast to learn how, easy to implement, by non-wizards, significantly shortening "Time to Market" while enormously saving on engineering resources.

## Walking You Through the Entire Motion implementation

EASII, Elmo Motion Control's leading motion control software, offers an intuitive interface to simplify complex advanced motion programming. EASII configures, programs, maintains, monitors and analyzes every feature and capability of Elmo's servo drives and Maestro motion controllers. It brings your machine to peak performance in the shortest time, makes drive setup simpler and puts powerful, intuitive software tools for motion control at your fingertips, regardless of the complexity of the application.

EASII includes intelligent, simple to use Elmo Motion Block Libraries (EMBLs), machine templates, function, and capabilities which operate in a wide variety of high-level, multi-axis programming environments such as Microsoft .NET, IEC 61131-3 PLCopen, Native C/C++ programming using the PLCopen for Motion and Win32 C/C++.

The EASII with EMBLs are indeed "One Tool That Does it All " providing Configuration, Set-Up, Networking, Programming, Tuning, Load Identification, Multi-dimensional Control Optimization, Synchronization, Motion Blending and Transitions, Error mapping, ECAM, Gain Scheduling, Testing, Monitoring, and Recording.

- Innovative software tools enable motion control in every field - any application!
- User unit support, error mapping and correction, drive feedback emulation
- Maestro controller and servo drive ECAM configuration, with simplified external reference input processing, bode & Nichols tuning graphical analysis
- Management (upload/download) of numerous servo drive configurations
- Automated recording live scope and gauge displays
- Comprehensive inline help system

**EASII**  
Elmo Application Studio

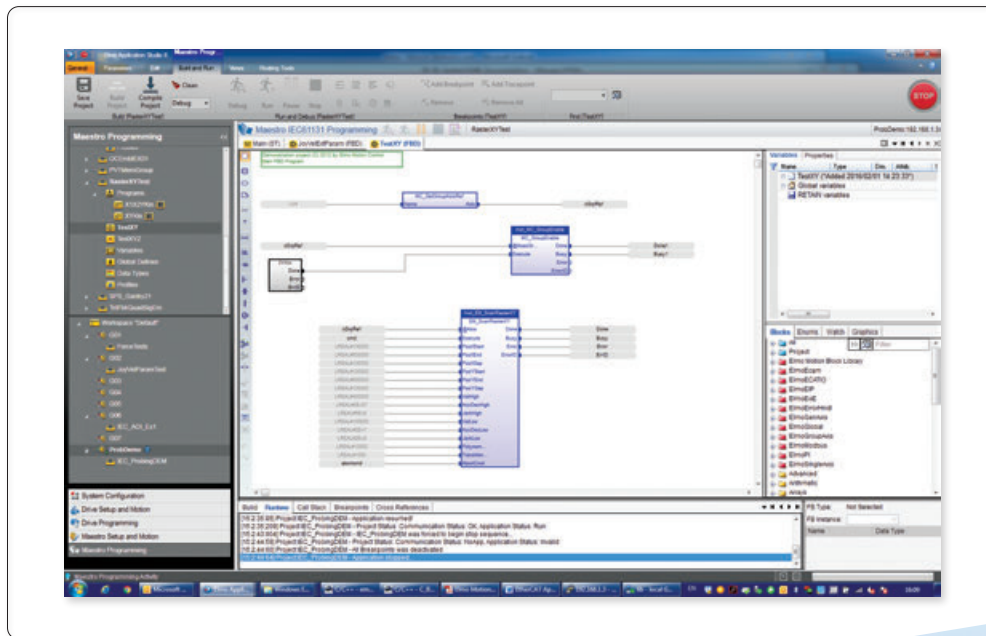


The advanced wizard-based  
Application Studio II



# EMBLs Faster, Simpler Implementation

EASII's ready to use motion function blocks, EMBLs, significantly simplify the development process of the application in the fastest speed. EMBLs are Elmo has developed numerous EMBLs that simplify the development process of the machine, for example Homing (all DS-402 methods and more), Output Compare (PEGS), Emulation, ECAM, PVT, Splines, Joystick, Position-To-Force, Raster Scan, Group Motion & Kinematics and more.



Drag and drop an EMBL on to project from the library. Define input and outputs, then execute. As easy as that!

Saving you time by  
keeping it simple



# ExtriQ Gold Servo Capabilities

**Reliable and Rugged high performance Servo Drives with a high bandwidth to receive best results for any Servo load, even for the most demanding non-linear mechanics.**

- Best results with any servo mechanism, whether high resonance, high inertia, wide bandwidth, very low speed, non-linear. Ultimate tuning tools, accomplishing top performance “Fast & Easy”
- Down to 50µs sampling rate
- “1:1:1” technology, same sample time for current, velocity and position loops resulting very fast and wide bandwidths
- High servo loop bandwidth, as high as 4.5KHz current loop Bandwidth
- Very High linearity, current dynamic range of 2000:1 (100A drive runs smoothly 0.05A load)
- Supports Any “known” Feedback sensor and any combination of Dual Loop sensors
- Mastering Gantry by only 2 Gold Drives, No need for additional bulky controller
- “By The Book” Standard EtherCAT and CANopen networking
- Abundance of control features:
  - ECAM
  - Output Compare
  - Master-Slave Follower
  - Modulo
  - Dynamic Braking
  - Dual Loop
  - Gantry
  - Planar
  - 1D error correction
  - Unlimited Control Numerical values
- Utmost efficiency of 99%
- Ultra High Current Technology
- Certified STO (Safety Torque Off), IEC 61800-5-2 SIL 3, EN ISO 13849-1 Cat 3, PL e
- Proven reliability of MTBF > 1,000,000 Hours





# Gold Bee

The NANO servo drive that delivers over 4,000 "qualitative" watts

- Ready for the Extreme, -40 °C to +70 °C, Vibrations up to 14 GRMS
- Rugged to endure any environment
- Ultra High Current, 50 A at 100 VDC
- Advanced Servo capabilities for Best results with any load



## 60V & 100V Rating

Feature	Units	30/60	R50/60	3/100	6/100	10/100	15/100	25/100	R45/100	R50/100
Minimum supply voltage	VDC	8		10						
Nominal supply voltage	VDC	48		85						
Maximum supply voltage	VDC	55		95						
Ic, Amplitude sinusoidal/ DC continuous current	A	30	50	3	6	10	15	25	45	50

## 200V Rating

Feature	Units	3/200	6/200	10/200	R15/200
Minimum supply voltage	VDC	20			
Nominal supply voltage	VDC	170			
Maximum supply voltage	VDC	194			
Ic, Amplitude sinusoidal/ DC continuous current	A	3	6	10	15

# Gold Hornet

## Ultra Miniature Servo Drive

-40 °C to +70 °C, Vibrations up to 14 GRMS



### Gold Hornet & Gold Solo Hornet 100V Rating

Feature	Units	1/100	2.5/100	5/100	10/100	15/100	20/100
Minimum supply voltage	VDC				12		
Nominal supply voltage	VDC				85		
Maximum supply voltage	VDC				95		
Amplitude sinusoidal/DC continuous current	A	1.0	2.5	5	10	15	20

### Gold Hornet & Gold Solo Hornet 200V Rating

Feature	Units	3/200	6/200	9/200
Minimum supply voltage	VDC		12	
Nominal supply voltage	VDC		170	
Maximum supply voltage	VDC		195	
Amplitude sinusoidal/DC continuous current	A	3	6	9



# Gold Hawk

## Super Compact, High Current Servo Drive

-40 °C to +70 °C, Vibrations up to 14 GRMS



Actual Size



Gold Solo Hawk

Gold Hawk

Feature	Units	20/100	35/100	50/100	10/200	17/200	20/200
Minimum supply voltage	VDC		14			23	
Nominal supply voltage	VDC		85			170	
Maximum supply voltage	VDC		95			195	
Continuous current limit (I <sub>c</sub> ) amplitude of sinusoidal current	A	20	35	50	10	17	20



# Gold Panther

## Super Compact, High Voltage Servo Drive

-40 °C to +70 °C, Vibrations up to 14 GRMS

Actual Size



### Gold Panther & Gold Tiger Rating

Feature	Units	6/400	16/400	R22/400	8/800	12/800	R16/800	8/900	12/900	R16/900
Minimum supply voltage	VDC		50			95			95	
Nominal supply voltage	VDC		325			560- 680			620	
Nominal supply voltage	VDC		400			780			840	
Continuous current limit (Ic) Amplitude sinusoidal/DC trapezoidal commutation	A	6	16	22	8	12	16	8	12	16
Control supply voltage (option)	VDC	18 V to 30 V Up to 7VA								



# Gold Tiger

Super Compact, High Voltage,  
Metal Housed Servo Drive

-40 °C to +70 °C, Vibrations up to 14 GRMS

Actual  
Size





# Gold Eagle

## Ultra High Current, Super Compact Servo Drive

-40 °C to +70 °C, Vibrations up to 14 GRMS

**Actual  
Size**



### Gold Eagle

Feature	Units	70/60	50/100	100/100	R150/100
Minimum supply voltage	VDC	14			
Nominal supply voltage	VDC	50	85		
Maximum supply voltage	VDC	59	95		
VL Logic supply input voltage	VDC	14 to 72, up to 6VA			
Amplitude sinusoidal/DC continuous current	A	70	50	100	150

Feature	Units	35/200	R60/200	18/400	R26/400
Minimum supply voltage	VDC	46		92	
Nominal supply voltage	VDC	170		340	
Maximum supply voltage	VDC	195		390	
VL Logic supply input voltage	VDC	14 to 72, up to 6VA			
Amplitude sinusoidal/DC continuous current	A	35	60	18	26



# Gold Eagle HV

## Super Compact, High Voltage Servo Drive

-40 °C to +70 °C, Vibrations up to 14 GRMS

Actual  
Size



### Gold Eagle HV

Feature	Units	50/400	R100/400	35/800	50/800	R70/800	R100/800	35/900	70/900	100/900
Minimum supply voltage	VDC	*For S, T, or A option = 50 For O or 1 option = 100			95			95		
For O or 1 option = 100	VDC	325			560- 680			620		
Nominal supply voltage	VDC	400			780			840		
Maximum supply voltage	A	400	780	840	50	70	100	35	70	100
Auxiliary supply voltage option	A	18 to 30 VDC, <7VA								



# Gold Eagle 500

500A Ultra High Current, Rugged, Servo Drive

-40 °C to +70 °C, Vibrations up to 14 GRMS

Actual  
Size



Feature	Units	500/100
Minimum supply voltage	VDC	14
Nominal supply voltage	VDC	85
Maximum supply voltage	VDC	95
Continuous current limit (Ic) amplitude of sinusoidal current	A	500





PORT A

 **Elmo**  
Motion Control  
www.elmormc.com

P/N: G-EAG500/100EE  
S/N: GEA15121318  
CSN:  
Made In Israel

CE

# ExtrIQ, SimplIQ Servo Drives

**Leader since 2004, Field proven for High reliability and Top Servo performance.**

Elmo's servo drives combine high power density, intelligent functionality and extreme environment durability.

The drives integrate Elmo's advanced, SimplIQ motion control core technology, which enables superior control performance.

## ExtrIQ SimplIQ Servo Highlights

**Elmo SimplIQ Core servo drive exhibit richness of capabilities and features supporting large variety of applications requiring harsh environmental conditions.**

- Field Proven performance, quality and reliability since 2004
- High performance servo control
- Down to 50µs sampling rate
- High servo loop bandwidth, as high as 2KHz current loop Bandwidth
- Supports large variety of feedback sensors
- "By The Book" Standard CANopen networking (DS402, DS303)
- RS232 communication
- Abundance of control features:
  - ECAM
  - Smart position follower
  - Pulse and Direction
  - Output Compare
  - Master-Slave Follower
  - PT and PVT position and velocity operating modes
  - Modulo
  - Dynamic Braking
  - Dual Loop
- Utmost efficiency of 99%
- Ultra High Current Technology
- Proven reliability of MTBF > 1,000,000 Hours





## ExtriQ, SimpliQ Servo Drives



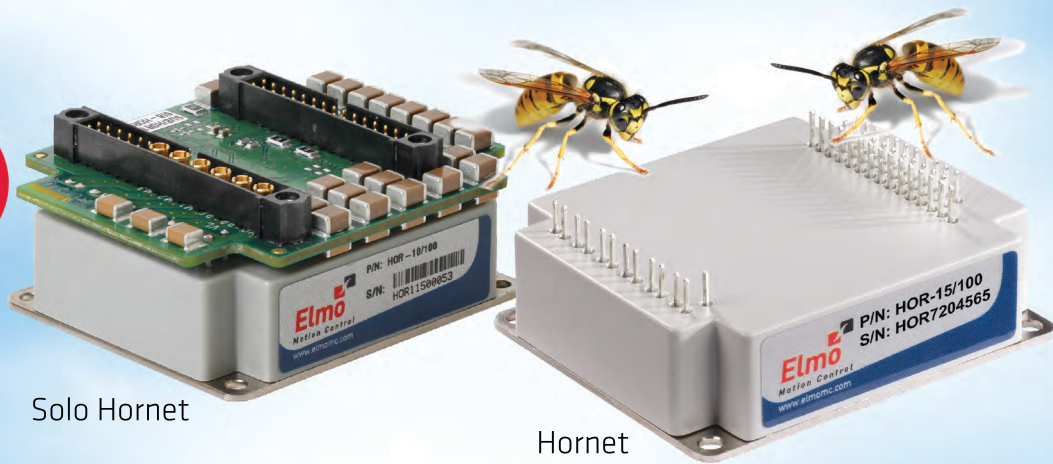
# SimpliQ

## Hornet

### Ultra Compact Servo Drive

-40 °C to +70 °C, Vibrations up to 14 GRMS

**Actual  
Size**



Solo Hornet

Hornet

#### Gold Hornet

Feature	Units	1/100	2.5/100	5/100	10/100	15/100	20/100
Minimum supply voltage	VDC				12		
Nominal supply voltage	VDC				85		
Maximum supply voltage	VDC				95		
Amplitude sinusoidal/DC continuous current	A	1.0	2.5	5	10	15	20

#### Gold Solo Hornet

Feature	Units	3/200	6/200	9/200
Minimum supply voltage	VDC		12	
Nominal supply voltage	VDC		170	
Maximum supply voltage	VDC		195	
Amplitude sinusoidal/DC continuous current	A	3	6	9



# SimpliQ

## Hawk

### Highly Compact and Intelligent Digital Servo Drive

-40 °C to +70 °C, Vibrations up to 14 GRMS



Feature	Units	20/100	35/100	50/100	10/200	17/200	20/200
Minimum supply voltage	VDC		14			23	
Nominal supply voltage	VDC		85			170	
Maximum supply voltage	VDC		95			195	
Continuous current limit (Ic) amplitude of sinusoidal current	A	20	35	50	10	17	20



# SimplIQ

## Panther

### DC Offline Servo Drive for Extreme Environmental Conditions

-40 °C to +70 °C, Vibrations up to 14 GRMS

Actual Size



Feature	Units	12/400	16/400	R22/400	8/800	12/800	R16/800
Minimum supply voltage	VDC		50			95	
Nominal supply voltage	VDC		325			560- 680	
Nominal supply voltage	VDC		400			780	
Continuous current limit (Ic) Amplitude sinusoidal/DC trapezoidal commutation	A	12	16	22	8	12	16
Control supply voltage (option)	VDC				18 V to 30 V		



# SimplIQ

## Falcon

### Harsh Environment Power Supply for Servo applications

-40 °C to +70 °C, Vibrations up to 14 GRMS



Actual  
Size

Feature	Units	15/60	30/60	15/100	30/100	15/200
Minimum supply voltage	VDC	10		20		40
Nominal supply voltage	VDC	50		85		170
Maximum supply voltage	VDC	59		95		195
Auxiliary supply voltage	VDC	24 ± 20%				
Auxiliary power supply	VA	12				
Amplitude sinusoidal/ DC continuous current	A	15	30	15	30	15



# SimpliQ

## Eagle HV

Eagle HV (High Voltage) Digital Servo Drive up to 65 kW

-40 °C to +70 °C, Vibrations up to 14 GRMS

Actual  
Size



Feature	Units	50/400	R100/400	35/800	R70/800	R100/800
Minimum supply voltage	VDC	*For S, T, or A option = 50 For 0 or 1 option = 100		95		
For 0 or 1 option = 100	VDC	325		560- 680		
Nominal supply voltage	VDC	400		780		
Maximum supply voltage	A	400	780	840	70	100
Auxiliary supply voltage option	A	18 to 30 VDC				



# SimplIQ



## Eagle

Powerful Digital Servo Drive  
up to 9.6 kW of Continuous Power

-40 °C to +70 °C, Vibrations up to 14 GRMS



**Actual  
Size**

Feature	Units	70/48	70/60	R90/60	100/60	50/100	R75/100	100/100	35/200	R60/200	18/400
Minimum supply voltage	VDC	11		14			23			46	92
Nominal supply voltage	VDC	42		50			85			170	340
Maximum supply voltage	VDC	48		59			95			195	390
Amplitude sinusoidal/DC continuous current (Ic)	A	70	70	90	100	50	75	100	35	60	18



# Elephant

## Harsh Environment Power Supply for Servo applications

-40 °C to +70 °C, Vibrations up to 14 GRM

Power Supply (VAC)	Unit	ELP-30/36	ELP-30/60	ELP-30/120	ELP-30/230	ELP-30/480	ELP-30/480
Nominal Input AC Voltage	VAC	36	60	120	230	3X480	3X500
Max Input AC Voltage	VAC	38	61	131	270	3X528	3X600
Max Output Power Cont.	W	1650	2700	5700	11400	21000	25000
Max Output Power Peak	W	3300	5400	11400	22800	42000	50000
Nominal DC bus Output (at nominal AC Voltage)	VDC	50	85	170	325	678	705
Shunt Power (Peak) 1	kW	1.8	4.5	5.5	6	6.7	8.8
DC Output Cont. Current	A	30	30	30	30	30	30
DC Output Peak Current	A	60	60	60	60	60	60
Mating Drives XXX-YY/_/_ (voltage rating)		/60	/100	/200	/400	/800	/900
Weight	gr	1155					



Actual  
Size



480VAC

Elmo

POWER ●  
TEMP ●  
OVER VOLTAGE ●  
SHUNT ●  
DUTY CYCLE ●

CONTROL

ENABLE  
BY PASS

DC OUT  
5000 480VDC





# Where Motion Matters



## About Us

Elmo develops and manufactures cutting-edge servo drives and network motion controllers that are one-stop solutions for any motion control technology. As a leading global company with millions of servo drives in operation, we have over 25 years of proven experience bringing our customers profitability and success. With a focus on highest performance, efficiency, reliability, safety, ease-of-use and compliance to standards, Elmo's solutions are chosen by leading machine manufacturers in nearly every industry around the world.

## About Elmo Quick Facts:

- Established in 1988
- Elmo global presence: China, Germany, Israel, Italy, Korea, Poland, USA
- Over 3,000,000 servo drives installed and operating globally
- Worldwide sales and support network

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Accelerate Time to Market With Elmo's Extriq Line