



Motion Control Made  
**Small, Smart & Simple**

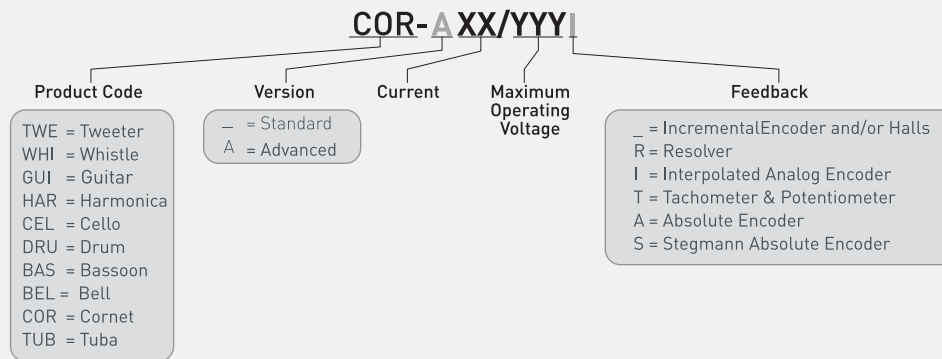


**SimpliIQ**  
Superior Servo Technology Products

# SimplIQ Servo Drives

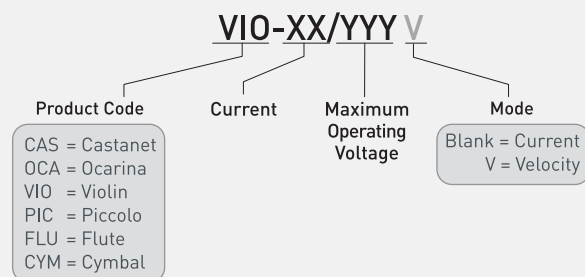
| Intelligent Digital Servo Drives  | DC power supply                                      |         |           |        |        |      | AC power supply |         |      |  |
|-----------------------------------|------------------------------------------------------|---------|-----------|--------|--------|------|-----------------|---------|------|--|
|                                   | Tweeter                                              | Whistle | Harmonica | Cello  | Guitar | Drum | Bassoon         | Cornet  | Tuba |  |
| Page                              | 14                                                   | 15      | 16        | 17     | 18     | 19   | 20              | 21      | 22   |  |
| Motor                             | Brush, Brushless, trapezoidal, sinusoidal, stepper   |         |           |        |        |      |                 |         |      |  |
| Operating Modes                   | Current, Velocity, Position ECAM, Gearing, Dual Loop |         |           |        |        |      |                 |         |      |  |
| Supply Voltage Range (VDC) (Max.) | ≤95                                                  |         | ≤195      |        |        | ≤390 | ≤380, 650       |         |      |  |
| Supply Voltage Range (VAC)        |                                                      |         |           |        |        |      | ≤270            | 3 x 505 |      |  |
| Continuous Output Current (A) DC  | ≤3.3                                                 | ≤15     | ≤13.3     | ≤30    | ≤50    | ≤180 | ≤6              | ≤9      | ≤20  |  |
| Output Power Range (KW)           | ≤0.2                                                 | ≤1.2    | ≤1.1      | ≤3.4   | ≤4.8   | ≤18  | ≤1.4            | ≤3.1    | ≤10  |  |
| Digital In, Out, Analog In        | 6/2/1                                                |         |           | 10/5/2 | 6/2/1  |      |                 | 10/6/2  |      |  |
| Communications                    | RS-232, CANopen, DS 301, DS 402                      |         |           |        |        |      |                 |         |      |  |
| Software Tools                    | Composer                                             |         |           |        |        |      |                 |         |      |  |
| Application Memory                | Up to 32 KB                                          |         |           |        |        |      |                 |         |      |  |

## Product Number Format



| Current mode analog              | DC       |         |                               |                                        |       |         |
|----------------------------------|----------|---------|-------------------------------|----------------------------------------|-------|---------|
|                                  | Castanet | Ocarina | Violin                        | Piccolo                                | Flute | Cymbal  |
| Page                             | 29       | 30      | 27                            | 31                                     | 28    | 32      |
| Motor                            | Brush    |         |                               | Trapezoidal Brushless Sinusoidal Brush |       |         |
| Operating Modes                  | Current  |         | Current and Optional Velocity |                                        |       | Current |
| Supply Voltage Range (VDC)       | ≤95      |         | ≤195                          |                                        |       | ≤390    |
| Continuous Output Current (A) DC | ≤25      | ≤25     | ≤3.3                          | ≤15                                    | ≤25   | ≤180    |
| Output Power Range (KW)          | ≤2.9     | ≤2.4    | ≤0.2                          | ≤1.4                                   | ≤2.9  | ≤22     |

## Product Number Format





***SimpliQ***  
Product Catalog



# Sparkling a Symphony of Motion

Meticulous management of power. Precision of movement. Flawless performance. These are the essential attributes that form the foundation of reliable, trouble-free machinery for any demanding industrial application. At Elmo Motion Control, it is the benchmark for all of our endeavors in creating they are the most sophisticated, integrated motion control solutions available in today's market.

For over 20 years, the company has been a pure-play provider of consistently innovative motion control products for machine manufacturers. Elmo designs, produces and markets network-based motion controllers, intelligent digital servo drives, highly efficient servo amplifiers for both brush and brushless motors. The innovative *SimplIQ* Motion Control Technology incorporated into the digital servo drives provides a wide range of motor feedback options, programming capabilities and communication protocols. Elmo's solutions support single and multi-axis control applications.

Elmo's products have been integrated by leading machine manufacturers around the globe in a wide variety of challenging industries where performance, precision and consistency of operation are paramount, including:

- Robotics
- Semiconductor production
- Avionics
- Machine tools
- Packaging
- Wood processing
- Textiles
- Medical and pharmaceutical instruments
- Printing/Converting
- Sorting
- Material handling

## Stable machinery, sophisticated performance

Founded in 1988, Elmo Motion Control is a privately owned company. With its headquarters in Israel, Elmo's operating infrastructure and international marketing activities are further augmented by two, wholly owned subsidiaries: Elmo Motion Control Inc. of Westford Massachusetts and Elmo Motion Control GmbH of Villingen-Schwenningen, Germany.

Moreover, a wide variety of machine component resellers and system integrators throughout the U.S., Europe and Asia-Pacific are active in the marketing and distribution of Elmo products. Elmo has a distinguished customer base that manufactures superior machinery for myriad industrial applications. Our customers are recognized for their rigorous standards. The lion's share of Elmo's sales (approximately 80,000 motion control products per annum) is rooted in its activities in every major market sector.

## The art of moving forward

At Elmo, finding the right synergy between intelligence and simplicity is at the heart of all our R&D activity. The Company designs and produces motion control products that are as sophisticated in their abilities, as they are simple to integrate and cost-effective to maintain. Elmo's diverse product range addresses all the key parameters in successful motion control: current control, velocity control as well as standard and advanced position control. Add to that a set of powerful and rich features, accessible, intuitive interfaces with groundbreaking concepts in miniature design that is unparalleled by any other manufacturer in the industry, and there's a winning formula that sets the wheels of industrial machinery in full motion.

Elmo's commitment to uncompromising high quality is accentuated in its modern R&D and manufacturing facilities, which feature ISO 9001:2000 certification, MRP II controlled operation and a fully automated SMD production line.

# SimplIQ

### Superior Servo Control Technology

- Wide variety of feedback options
- Enhanced programming capabilities
- Standard communication protocol support
- Robust functionality
- Current, velocity and position control
- ECAM, Follower, master/slave architecture
- Advanced software tools for setup and tuning



# Conducting an Ensemble of Communication

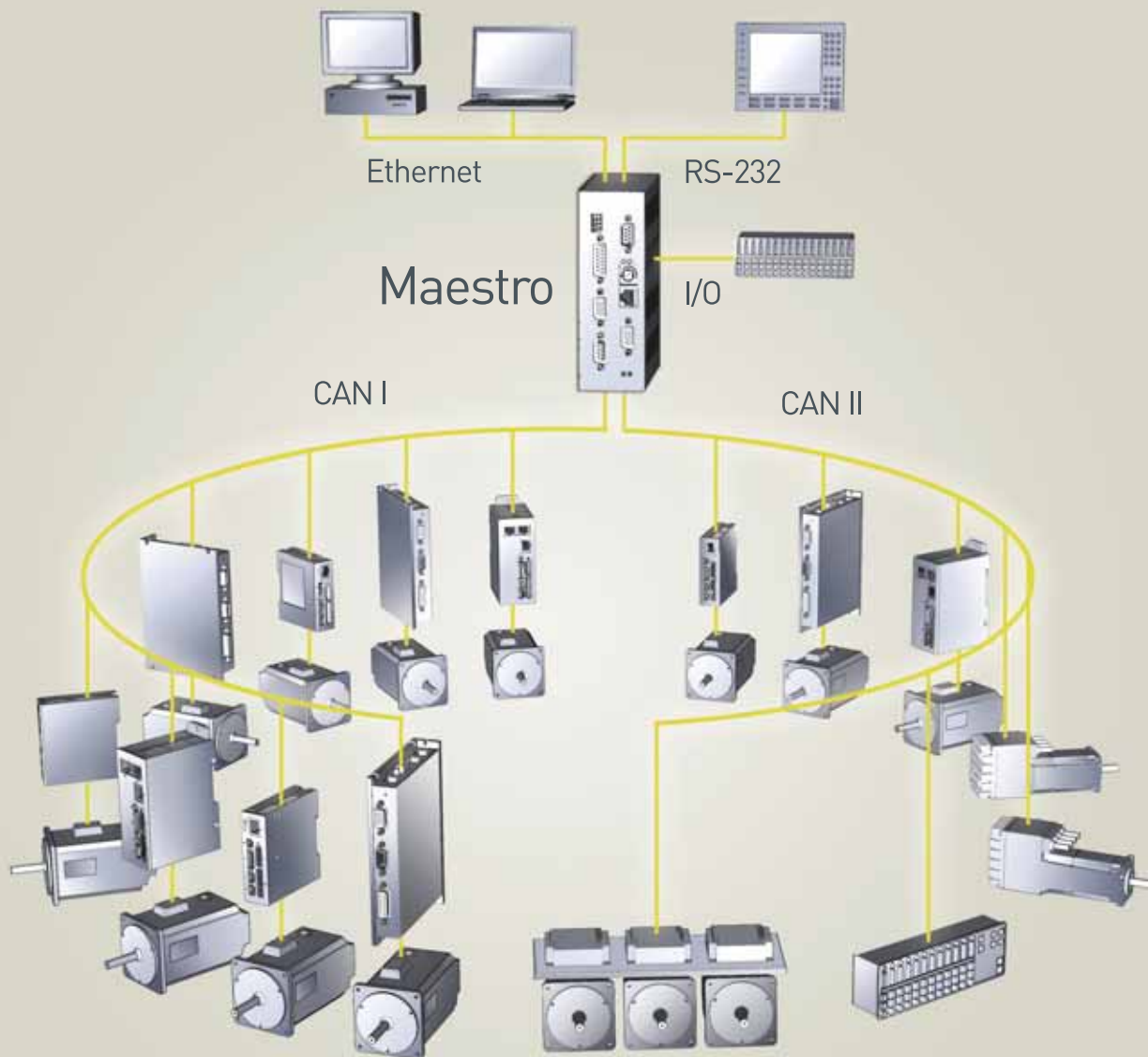
Elmo's approach to provide system-based solutions is delivered in two advanced network control products:

- **Maestro**- a sophisticated multi-axis motion controller capable of controlling the Elmo digital servo drives and CANopen-based nodes
- **Harp**- a powerful CAN-RS-232 gateway bridging communication between an RS-232 serial port and a CAN network

## Maestro

Elmo's Maestro is a network-based, multi-axis motion controller that operates in conjunction with **SimpliQ** intelligent servo drives to provide a comprehensive system-based solution. The Maestro is based on an efficient and cost effective distributed motion control architecture to share the motion processing workload. It contains a rich feature set which combines sophisticated motion control, advanced communication and full programming capabilities.

# Elmo Network-Based Motion Control

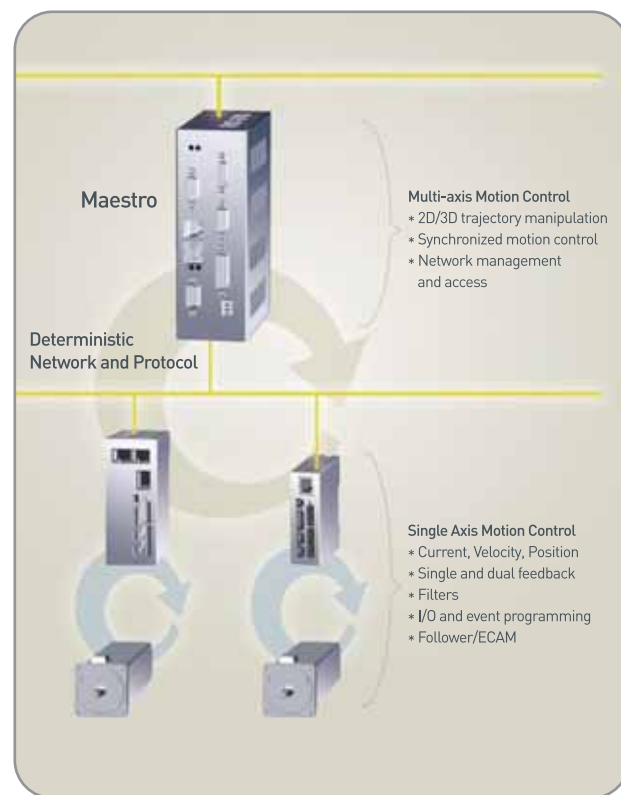


# ...Maestro

|                     |                                                                                                                                                                                   |
|---------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Axis Types          | Axis: Elmo <b>SimplIQ</b> drives and CANopen DS-402<br>I/O: DS-401<br>Other: DS-301                                                                                               |
| Axis Functions      | Full <b>SimplIQ</b> functions<br>Motion Axis DS-402 supports                                                                                                                      |
| Number of Axes      | Up to 80 axes per CAN bus<br>2-16 interpolated axes depending on bus load                                                                                                         |
| CANopen Master      | Heartbeat<br>Network management, clock synchronization                                                                                                                            |
| I/O System          | On-board isolated 8 DI, 8 DO, 4 AI<br>CANopen DS-401                                                                                                                              |
| Feedback            | Incremental encoder 20 mega-counts/sec                                                                                                                                            |
| Interface           | RS-232<br>Fast Ethernet (10/100 Mbps)<br>2 CAN buses                                                                                                                              |
| Execution Time      | Interpolated points: 1 msec                                                                                                                                                       |
| Protocols           | CANopen: DS-301, DS-305, DS-401, DS-402<br>Ethernet: Telnet, HTTP, FTP<br>Ethernet/IP, ModBusTCP RS232 ModBusRS232                                                                |
| Setup & Diagnostics | Direct drive access for tuning and setup<br>Single and multi-axis recording<br>Event driven error detection and comprehensive status/error codes<br>Dynamic and Static IP address |
| Programming         | Automated network configuration<br>Elmo extended <b>SimplIQ</b> language                                                                                                          |
| Operating System    | Real-Time OS with Elmo's <b>SimplIQ</b> Kernel                                                                                                                                    |
| Hardware            | Stand-alone                                                                                                                                                                       |
| Boot Up Time        | 30 sec                                                                                                                                                                            |
| Connectivity        | Variable access via Maestro API                                                                                                                                                   |
| Power Supply        | 24 VDC                                                                                                                                                                            |
| Processor           | 300 MHz, Pentium compatible<br>16 bit ISA (PC104 standard)                                                                                                                        |
| Memory              | 64 MB internal flash<br>64 MB RAM (both expandable to 128 MB)                                                                                                                     |
| Diagnostic LEDs     | Power, LAN speed, LAN activity                                                                                                                                                    |
| Dimensions          | 153 mm X 107 mm X 51 mm                                                                                                                                                           |
| Weight              | 400 gm (14 oz)                                                                                                                                                                    |
| Operating Temp      | 0°C ~ 40°C                                                                                                                                                                        |

## Distributed Motion Control Architecture

The Maestro's distributed motion control architecture enables allocation of the workload between the controller and the **SimplIQ** intelligent digital servo drives. Within this architectural framework, the Maestro's role is primarily a managerial one with responsibilities that include network management and access, motion control synchronization and trajectory manipulation. The servo drives are responsible for the servo loops (current, velocity, position) with single or dual feedbacks, deployment of local filters, local programming and execution as well as the other functions listed in the diagram to the left.



Implementation of the Maestro provides numerous advantages including:

- **Load balancing** on the system by distributing the intelligence between the controller and the intelligent drives
- **Flexibility** to add up to 80 drives on a single bus with only a simple Maestro re-configuration
- **Reliability** by using digital command signals on a real-time deterministic networking
- **Comprehensive diagnostics** of the network and individual drives
- **Cost effectiveness** by reducing expenses on wiring and space requirements, and offering a simple and dependable solution
- **Reduced cost of ownership** by eliminating the need for dedicated motor, drive and controller

### Maestro Functionality

The Maestro offers rich functionality to provide a complete and flexible network management solution.

#### CAN Network Master

- Enables network configuration
- Recognizes existing CAN devices
- Maps CAN devices according to working mode
- Sends and receives CAN messages using standard CANopen communication objects
- Processes CAN Emergency messages
- Provides heartbeat control
- Synchronizes the clock via a SYNC / Timestamp mechanism
- Communicates with CAN devices using CANopen protocols DS301, DS305, DS401 and DS402
- Network management

#### Motion Synchronization

- Sends commands to motion objects simultaneously
- Synchronizes start and stop motion
- Monitors motion complete and drives events by mechanism callback function
- Sends notification messages to external host
- Contains a motion library which:
  - Creates motion trajectories for 1, 2, 2.5 dimensions
  - Resolves geometric and kinematical problems
  - Uses the Maestro proprietary program language to create PVT trajectories
  - Builds trajectories from motion primitives such as line, circle arc, polyline and spline
  - Inserts chamfering and corner rounding blocks automatically according to user definition

#### Host Communication

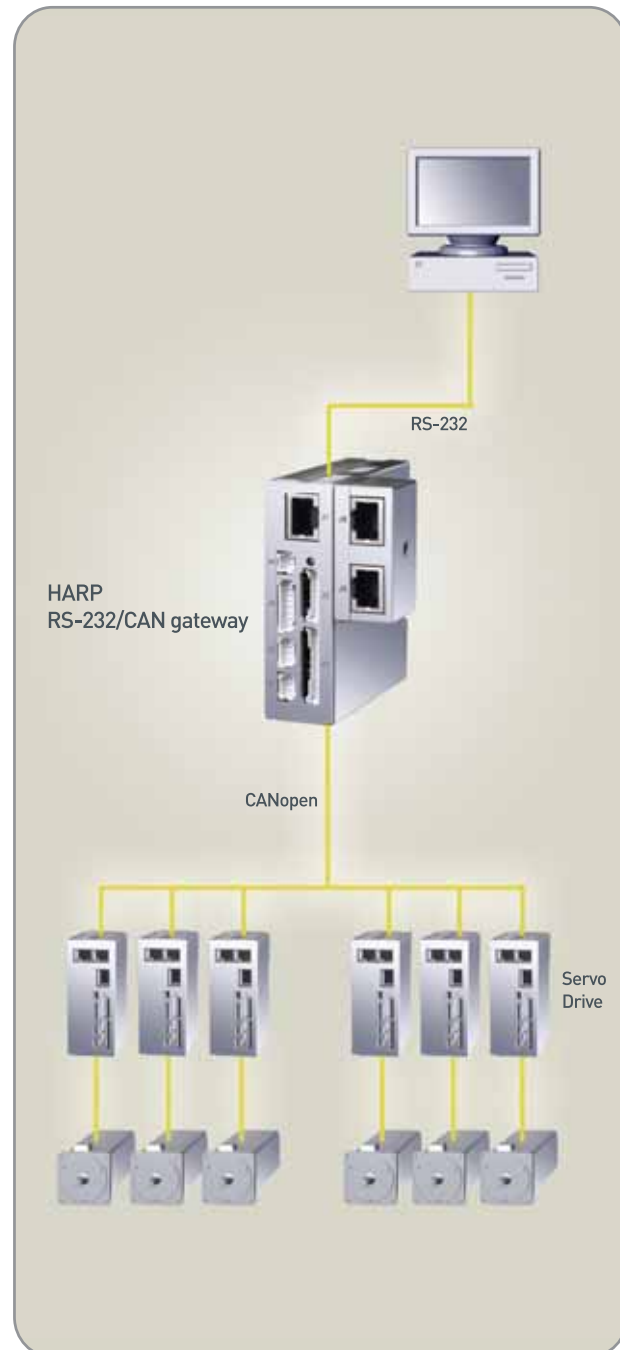
- Communicates with host applications via:
  - Ethernet TCP/IP
  - Communication with PLC by Ethernet/IP and ModBus (TCP/RS232)
  - RS-232
- Carries out processes such as:
  - Maestro interpreter command processing
  - Maintenance and file download/upload
  - Status requests and debugging user program
  - Direct-axis interpreter command processing gateway, "transparent path" to any drive

#### User Programs

- Behaves as a fully programmable motion controller
- Enables multi-axis programming
- Multi-program execution
- Offers a simple programming language with syntax based on *SimplIQ* language

## Harp

Elmo's Harp is a CAN-RS232 gateway based on Elmo's *SimplIQ* .core. The gateway simplifies the communication between RS232 serial port and a CAN network. The Harp enables transferring data unobtrusively from one method to another via a simple communication protocol. Data integrity is checked using checksum. Typical applications use the Harp for setting motion set point, monitor motion status and inquiring faults details from the drives. Being a general gateway the Harp supports SimplIQ drive as well as any other CAN node, independent from specific protocol. We offer a DLL that can ease the integration from the PC to the Harp. A demo application is available as well.





# Orchestrating Graceful Movement of Machinery

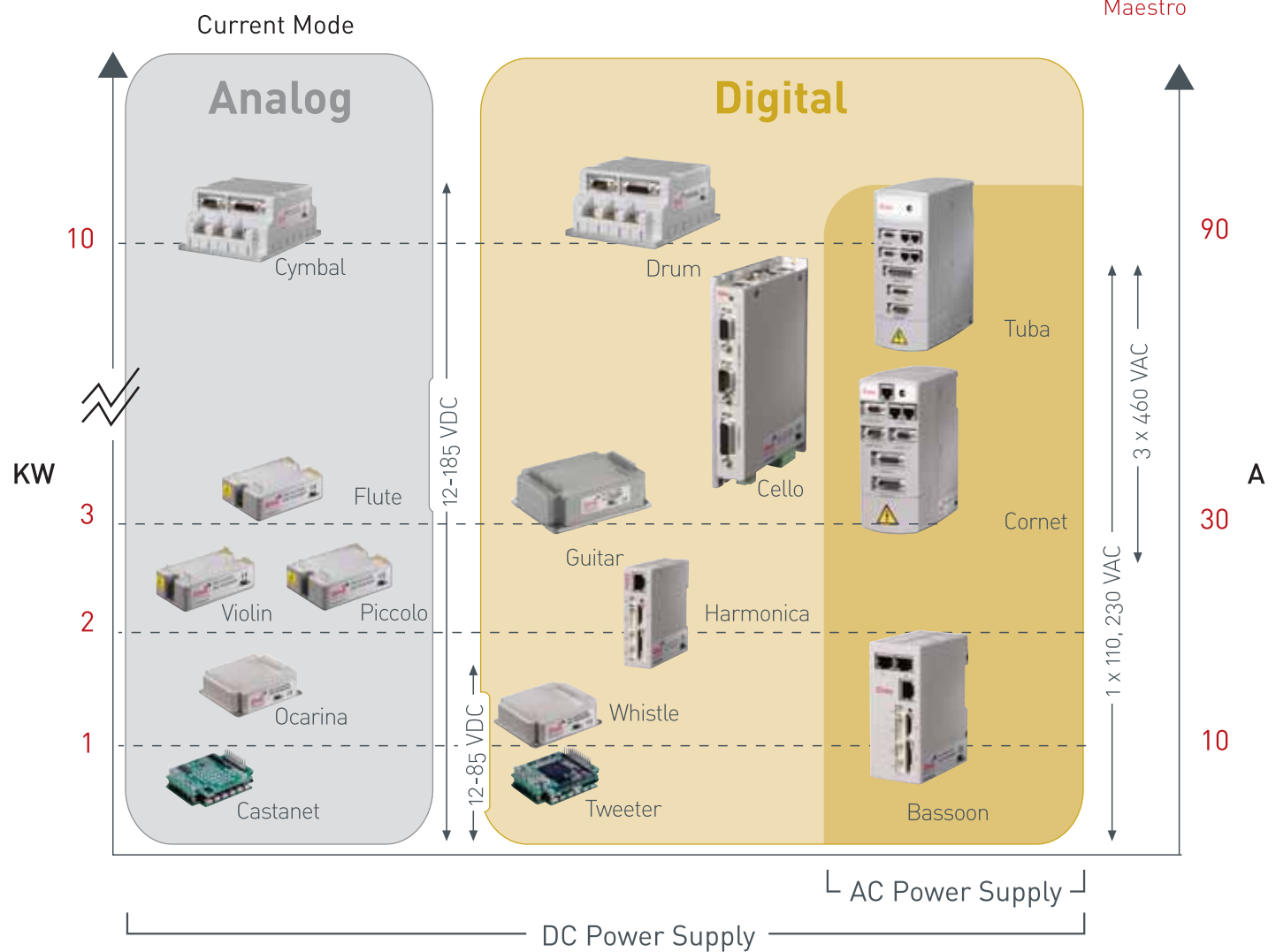
## Digital Servo Drives

Elmo's intelligent digital servo drives contain Elmo's *SimplIQ* motion control technology, support DC and AC brushless motors and feature a range of functionalities including CANopen networking for distributed intelligence. The *Tweeter*, *Whistle*, *Guitar*, *Harmonica*, *Bassoon*, *Cello*, *Drum*, *Cornet* and *Tuba* series comprise the core products in Elmo's range of digital servo drives, combining high densities of power, intelligent functionality and space-friendly design.

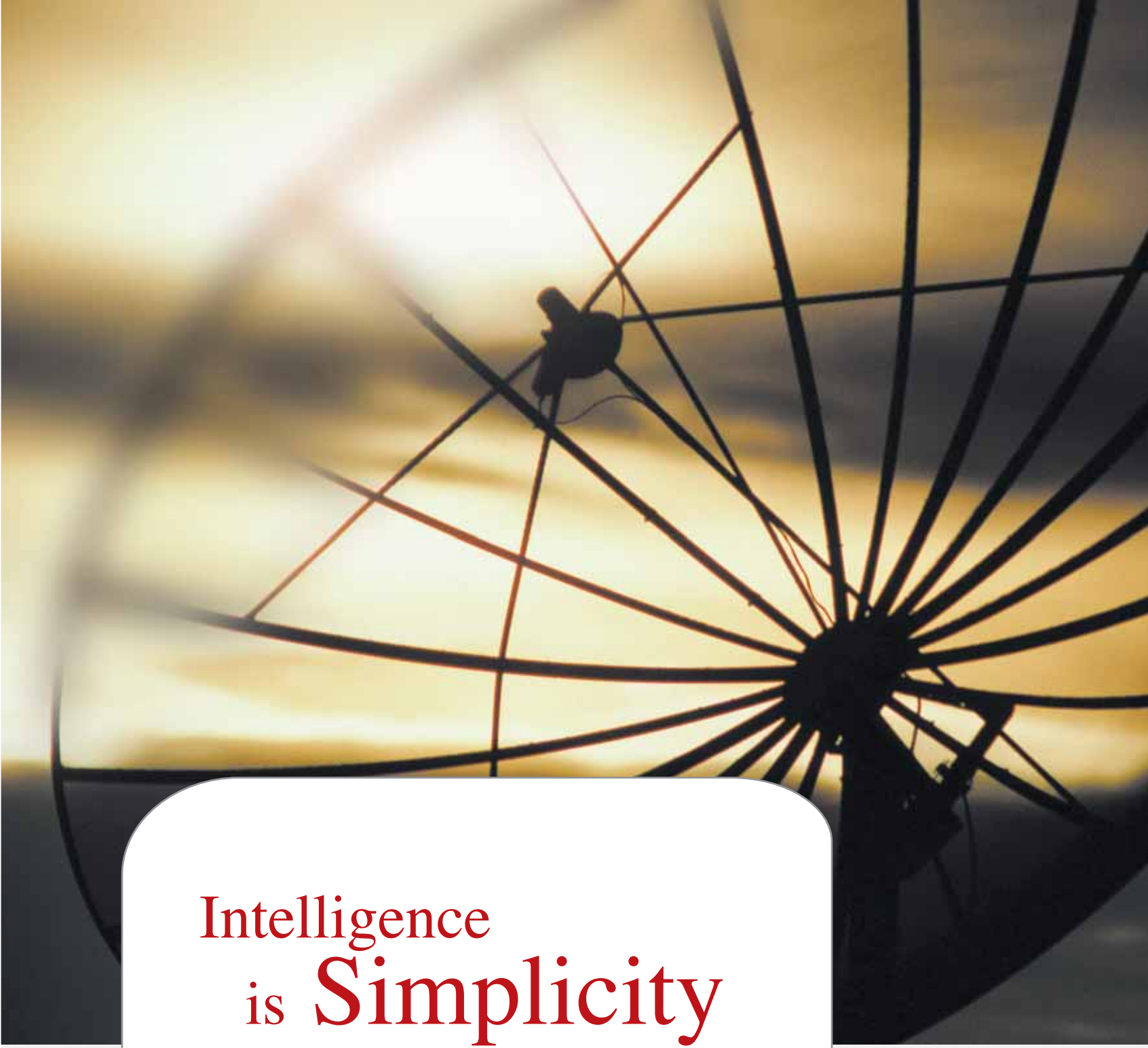
Elmo Motion Control servo drives are fully integrated in distributed motion control environments via a serial interface and/or industrial, real-time communication protocols. These include CANopen DS 301 and a full implementation of DS 402 and DS 305. By incorporating a binary interpreter, Elmo's implementation of the CANopen protocol in the servo drives and Maestro enables fast, simultaneous communication via CANopen and serial RS-232 lines.

| Feature                                | Standard | Advanced |
|----------------------------------------|----------|----------|
| CANopen and RS-232 interface           | Yes      | Yes      |
| Current mode                           | Yes      | Yes      |
| Velocity mode                          | Yes      | Yes      |
| Position mode: jogging, point-to-point | Yes      | Yes      |
| Pulse and direction input              | Yes      | Yes      |
| PT position versus time                | Yes      | Yes      |
| PVT position and velocity versus time  | Yes      | Yes      |
| Dual loop                              | No       | Yes      |
| ECAM/Follower                          | No       | Yes      |
| User program size                      | 2 KB     | 32 KB    |

# SimplIQ Product Range



Elmo manufactures a wide range of analog amplifiers and digital servo drives. Our digital and analog servo drives can provide up to 14KW continuous power. Elmo's digital servo drives are available in AC input and DC input models. The pages that follow describe our drives and amplifiers in more detail.

A large satellite dish antenna is shown in silhouette against a bright, hazy sunset sky. The dish's structure, including its radial ribs and support arms, is clearly visible. The sun is low on the horizon, creating a strong backlight effect and lens flare.

# Intelligence is **Simplicity**

For fast and powerful implementation of sophisticated motion control system capabilities, Elmo Motion Control has developed its ***SimplIQ*** technology. Elmo's ***SimplIQ*** combines advanced motion control with real-time networking capabilities. The technology delivers a wealth of feedback options, programming capabilities and standard communication protocol support.

***SimplIQ***... for optimal performance and rapid integration.

## SimplIQ Features for Digital Servo Drives

### Motion Control Modes

- Current, Velocity and Position servo control
- Single and multi-axis coordinated control
- PVT, PT, ECAM, Follower, Dual Loop
- Advanced filtering and gain scheduling
- Step and direction control
- PWM control

### Power Switching

- Adjustable PWM
- High density power modules
- High efficiency (over 97%)

### Single & Multi-Axis Programming

- Third generation programming language
- Event triggered programming
- Command set
  - Extensive mnemonic command set
  - Command changes on-the-fly

### Software Tools

- Setup and configuration of single and multiple axes
- Automatic and manual tuning, analysis and debugging
- Online monitoring with direct and remote access
- Auto tuning of all loops
- High resolution monitoring

### Dual Feedbacks

- Digital
  - Digital Incremental Encoder (up to 20 MHz)
  - Digital Halls (up to 2 KHz)
  - Digital Halls + Digital Encoder
- Analog
  - Interpolated Analog (sine/cosine) Encoder up to 250 KHz
    - Internal Interpolation up to X 4096
    - Resolver, 10 - 16 bit resolution
    - DC Tachometer for velocity control (brush motors)
    - Potentiometer for position feedback (brush motors)
    - Analog Halls
- Absolute Encoder
  - Heidenhain EnDat 2.1
  - Sick-Stegmann Hiperface
- Feedback Output
  - Buffered output of main and auxiliary encoder
  - Emulated output of analog feedbacks

### Communication

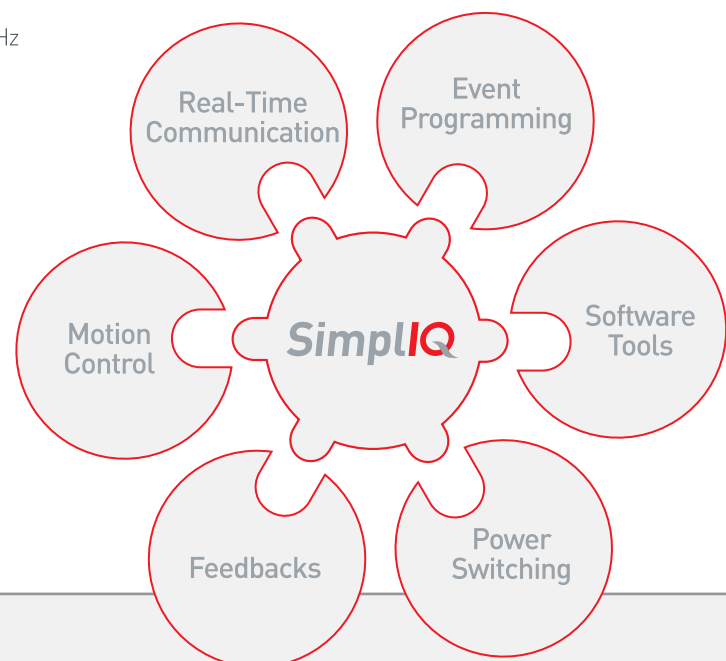
- RS-232
- CANopen DS-301, DS-305, DS-402

### Input/Output

- Analog inputs- 14-bit resolution
- Digital input/output:
  - Programmable
  - Optical isolation
  - Fast capturing/output comparison (3 msec)
  - Predefined functions:
    - Inhibit, soft/hard stop, limit switches, begin on input, abort, homing
    - Brake control, fault detection, enabled

### Built-in Protection & Diagnostics

- Software error handling
- Abort
- Extensive status reporting
- Protection against:
  - Shorts between motor power outputs, power outputs and power input/ return
  - Over temperature
  - Over/under voltage
  - Loss of feedback
  - Motor current
  - Current limits
  - Following errors
  - i<sup>2</sup>t motor current



## General Table

| Feature                       | Units   | Specification                    |
|-------------------------------|---------|----------------------------------|
| PWM switching frequency       | kHz     | 22 ± 5% default on the motor     |
| Switching method              |         | Advanced Unipolar PWM            |
| Current loop bandwidth        | kHz     | < 2.5                            |
| Current loop sampling rate    | kHz     | Up to 16; default 11             |
| Velocity loop bandwidth       | Hz      | < 350                            |
| Velocity loop sampling rate   | kHz     | Up to 8; default 5.5             |
| Position loop bandwidth       | Hz      | < 80                             |
| Position loop sampling rate   | kHz     | Up to 4; default 2.75            |
| Maximum heat sink temperature | °C (°F) | 85 °C - 88 °C (185 °F - 190 °F)  |
| Ambient operating temperature | °C (°F) | 0 °C - 40 °C (32 °F - 104 °F)    |
| Storage temperature           | °C (°F) | -20 °C - 85 °C (-4 °F - +185 °F) |
| Maximum humidity              | %       | 90% non-condensing               |
| Maximum operating altitude    | m (ft)  | Up to 10,000 (30,000)            |
| Protection level              |         |                                  |

## Tweeter Full Digital Servo Drive



| Feature                                          | Units   | 3/60                                                     | 2.5/100 |
|--------------------------------------------------|---------|----------------------------------------------------------|---------|
| Minimum supply voltage                           | VDC     | 7.5                                                      | 12      |
| Nominal supply voltage                           | VDC     | 50                                                       | 85      |
| Maximum supply voltage                           | VDC     | 59                                                       | 95      |
| Maximum continuous power output                  | W       | 160                                                      | 200     |
| Efficiency at rated power (at normal conditions) | %       | > 99%                                                    |         |
| Maximum output voltage                           |         | > 95% of DC bus voltage at f=22 kHz                      |         |
| Auxiliary power supply                           | VDC     | 11 - 95 VDC (up to 2.5 VA inc. 5 V / 200 mA for encoder) |         |
| Amplitude sinusoidal/DC continuous current       | A       | 3.3                                                      | 2.5     |
| Sinusoidal continuous RMS continuous current     | A       | 2.3                                                      | 1.8     |
| Peak current limit                               | A       | 2 x I <sub>c</sub>                                       |         |
| Weight                                           | g (oz)  | 27 g (0.95 oz)                                           |         |
| Dimensions                                       | mm (in) | 51 x 12.5 x 42 (2" x 0.49" x 1.65")                      |         |
| Digital in/Digital out/Analog in                 |         | 6/2/1                                                    |         |
| Mounting method                                  |         | PCB mounted or soldered pins                             |         |

# Whistle

Full Digital Servo Drive



| Feature                                           | Units   | 15/48                                                  | 20/48 | 1/60 | 2.5/60 | 5/60 | 10/60 | 15/60 | 20/60 | 1/100 | 2.5/100 | 5/100 | 10/100 | 15/100 | 20/100 |
|---------------------------------------------------|---------|--------------------------------------------------------|-------|------|--------|------|-------|-------|-------|-------|---------|-------|--------|--------|--------|
| Minimum supply voltage                            | VDC     | 6                                                      |       | 7.5  |        |      |       |       |       | 12    |         |       |        |        |        |
| Nominal supply voltage                            | VDC     | 42                                                     |       | 50   |        |      |       |       |       | 85    |         |       |        |        |        |
| Maximum supply voltage                            | VDC     | 48                                                     |       | 59   |        |      |       |       |       | 95    |         |       |        |        |        |
| Maximum continuous power output                   | W       | 600                                                    | 800   | 50   | 120    | 240  | 480   | 720   | 960   | 80    | 200     | 400   | 800    | 1200   | 1600   |
| Efficiency at rated power (at nominal conditions) | %       | > 99                                                   |       |      |        |      |       |       |       |       |         |       |        |        |        |
| Maximum output voltage                            |         | > 95% of DC bus voltage at f=22 kHz                    |       |      |        |      |       |       |       |       |         |       |        |        |        |
| Auxiliary power supply                            | VDC     | 11 - 95 VDC (up to 2.5 VA inc. 5 V/200 mA for encoder) |       |      |        |      |       |       |       |       |         |       |        |        |        |
| Amplitude sinusoidal/DC continuous current        | A       | 15                                                     | 20    | 1    | 2.5    | 5    | 10    | 15    | 20    | 1     | 2.5     | 5     | 10     | 15     | 20     |
| Sinusoidal continuous RMS current limit (Ic)      | A       | 10.6                                                   | 14.1  | 0.7  | 1.8    | 3.5  | 7     | 10.6  | 14.1  | 0.7   | 1.8     | 3.5   | 7      | 10.6   | 14.1   |
| Peak current limit                                | A       | 2 x Ic                                                 |       |      |        |      |       |       |       |       |         |       |        |        |        |
| Weight                                            | g (oz)  | 50 g (1.8 ounces)                                      |       |      |        |      |       |       |       |       |         |       |        |        |        |
| Dimensions                                        | mm (in) |                                                        |       |      |        |      |       |       |       |       |         |       |        |        |        |
| Digital in/Digital out/Analog in                  |         | 6/2/1                                                  |       |      |        |      |       |       |       |       |         |       |        |        |        |
| Mounting method                                   |         | PCB Mount                                              |       |      |        |      |       |       |       |       |         |       |        |        |        |

Also available **Solo Whistle**



## Harmonica Full Digital Servo Drive



| Feature                                           | Units   | 5/60                                 | 8/60 | 12/60 | 2/100 | 4/100 | 8/100 | 12/100 | 1/200 | 2/200 | 4/200 | 6/200 |
|---------------------------------------------------|---------|--------------------------------------|------|-------|-------|-------|-------|--------|-------|-------|-------|-------|
| Minimum supply voltage                            | VDC     | 10                                   |      |       | 20    |       |       |        | 40    |       |       |       |
| Nominal supply voltage                            | VDC     | 50                                   |      |       | 85    |       |       |        | 170   |       |       |       |
| Maximum supply voltage                            | VDC     | 59                                   |      |       | 95    |       |       |        | 195   |       |       |       |
| Maximum continuous power output                   | W       | 250                                  | 400  | 650   | 200   | 320   | 640   | 1100   | 200   | 320   | 640   | 1100  |
| Efficiency at rated power (at nominal conditions) | %       | > 97                                 |      |       |       |       |       |        |       |       |       |       |
| Maximum output voltage                            |         | > 97% of DC bus voltage at f=22 kHz  |      |       |       |       |       |        |       |       |       |       |
| Auxiliary supply voltage                          | VDC     | 24 ± 20%                             |      |       |       |       |       |        |       |       |       |       |
| Auxiliary power supply                            | VA      | 8                                    |      |       |       |       |       |        |       |       |       |       |
| Amplitude sinusoidal/D continuous current         | A       | 5                                    | 8    | 13.3  | 2.5   | 4     | 8     | 13.3   | 1.25  | 2     | 4     | 6.6   |
| Sinusoidal continuous RMS current limit (Ic)      | A       | 3.5                                  | 5.7  | 9.4   | 1.8   | 2.8   | 5.7   | 9.4    | 0.9   | 1.4   | 2.8   | 4.7   |
| Peak current limit                                | A       | 2 x Ic                               |      |       |       |       |       |        |       |       |       |       |
| RMS output power without heatsink                 | %       | 100                                  | 50   | 20    | 100   | 50    | 20    | 20     | 100   | 50    | 20    | 20    |
| Weight                                            | g (oz)  | 150 g (5.3 ounces)                   |      |       |       |       |       |        |       |       |       |       |
| Dimensions                                        | mm (in) | 82 x 25.4 x 75 (3.2" x 1.0" x 3.0")  |      |       |       |       |       |        |       |       |       |       |
| Digital in/Digital out/Analog in                  |         | 6/2/1                                |      |       |       |       |       |        |       |       |       |       |
| Mounting method                                   |         | Wall mount ("Bookshelf") or DIN rail |      |       |       |       |       |        |       |       |       |       |

## Cello Full Digital Servo Drive



| Feature                                           | Units   | 5/60                                  | 10/60 | 15/60 | 15RMS/60 | 30/60 | 3/100 | 10/100 | 15/100 | 15RMS/100 | 30/100 | 2/200 | 6/200 | 10/200 | 15/200 | 15RMS/200 |
|---------------------------------------------------|---------|---------------------------------------|-------|-------|----------|-------|-------|--------|--------|-----------|--------|-------|-------|--------|--------|-----------|
| Minimum supply voltage                            | VDC     | 10                                    |       |       |          |       | 20    |        |        |           |        | 40    |       |        |        |           |
| Nominal supply voltage                            | VDC     | 50                                    |       |       |          |       | 85    |        |        |           |        | 170   |       |        |        |           |
| Maximum supply voltage                            | VDC     | 59                                    |       |       |          |       | 95    |        |        |           |        | 195   |       |        |        |           |
| Maximum continuous power output                   | W       | 240                                   | 480   | 720   | 1000     | 1440  | 260   | 800    | 1200   | 1700      | 2400   | 360   | 960   | 1600   | 2400   | 3400      |
| Efficiency at rated power (at nominal conditions) | %       | > 97                                  |       |       |          |       |       |        |        |           |        |       |       |        |        |           |
| Maximum output voltage                            |         | 97% of DC bus voltage at f=22 kHz     |       |       |          |       |       |        |        |           |        |       |       |        |        |           |
| Auxiliary supply voltage                          | VDC     | 24 ± 20%                              |       |       |          |       |       |        |        |           |        |       |       |        |        |           |
| Auxiliary power supply                            | VA      | 12                                    |       |       |          |       |       |        |        |           |        |       |       |        |        |           |
| Amplitude sinusoidal/DC continuous current        | A       | 5                                     | 10    | 15    | 21       | 30    | 3.3   | 10     | 15     | 21        | 30     | 2.25  | 6     | 10     | 15     | 21        |
| Sinusoidal continuous RMS current limit (Ic)      | A       | 3.5                                   | 7.1   | 10.6  | 15       | 21.2  | 2.3   | 7.1    | 10.6   | 15        | 21.2   | 1.6   | 4.2   | 7.1    | 10.6   | 15        |
| Peak current limit                                | A       | 2 x Ic                                |       |       |          |       |       |        |        |           |        |       |       |        |        |           |
| Output power without additional heatsink          | %       | 100                                   |       |       |          | 75    | 100   |        |        |           |        | 100   |       |        | 75     | 50        |
| Weight                                            | g (oz)  | 640 g (22.6 ounces)                   |       |       |          |       |       |        |        |           |        |       |       |        |        |           |
| Dimensions                                        | mm (in) | 150 x 25.4 x 105 (5.9" x 1.0" x 4.1") |       |       |          |       |       |        |        |           |        |       |       |        |        |           |
| Digital in/Digital out/Analog in                  |         | 10/5/2                                |       |       |          |       |       |        |        |           |        |       |       |        |        |           |
| Mounting method                                   |         | Wall Mount (on back or on side)       |       |       |          |       |       |        |        |           |        |       |       |        |        |           |

# Guitar Full Digital Servo Drive



| Feature                                           | Units   | 35/48                                  | 20/60 | 25/60 | 35/60 | 10/100 | 25/100 | 3/200 | 6/200 | 10/200 | 17/200 | R45/48  | R45/60 | R35/100 | R30/200 |
|---------------------------------------------------|---------|----------------------------------------|-------|-------|-------|--------|--------|-------|-------|--------|--------|---------|--------|---------|---------|
| Minimum supply voltage                            | VDC     | 11                                     | 14    |       |       | 23     |        | 46    |       |        |        | 11      | 14     | 23      | 46      |
| Nominal supply voltage                            | VDC     | 42                                     | 50    |       |       | 85     |        | 170   |       |        |        | 42      | 50     | 85      | 170     |
| Maximum supply voltage                            | VDC     | 48                                     | 59    |       |       | 95     |        | 195   |       |        |        | 48      | 59     | 95      | 195     |
| Maximum continuous power output                   | W       | 1300                                   | 960   | 1200  | 1700  | 1600   | 2000   | 480   | 960   | 1600   | 2700   | 1700    | 2200   | 2800    | 4800    |
| Efficiency at rated power (at nominal conditions) | %       | > 97                                   |       |       |       |        |        |       |       |        |        |         |        |         |         |
| Maximum output voltage                            |         | 97% of DC bus voltage at f=22 kHz      |       |       |       |        |        |       |       |        |        |         |        |         |         |
| Amplitude sinusoidal/DC continuous current        | A       | 35                                     | 20    | 25    | 35    | 20     | 25     | 3     | 6     | 10     | 17     | 45      | 45     | 35      | 30      |
| Sinusoidal continuous RMS current limit (Ic)      | A       | 25                                     | 14.1  | 17.7  | 25    | 14.1   | 17.7   | 2.12  | 4.2   | 7      | 12     | 32      | 31.8   | 24.8    | 21.2    |
| Peak current limit                                | A       | 2 x Ic                                 |       |       |       |        |        |       |       |        |        | No peak |        |         |         |
| Weight                                            | g (oz)  | 165 g (5.8 oz)                         |       |       |       |        |        |       |       |        |        |         |        |         |         |
| Dimensions                                        | mm (in) | 80 x 61 x 24.5 (3.15" x 2.4" x 0.965") |       |       |       |        |        |       |       |        |        |         |        |         |         |
| Digital in/Digital out/Analog in                  |         | 6/4/1                                  |       |       |       |        |        |       |       |        |        |         |        |         |         |
| Mounting method                                   |         | PCB mount                              |       |       |       |        |        |       |       |        |        |         |        |         |         |

Also available: **Solo Guitar & Solo Guitar with absolute encoder**



Drum Full Digital Servo Drive



| Feature                                           | Units   | 70/48                              | 70/60  | R90/60  | 50/100 | R75/100 | 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    |
| Maximum continuous power output                   | W       | 2700                               | 3400   | 4300    | 4000   | 6000    | 5600   | 9600    | 5600   |
| Efficiency at rated power (at nominal conditions) | %       | > 97                               |        |         |        |         |        |         |        |
| Maximum output voltage                            |         | 97% of DC bus voltage at f=22 kHz  |        |         |        |         |        |         |        |
| Amplitude sinusoidal/DC continuous current        | A       | 70                                 | 70     | 90      | 50     | 75      | 35     | 60      | 18     |
| Sinusoidal continuous RMS current limit (Ic)      | A       | 50                                 | 50     | 63      | 35     | 53      | 25     | 42      | 12.7   |
| Peak current limit                                | A       | 2 x Ic                             | 2 x Ic | No Peak | 2 x Ic | No Peak | 2 x Ic | No Peak | 2 x Ic |
| Weight                                            | g (oz)  | 700 g (24.7 oz)                    |        |         |        |         |        |         |        |
| Dimensions                                        | mm (in) | 134 x 95 x 60 (5.3" x 3.7" x 2.4") |        |         |        |         |        |         |        |
| Digital in/Digital out/Analog in                  |         | 6/2/1                              |        |         |        |         |        |         |        |
| Mounting method                                   |         | Panel mount                        |        |         |        |         |        |         |        |
|                                                   |         |                                    |        |         |        |         |        |         |        |

# Bassoon

Full Digital Servo Drive



| Feature                                           | Units   | 1/230                                    | 3/230                                    | 6/230                                      |
|---------------------------------------------------|---------|------------------------------------------|------------------------------------------|--------------------------------------------|
| Minimum supply voltage                            | VAC     | 30                                       |                                          |                                            |
| Nominal supply voltage                            | VAC     | 230                                      |                                          |                                            |
| Maximum supply voltage                            | VAC     | 270                                      |                                          |                                            |
| Maximum continuous power output                   | W       | 320                                      | 1050                                     | 1900                                       |
| Efficiency at rated power (at nominal conditions) | %       | > 97                                     |                                          |                                            |
| Auxiliary supply voltage                          | VDC     | 24 ± 20%                                 |                                          |                                            |
| Auxiliary power supply                            | VA      | 8                                        |                                          |                                            |
| Amplitude sinusoidal/DC continuous current        | A       | 1                                        | 3.3                                      | 6                                          |
| Sinusoidal continuous RMS current limit (Ic)      | A       | 0.7                                      | 2.3                                      | 4.2                                        |
| Peak current limit                                | A       | 2 x Ic                                   |                                          |                                            |
| Supplied with heat sink                           |         | No                                       | #2 (fins)                                | #4 (fins and fan)                          |
| Built-in shunt (peak power)                       | W       | 400                                      |                                          |                                            |
| Weight                                            | g (oz)  | 350 g (12.35)                            | 490 g (17.28)                            | 505 g (17.81)                              |
| Dimensions                                        | mm (in) | 105 x 44 x 76<br>(4.13" x 1.73" x 3.00") | 105 x 56 x 76<br>(4.13" x 2.20" x 3.00") | 105 x 66.5 x 76<br>(4.13" x 2.60" x 3.00") |
| Digital in/Digital out/Analog in                  |         | 6/2/1                                    |                                          |                                            |
| Mounting method                                   |         | Wall mount ("Bookshelf") or DIN rail     |                                          |                                            |

# **Cornet** Full Digital Servo Drive



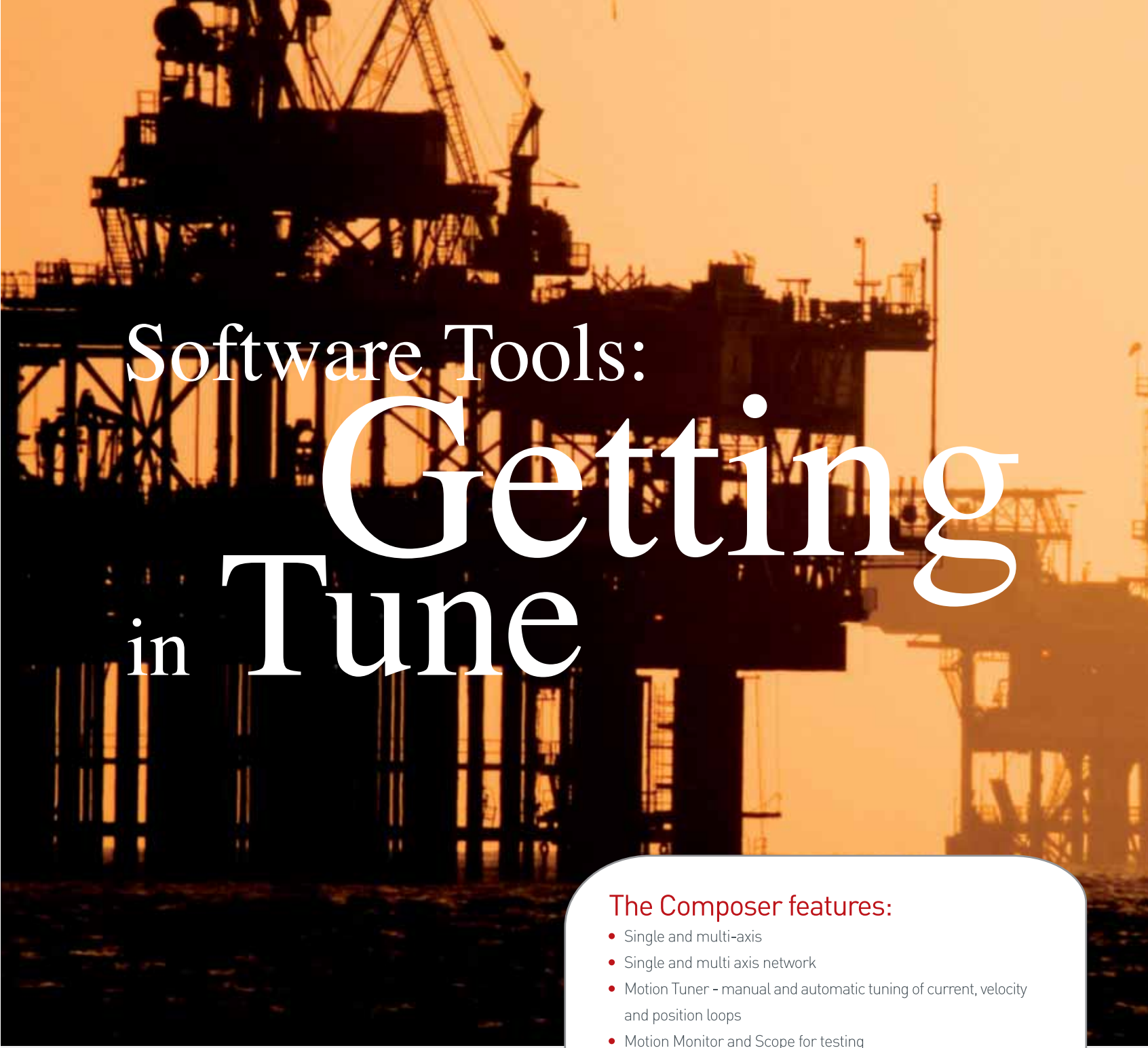
| Feature                                           | Units    | 1/230                                | 3/230 | 5/230 | 7/230 | 9/230 | 1/460            | 3/460 | 6/460 |
|---------------------------------------------------|----------|--------------------------------------|-------|-------|-------|-------|------------------|-------|-------|
| Minimum supply voltage                            | VAC      | 60                                   |       |       |       |       | 140              |       |       |
| Nominal supply voltage                            | VAC      | 1 x 115, 1 x 230, 3 x 230            |       |       |       |       | 3 x 400, 3 x 460 |       |       |
| Maximum supply voltage                            | VAC      | 1 x 270 or 3 x 270                   |       |       |       |       | 3 x 505          |       |       |
| Maximum continuous power output                   | W        | 420                                  | 1050  | 1500  | 2100  | 2700  | 800              | 2000  | 3400  |
| Efficiency at rated power (at nominal conditions) | %        | > 93                                 |       |       |       |       |                  |       |       |
| Auxiliary supply voltage                          | VDC      | 24 ± 15%                             |       |       |       |       |                  |       |       |
| Auxiliary power supply                            | VA       | 20                                   |       |       |       |       |                  |       |       |
| Amplitude sinusoidal/DC continuous current        | A        | 1.4                                  | 3.5   | 5     | 7     | 9     | 1.4              | 3.5   | 6     |
| Sinusoidal continuous RMS current limit (Ic)      | A        | 1                                    | 2.5   | 3.5   | 5     | 6.4   | 1                | 2.5   | 4.3   |
| Peak current limit                                | A        | 2 x Ic                               |       |       |       |       |                  |       |       |
| Built-in shunt (peak power)                       | kW       | 2.4                                  |       |       |       |       | 1.1              | 3.4   | 3.4   |
| Weight                                            | kg (lbs) | 1.1 kg (2.4 lbs)                     |       |       |       |       |                  |       |       |
| Dimensions                                        | mm (in)  | 180 x 123 x 75 (7.1" x 4.8" x 3")    |       |       |       |       |                  |       |       |
| Digital in/Digital out/Analog in                  |          | 10/6/2                               |       |       |       |       |                  |       |       |
| Mounting method                                   |          | Wall mount ("Bookshelf") or DIN rail |       |       |       |       |                  |       |       |

# Tuba Full Digital Servo Drive



| Feature                                           | Units    | 12/230                               | 15/230 | 20/230 | 12/460           | 15/460 | 20/460 |
|---------------------------------------------------|----------|--------------------------------------|--------|--------|------------------|--------|--------|
| Minimum supply voltage                            | VAC      | 60                                   |        |        | 140              |        |        |
| Nominal supply voltage                            | VAC      | 1 x 115, 1 x 230, 3 x 230            |        |        | 3 x 400, 3 x 460 |        |        |
| Maximum supply voltage                            | VAC      | 1 x 270 or 3 x 270                   |        |        | 3 x 505          |        |        |
| Maximum continuous power output                   | W        | 3600                                 | 4500   | 6000   | 6800             | 8500   | 11300  |
| Efficiency at rated power (at nominal conditions) | %        | > 93                                 |        |        |                  |        |        |
| Auxiliary supply voltage                          | VDC      | 24 ± 15%                             |        |        |                  |        |        |
| Auxiliary power supply                            | VA       | 20                                   |        |        |                  |        |        |
| Amplitude sinusoidal/DC continuous current        | A        | 12                                   | 15     | 20     | 12               | 15     | 20     |
| Sinusoidal continuous RMS current limit (Ic)      | A        | 8.5                                  | 10.6   | 14.1   | 8.5              | 10.6   | 14.1   |
| Peak current limit                                | A        | 2 x Ic                               |        |        |                  |        |        |
| Built-in shunt (peak power)                       | KW       | 6                                    |        |        | 11               |        |        |
| Weight                                            | kg (lbs) | 2.7 kg (5.9 lbs)                     |        |        |                  |        |        |
| Dimensions                                        | mm (in)  | 247 x 190 x 92 (9.7" x 7.5" x 3.6")  |        |        |                  |        |        |
| Digital in/Digital out/Analog in                  |          | 10/6/2                               |        |        |                  |        |        |
| Mounting method                                   |          | Wall mount ("Bookshelf") or DIN rail |        |        |                  |        |        |





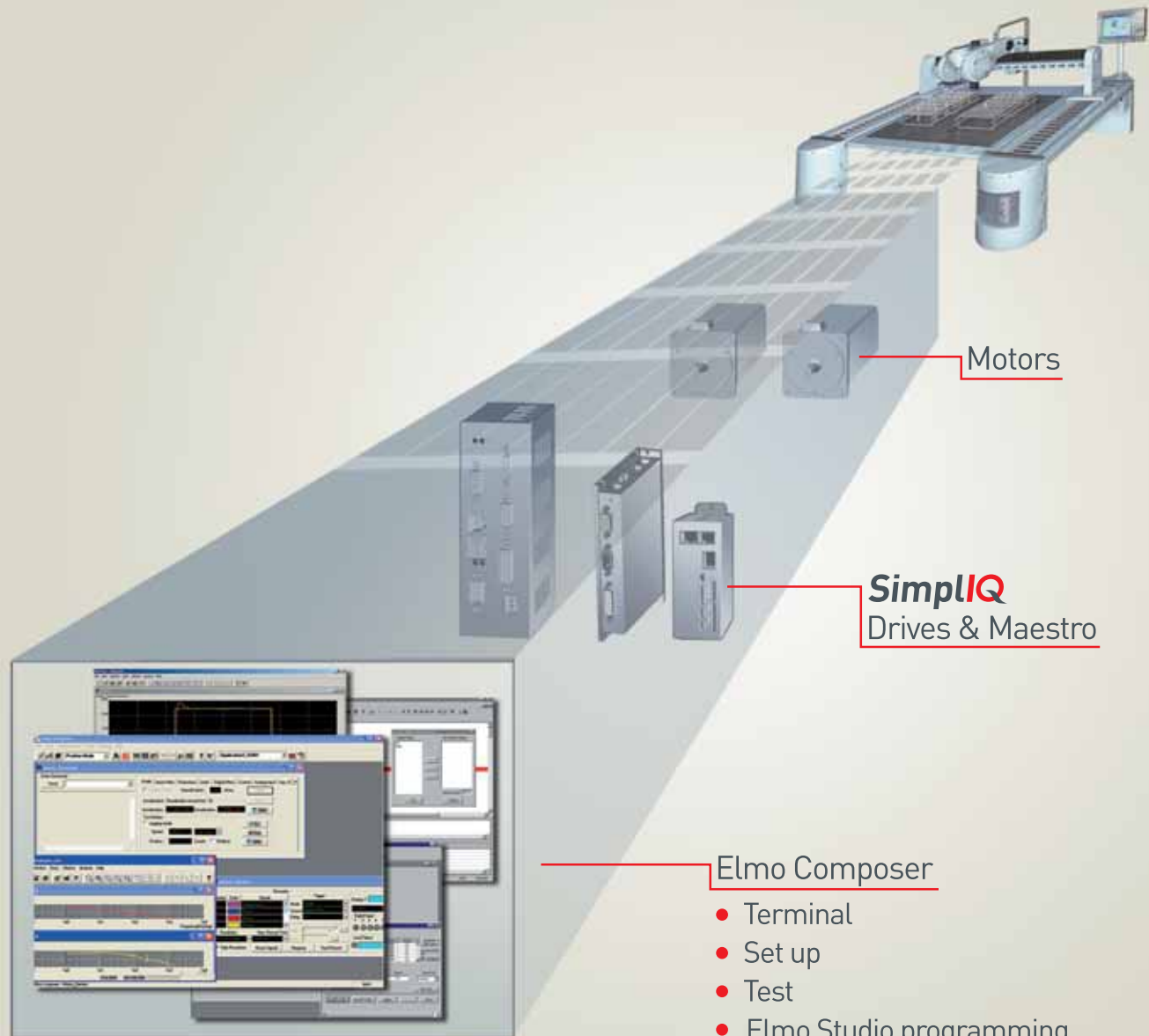
# Software Tools: Getting in Tune

Elmo offers a proprietary, Microsoft Windows-based software application called **Composer** that quickly and easily configures, tests and precisely tunes any **SimpliQ** servo drive. Elmo's third generation universal programming language is suitable for all of our digital drives and Maestro. It enables fast, straightforward, trouble-free servo drive installation with flexible and intuitive programming and smooth operation. Communication is achieved via serial RS-232, CANopen and Ethernet.

## The Composer features:

- Single and multi-axis
- Single and multi axis network
- Motion Tuner - manual and automatic tuning of current, velocity and position loops
- Motion Monitor and Scope for testing
- Recording - 8 recording channels - smart event triggering modes
- Elmo Studio programming environment - includes compilation and debugging tools
- Table Editor - for testing PVT (Position, Velocity, Time ) and trajectories
- Network monitoring tools
- Online smart terminal command reference

# Software Tools





# Leading the Band in Analog Amplification

Elmo's analog servo amplifier family - including the **Castanet**, **Ocarina**, **Cymbal**, **Violin**, **Piccolo** and **Flute** - addresses the needs of brush DC and brushless AC motors. The **Castanet**, **Ocarina**, **Piccolo** and **Cymbal** provide trapezoidal commutation, the **Flute** provides sinusoidal commutation and the **Violin** supports DC brush motors.

Each amplifier series exhibits excellent servo performance, top efficiency, high quality and reliability - all in sleek and compact, high power density packages. Outstanding motion control is achieved through the implementation of Elmo's proprietary switching and control methods enabled by dedicated ASICs and advanced heat transfer methods.

## Standard Features

- Operation in current mode
- Internal DC-to-DC converter for single supply operation
- Zero deadband
- Excellent linearity
- External continuous and peak current limit adjustments
- Current feedback multiplier for low current motors
- Remote current gain control
- Ultra compact size
- Copper base plate with plastic housing
- High reliability with field-proven MTBF of over 500,000 working hours

## Built-in Protection

- Shorts between motor power outputs
- Shorts between motor power outputs and power input returns
- Excess temperature
- Under/Over voltage
- Failure of internal power supplies
- Latch mode for each protective feature

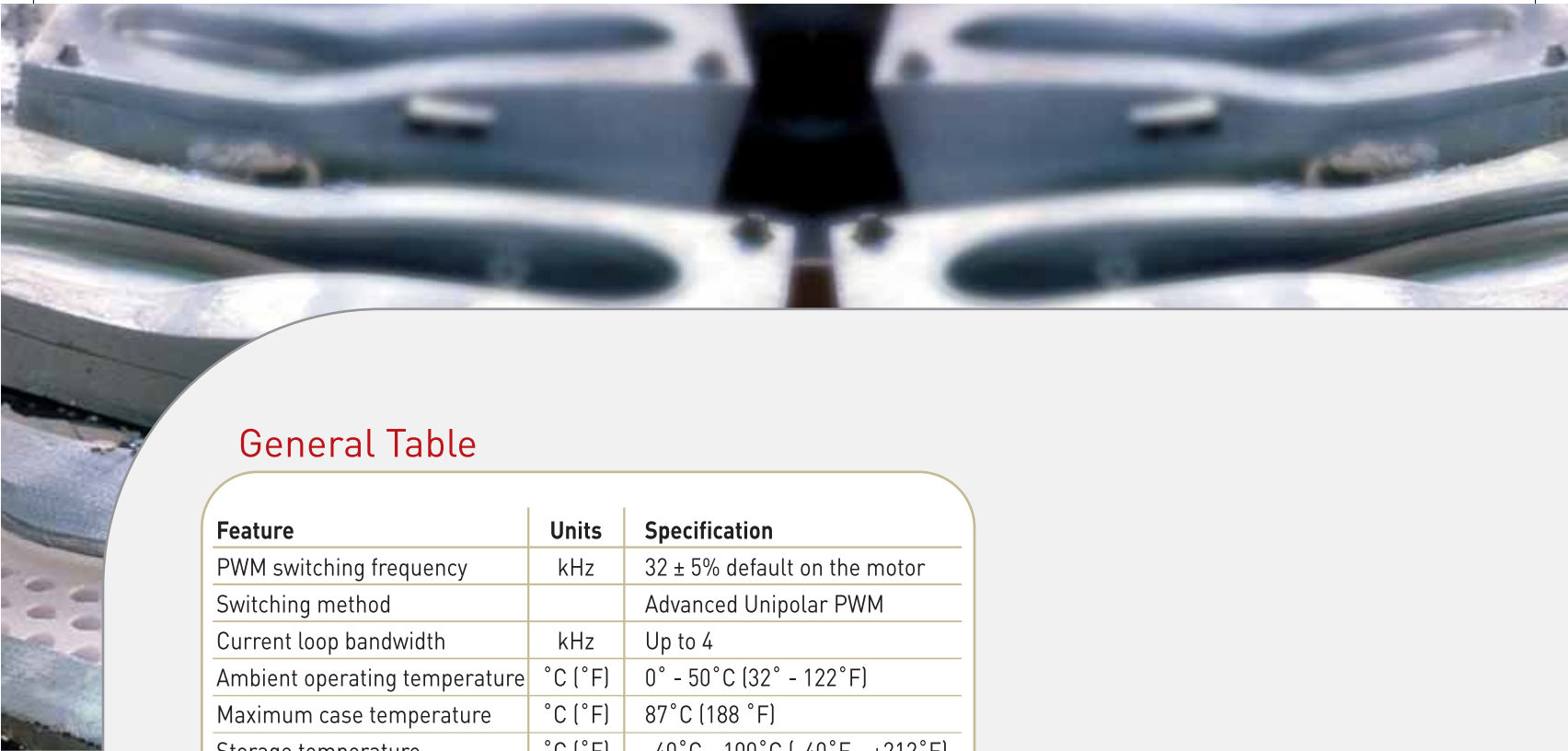
## Control Connections

- Current command input
- External continuous current limit
- External peak current limit
- Current monitor
- Current gain control

## Motor Output

- Nominal output continuous current: up to 90A
- Peak output current: up to 140A

\*A Velocity version is available for the **Piccolo** and **Violin** by adding a velocity loop card. The Velocity Kit enables operation in current or velocity mode using either encoders or hall sensors for feedback.



## General Table

| Feature                       | Units   | Specification                  |
|-------------------------------|---------|--------------------------------|
| PWM switching frequency       | kHz     | 32 ± 5% default on the motor   |
| Switching method              |         | Advanced Unipolar PWM          |
| Current loop bandwidth        | kHz     | Up to 4                        |
| Ambient operating temperature | °C (°F) | 0° - 50°C (32° - 122°F)        |
| Maximum case temperature      | °C (°F) | 87°C (188 °F)                  |
| Storage temperature           | °C (°F) | -40°C - 100°C [-40°F - +212°F] |
| Maximum humidity              | %       | 90% non-condensing             |
| Maximum operating altitude    | m (ft)  | Up to 10,000 (30,000)          |

## Violin

Current mode analog servo drive for DC brush motors



| Feature                                           | Units   | 5/60                                | 10/60 | 15/60 | 25/60 | 10/100 | 15/100 | 20/100 | 6/200 | 10/200 | 15/200 |
|---------------------------------------------------|---------|-------------------------------------|-------|-------|-------|--------|--------|--------|-------|--------|--------|
| Minimum supply voltage                            | VDC     | 10                                  |       |       |       | 20     |        |        | 40    |        |        |
| Nominal supply voltage                            | VDC     | 50                                  |       |       |       | 85     |        |        | 170   |        |        |
| Maximum supply voltage                            | VDC     | 59                                  |       |       |       | 95     |        |        | 195   |        |        |
| Maximum continuous power output                   | W       | 290                                 | 570   | 860   | 1400  | 950    | 1400   | 1900   | 1170  | 1900   | 2900   |
| Efficiency at rated power (at nominal conditions) | %       | >97                                 |       |       |       |        |        |        |       |        |        |
| Maximum output voltage                            |         | Up to 100% of DC bus voltage        |       |       |       |        |        |        |       |        |        |
| Maximum continuous current (Ic)                   | A       | 5                                   | 10    | 15    | 25    | 10     | 15     | 20     | 6     | 10     | 15     |
| Peak current limit                                | A       | 2 x Ic                              |       |       |       |        |        |        |       |        |        |
| Dimensions                                        | mm (in) | 82 x 47 x 25.4 (3.2" x 1.9" x 1.0") |       |       |       |        |        |        |       |        |        |
| Weight                                            | g (oz)  | 180 g (6.4 oz)                      |       |       |       |        |        |        |       |        |        |
| Mounting method                                   |         | PCB mounted                         |       |       |       |        |        |        |       |        |        |

## Flute

Current mode analog servo drive for DC brushless motors with external sinusoidal commutation



| Feature                                           | Units   | 5/60                                | 10/60 | 15/60 | 25/60 | 3/100 | 10/100 | 15/100 | 20/100 | 2/200 | 6/200 | 10/200 | 15/200 |
|---------------------------------------------------|---------|-------------------------------------|-------|-------|-------|-------|--------|--------|--------|-------|-------|--------|--------|
| Minimum supply voltage                            | VDC     | 10                                  |       |       |       | 20    |        |        |        | 40    |       |        |        |
| Nominal supply voltage                            | VDC     | 50                                  |       |       |       | 85    |        |        |        | 170   |       |        |        |
| Maximum supply voltage                            | VDC     | 59                                  |       |       |       | 95    |        |        |        | 195   |       |        |        |
| Maximum continuous power output                   | W       | 240                                 | 480   | 720   | 1200  | 260   | 800    | 1200   | 1600   | 360   | 960   | 1600   | 2400   |
| Efficiency at rated power (at nominal conditions) | %       | >97                                 |       |       |       |       |        |        |        |       |       |        |        |
| Maximum output voltage                            |         | Up to 100% of DC bus voltage        |       |       |       |       |        |        |        |       |       |        |        |
| Maximum continuous current (I <sub>c</sub> )      | A       | 5                                   | 10    | 15    | 25    | 3.3   | 10     | 15     | 20     | 2.25  | 6     | 10     | 15     |
| Peak current limit                                | A       | 2 x I <sub>c</sub>                  |       |       |       |       |        |        |        |       |       |        |        |
| Dimensions                                        | mm (in) | 82 x 47 x 25.4 (3.2" x 1.9" x 1.0") |       |       |       |       |        |        |        |       |       |        |        |
| Weight                                            | g (oz)  | 250 g (8.8 oz)                      |       |       |       |       |        |        |        |       |       |        |        |
| Mounting method                                   |         | PCB mounted                         |       |       |       |       |        |        |        |       |       |        |        |

## Castanet

Current mode analog servo drive for  
trapezoidal commutation and DC brush motors



| Feature                                                                   | Units   | 3/60                                           | 2.5/100 |
|---------------------------------------------------------------------------|---------|------------------------------------------------|---------|
| Minimum supply voltage                                                    | VDC     | 11                                             | 20      |
| Nominal supply voltage                                                    | VDC     | 50                                             | 85      |
| Maximum supply voltage                                                    | VDC     | 59                                             | 95      |
| Maximum continuous power output                                           | W       | 190                                            | 240     |
| Efficiency at rated power                                                 | %       | Up to 99%                                      |         |
| Maximum output voltage                                                    |         | 93% of DC bus voltage at f=32 kHz              |         |
| DC and trapezoidal commutation continuous current limit (I <sub>c</sub> ) | A       | 3.3                                            | 2.5     |
| Peak current limit                                                        | A       | 2 x I <sub>c</sub>                             |         |
| Weight                                                                    | g (oz)  | 21.5 g (0.7 oz)                                |         |
| Dimensions                                                                | mm (in) | 51 x 12.5 x 42 (2" x .49" x 1.65")             |         |
| Mounting method                                                           |         | PCB mounted (with 2mm pitch, 0.51 mm sq. pins) |         |

# Ocarina

Current mode analog servo drive for trapezoidal  
comutation and DC brush motors



| Feature                                                      | Units   | 1/60                                           | 2.5/60 | 5/60 | 10/60 | 15/60 | 1/100 | 2.5/100 | 5/100 | 10/200 | 15/100 |
|--------------------------------------------------------------|---------|------------------------------------------------|--------|------|-------|-------|-------|---------|-------|--------|--------|
| Minimum supply voltage                                       | VDC     | 11                                             |        |      |       |       | 20    |         |       |        |        |
| Nominal supply voltage                                       | VDC     | 50                                             |        |      |       |       | 85    |         |       |        |        |
| Maximum supply voltage                                       | VDC     | 59                                             |        |      |       |       | 95    |         |       |        |        |
| Maximum continuous power output                              | W       | 55                                             | 140    | 280  | 570   | 850   | 90    | 230     | 460   | 920    | 1400   |
| Efficiency at rated power (at nominal conditions)            | %       | Up to 99%                                      |        |      |       |       |       |         |       |        |        |
| Maximum output voltage                                       |         | 93% of DC bus voltage at f=32 kz               |        |      |       |       |       |         |       |        |        |
| DC and trapezoidal commutation continuous current limit (Ic) | A       | 1                                              | 2.5    | 5    | 10    | 15    | 1     | 2.5     | 5     | 10     | 15     |
| Peak current limit                                           | A       | 2 x Ic                                         |        |      |       |       |       |         |       |        |        |
| Weight                                                       | g (oz)  | 45 g (1.6 oz)                                  |        |      |       |       |       |         |       |        |        |
| Dimensions                                                   | mm (in) | 55 x 15 x 46.5 (2.1" x 0.6" x 1.8")            |        |      |       |       |       |         |       |        |        |
| Mounting method                                              |         | PCB mounted (with 2mm pitch, 0.51 mm sq. pins) |        |      |       |       |       |         |       |        |        |

## Piccolo

Current mode analog servo drive for trapezoidal comutation and DC brush motors



| Feature                                           | Units   | 5/60                                | 10/60 | 15/60 | 25/60 | 3/100 | 10/100 | 15/100 | 20/100 | 2/200 | 6/200 | 10/200 | 15/200 |
|---------------------------------------------------|---------|-------------------------------------|-------|-------|-------|-------|--------|--------|--------|-------|-------|--------|--------|
| Minimum supply voltage                            | VDC     | 10                                  |       |       |       | 20    |        |        |        | 40    |       |        |        |
| Nominal supply voltage                            | VDC     | 50                                  |       |       |       | 85    |        |        |        | 170   |       |        |        |
| Maximum supply voltage                            | VDC     | 59                                  |       |       |       | 95    |        |        |        | 195   |       |        |        |
| Maximum continuous power output                   | W       | 290                                 | 570   | 860   | 1400  | 310   | 950    | 1400   | 1900   | 430   | 1200  | 1950   | 2900   |
| Efficiency at rated power (at nominal conditions) | %       | >97                                 |       |       |       |       |        |        |        |       |       |        |        |
| Maximum output voltage                            |         | Up to 100% of DC bus voltage        |       |       |       |       |        |        |        |       |       |        |        |
| Maximum continuous current (Ic)                   | A       | 5                                   | 10    | 15    | 25    | 3.3   | 10     | 15     | 20     | 2.25  | 6     | 10     | 15     |
| continuous current limit (Ic)                     |         |                                     |       |       |       |       |        |        |        |       |       |        |        |
| Peak current limit                                | A       | 2 x Ic                              |       |       |       |       |        |        |        |       |       |        |        |
| Dimensions                                        | mm (in) | 82 x 62 x 25.4 (3.2" x 2.4" x 1.0") |       |       |       |       |        |        |        |       |       |        |        |
| Weight                                            | g (oz)  | 230 g (8.1 oz)                      |       |       |       |       |        |        |        |       |       |        |        |
| Mounting method                                   |         | PCB mounted                         |       |       |       |       |        |        |        |       |       |        |        |

# Cymbal

Current mode analog servo drive for trapezoidal comutation and DC brush motors



| Feature                                                      | Units   | 70/48                              | 70/60  | R90/60  | 150/100 | R75/100 | 35/200 | R60/200 | 18/400 |
|--------------------------------------------------------------|---------|------------------------------------|--------|---------|---------|---------|--------|---------|--------|
| Minimum supply voltage                                       | VDC     | 11                                 | 12     |         | 18      |         | 36     |         | 72     |
| Nominal supply voltage                                       | VDC     | 42                                 | 50     |         | 85      |         | 170    |         | 360    |
| Maximum supply voltage                                       | VDC     | 48                                 | 59     |         | 95      |         | 195    |         | 390    |
| Maximum continuous power output                              | W       | 3200                               | 4000   | 5100    | 4600    | 6900    | 6600   | 11300   | 6800   |
| Efficiency at rated power (at nominal conditions)            | %       | > 97                               |        |         |         |         |        |         |        |
| Maximum output voltage                                       |         | 93% of DC bus voltage at f=32 kz   |        |         |         |         |        |         |        |
| DC and trapezoidal commutation continuous current limit (Ic) | A       | 70                                 | 70     | 90      | 50      | 75      | 35     | 60      | 18     |
| Peak current limit                                           | A       | 2 x Ic                             | 2 x Ic | No Peak | 2 x Ic  | No Peak | 2 x Ic | No Peak | 2 x Ic |
| Weight                                                       | g (oz)  | 700 g (24.7 oz)                    |        |         |         |         |        |         |        |
| Dimensions                                                   | mm (in) | 134 x 95 x 60 (5.3" x 3.7" x 2.4") |        |         |         |         |        |         |        |
| Mounting method                                              |         | Panel mount                        |        |         |         |         |        |         |        |



# a Harmonious Integration of Technology

Elmo has integrated its *SimpliQ* motion control technology into a variety of innovative products such as integrated boards and motor-drive combination packages.

## TRIO-WHI(TRW)

Elmo's TRIO-WHI(TRW) is an integrated board for X, Y, Z applications. As a highly compact solution, it combines multiple Whistle servo drives and a shunt-regulator, in one package and operates using a single AC/DC power supply with a shunt regulator. The TRIO-WHI(TRW) is offered as two different models supporting either 60 or 100 maximum DC voltage with a modular continuous current combination of up to 15 amps.

The TRIO-WHI(TRW) operates from an AC/DC power source in current, velocity, position and advanced position modes with permanent-magnet synchronous brushless motors, DC brush motors, linear motors or voice coils. The board is designed for use with any type of sinusoidal and trapezoidal commutation with

As with other Elmo *SimpliQ* digital products, the TRIO-WHI(TRW) can be easily set up and tuned using Elmo's Composer software tools.

For designing any similar types of board solutions, Elmo offers professional engineering services.



# Endure the Extreme

Elmo's **ExtrIQ** Product Suite is a family of highly durable and intelligent servo drives designed to address the requirements of a wide spectrum of applications operating under extreme environmental conditions. By integrating Elmo's industry leading power conversion and servo control technology containing extremely rugged capabilities, Elmo's **ExtrIQ** Product Suite offers a powerful and resilient solution.

Designed to endure extended temperature and high humidity, high mechanical shock resistance and high vibration resistance, the solution is ideal for a broad range of applications requiring durable motion control solutions including:

- Military Ground Mobile
- Naval
- Nautical
- Aviation
- Aerospace
- Missile Weaponry
- Specialized Laboratory Automation
- Oil Refining
- Un-manned Vehicles
- Satellite Communication



**ExtrIQ**

## EEC Standards Compliance

As a standards-based solution, the **ExtriQ** Product Suite complies with a host of military and industrial standards including:

- MIL-STD-810- Environmental Engineering Considerations and Laboratory Tests
- MIL-STD-1275- Characteristics of 28 Volt DC Electrical Systems in Military Vehicles
- MIL-STD-704- Aircraft, Electric Power Characteristics
- MIL-STD-461- Requirements for the Control of Electromagnetic Interference Characteristics of Subsystems and Equipment
- MIL-HDBK-217- Reliability Prediction of Electronic Equipment
- ISO-9001:2000
- WEEE, RoHS, UL, CE

## ExtriQ Product Range

