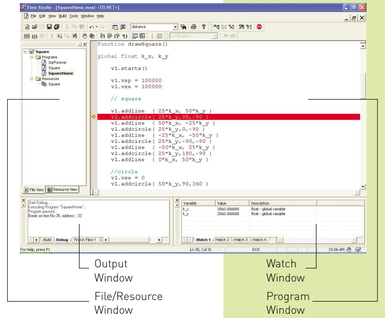
Maestro's User Programming Language (UPL)

The UPL is a compiled language, designed for real-time execution of motion-control tasks.
The user writes a program in an IDE (Integrated Development Environment) and then compiles the program.
A successfully compiled program can then be downloaded to the ***Maestro***, from where it can be edited and debugged using the Elmo Studio.



Designating Resources

The ***Maestro*** is designed to manage movement. Its' perspective of the world is based upon motor axes which perform the movement either independently or in combination. Therefore, an application developer's first job is to define the elements that make up the ***Maestro's*** world . These elements are:

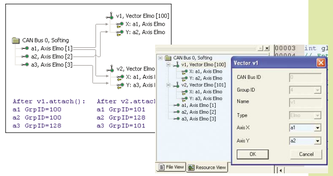
Axis: Drive and motor pair that controls motion along a specific axis.

Vector: A set of dependent axes designed to implement vector motion. Each axis require accurate timing and strict synchronization.

Group: A set of axes that the Maestro can send the same command to simultaneously. Each axis can implement motion independently.

The ***Maestro*** uses Primitives to define all types of motion. ***Maestro*** primitives are Lines, Circles and Poly-lines. Combined, these primitives can form even the most complex paths.

When the ***Maestro*** is in control, motion does not stop at each primitive's boundary, instead motion remains continuous.

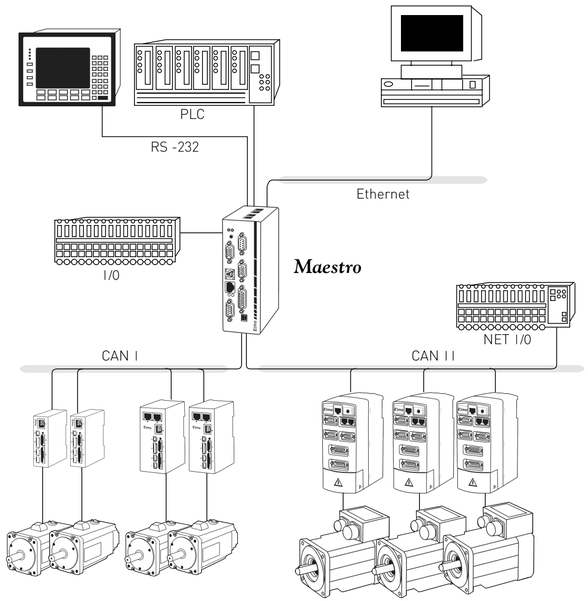


Command Line Interpreter (CLI)

CLI commands that are sent to the ***Maestro*** are either executed by the ***Maestro*** itself or are forwarded directly to the specified axis for immediate execution. The CLI currently supports the following commands:

- Initialization commands
- Commands for collecting information
- Axis commands
- Vector commands
- Group commands

Maestro - Network-based Multi-axis Motion Supervisor



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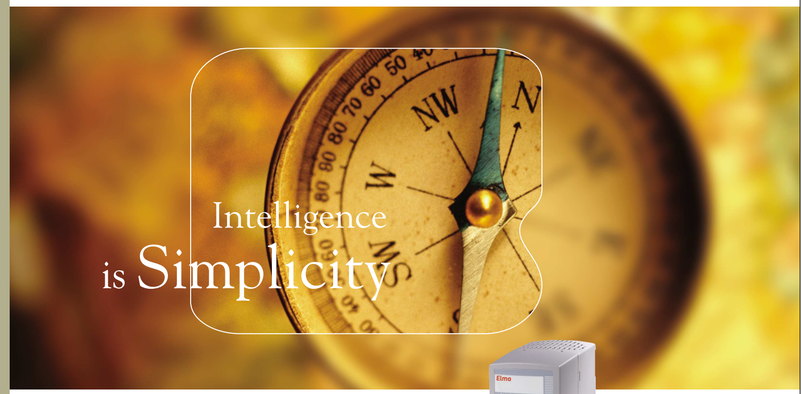


Elmo's ***Maestro*** is a network-based multi-axis motion supervisor that operates in conjunction with Elmo intelligent servo drives to provide a full multi-axis motion control solution. The ***Maestro*** and ***SimplIQ*** servo drives share the motion processing workload in a distributed motion control architecture.

The *Maestro* operates as a Multi-Axis Motion Supervisor to:

- Synchronized motion control - interpolated 3D / 2D
- Sequencing motion control - event handling of axis and I/O's

The *Maestro* operates as a CANopen Network Master for:

- Network management (NMT) - Heartbeat
- Clock synchronization

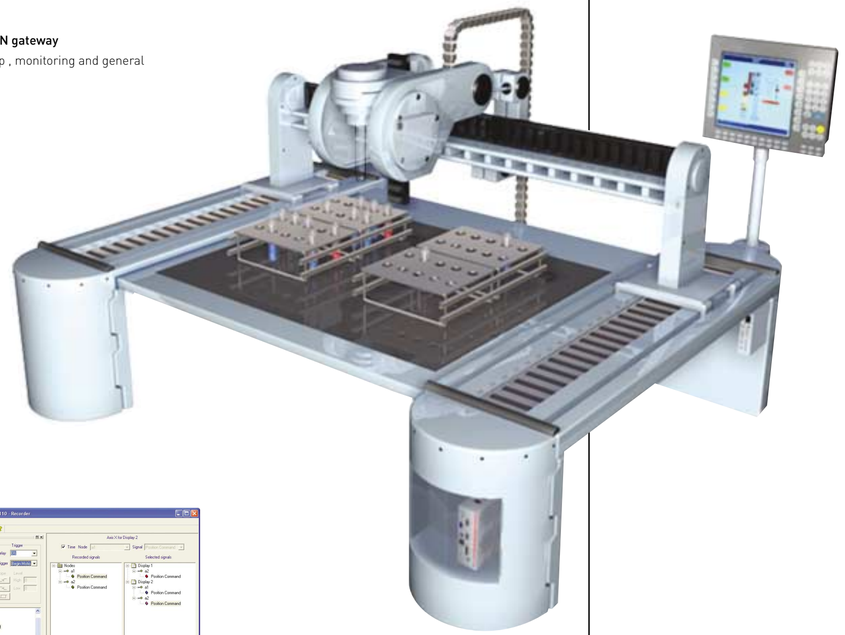
The *Maestro* operates as a Ethernet - CAN gateway

- Direct access to the axis level for set up , monitoring and general analysis.

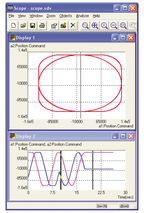
The *Maestro* operates as a Multi-Axis Motion Analysis & Development tool:

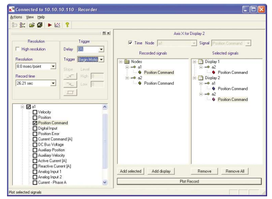
- Multi-Axis recording and analysis tools
- Multi-Axis application development environment

The *Maestro* can be monitored through a web browser



Recorder Screens





	Specifications
Hardware	Stand-alone
Operating System	Real Time OS with Elmo's SimplIQ Kernel
Programming	• Elmo Metronome extended language • Elmo Studio (IDE)
Tools	CLI, Recorder, Demo Case
Boot Up time	20 Sec
Debugging	On-line monitoring of all axes state variables, get/set values, controller values, on-line axis tuning, axis variables forcing, recording
Number of Axes	• Up to 64 axes per CAN bus • 2 ~ 16 Interpolated axes depending upon bus load
Axis Types	• Intelligent servo drives (Elmo) and/or • CANopen DSP-402, DS-301
Execution Time	• Interpolated points: 1 mSec
Axis Functions	Standard: start/stop/reset/ reference, velocity, position Special: master-slave cascading, electronic gearings, interpolated position
Protocols	• CANopen: DS 301, DSP 401 , DSP 402 • Telnet, HTTP
I/O System	• On board isolated 16 DI, 16 DO, 4 AI • CANopen DS 401 • Incremental encoder 20 Mega-Counts/Second
Connectivity	Variable access via ***Maestro*** API
Master	• Heartbeat • NMT Synchronization
Interface	• RS-232 • Fast Ethernet (10/100 Mbps) • 2 CAN bus
Power Supply	24 VDC
Processor	• 300 MHz, Pentium compatible • 16 bit ISA (PC104 standard)
Memory	• 64 MB Internal flash • 64 MB RAM (both expandable to 128 MB)
Diagnostic LEDs	power, LAN speed, LAN activity, Flash access
Dimensions	153 mm x 107 mm x 51 mm
Weight:	400 grams (14 ounces)
Oper. Temp.	0°C ~ 40°C