

**CONTROL
TECHNIQUES**

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DELTA TAU

Delta Tau's UMAC Motion Controllers with

M'Ax & MultiAx (SLM)

Competitive Multiaxes Servo Motion Solutions.

System Level Solutions



The UMAC System

The UMAC (Universal Motion and Automation Controller) is a modular system designed for you to customize to your application needs. UMAC utilizes the latest in DSP technology, including the Motorola 56k series DSP microprocessors. Its fast and precise calculation capabilities translate into a highly accurate and fast-paced motion trajectory calculation and control. In addition, we use a high-level BASIC-like language for performing real-time custom servo loop tasks in an Open Servo structure. Our continuously increasing computational speeds (40-160 MHz) enable our motion controllers to have many advanced features

With six generations of proven in-the-field motion controllers, we offer a broad and diverse line of motion control products. From 1 to 32 axes of linear or rotary servo, stepper or hydraulic motion in any combination, including a variety of analog or digital I/Os, different types of encoder feedback, analog (+/-10V) and digital (**SLM**), direct PWM or MACRO) outputs to servo amplifiers, as well as pulse and direction output for steppers. Also, RS232, USB and Ethernet communications. We can provide the best solution for today, with the best upgrade path to the future.

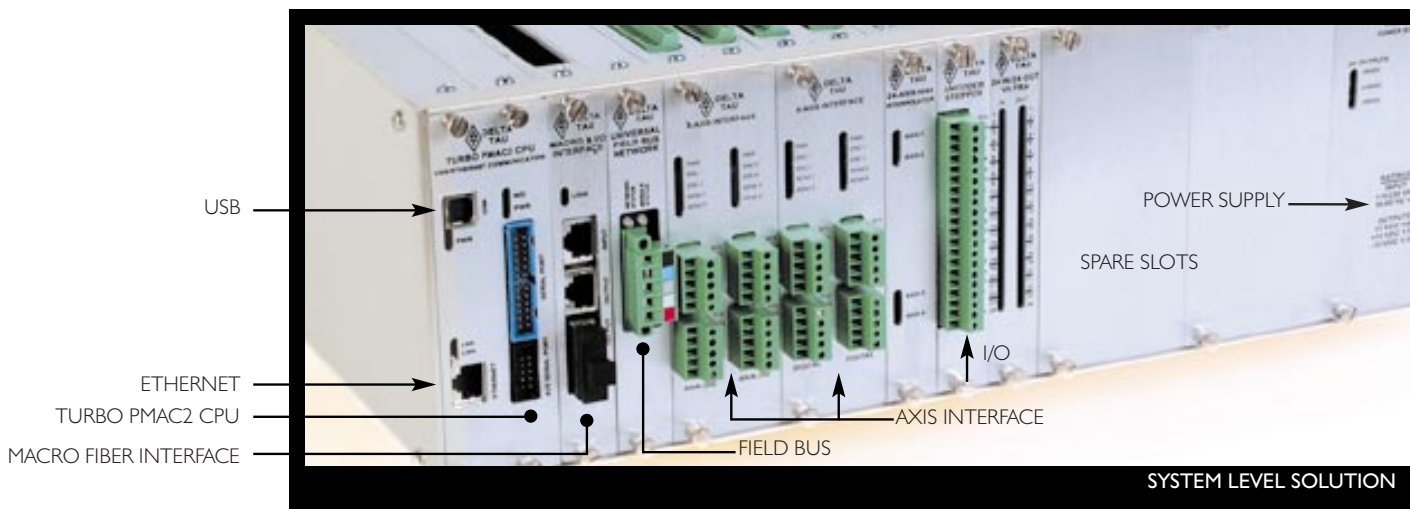
Each UMAC system is expandable and scalable by adding accessory cards to a rack or by connecting multiple racks together via Delta Tau's real time fiber optic field bus (MACRO). In addition, a PC/104 computer can be installed inside the UMAC system rack yielding an incredibly powerful controller within a compact industrial package.

ACC-69E (**SLM**) Interface

The ACC-69E Axis Expansion Board provides three or six channels of servo interface circuitry for UMAC controllers. The ACC-69E is part of the UMAC or MACRO Pack family of expansion cards and these accessory cards are designed to plug into an industrial 3U rack system (UBUS). The information from these accessories is passed directly to the Turbo PMAC2 CPU via the high speed UBUS back plane



15 SLOT 12 AXIS 48 I/O



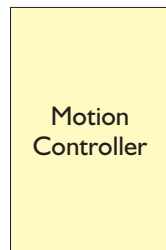
(SLM) technology

tomorrow's technology now!

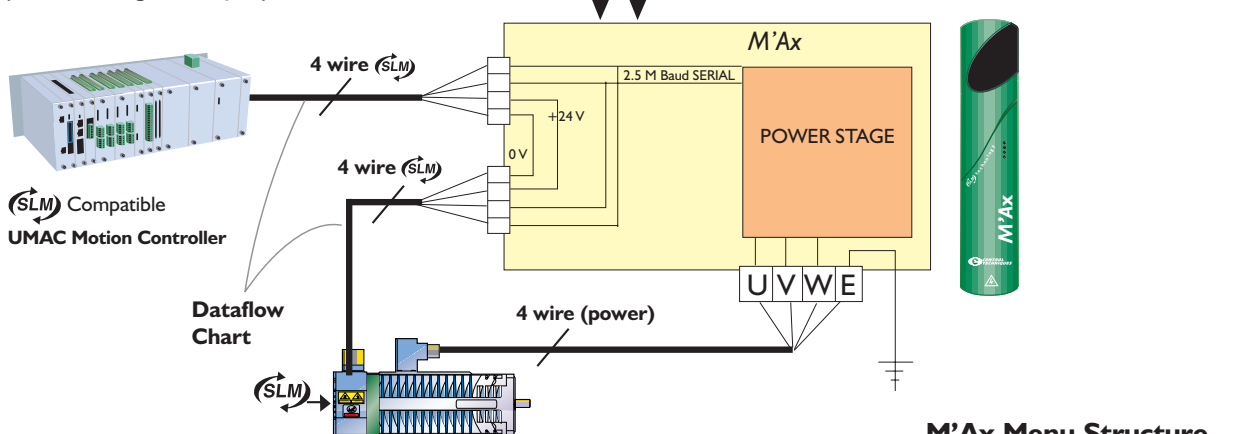
The (SLM) technology uses a combination of Control Techniques 4-wire, (SLM) ASIC and motor-mounted SinCos encoders to achieve an application invariant 20-fold increase in position feedback resolution (over 8.3 million points per revolution). This is achieved by integrating speed & position control within the feedback system on-board the servomotor. As a result, the (SLM) is able to overcome the degradation in performance experienced.

with encoder feedback signals when synchronising multiple servo axes on machines as operating speeds increase. For the ultimate interpolated multi-axes performance, control loops are deterministic and synchronised to give the lowest jitter in the industry - of 50 nanoseconds. As well as being a performance enhancer now, (SLM) technology is also a gateway to the future. Its integration into PC-based motion systems opens up a whole new vista for optimised multi-axes control in the new future.

(Traditional ±10V)



(Alternative Digital Interface)

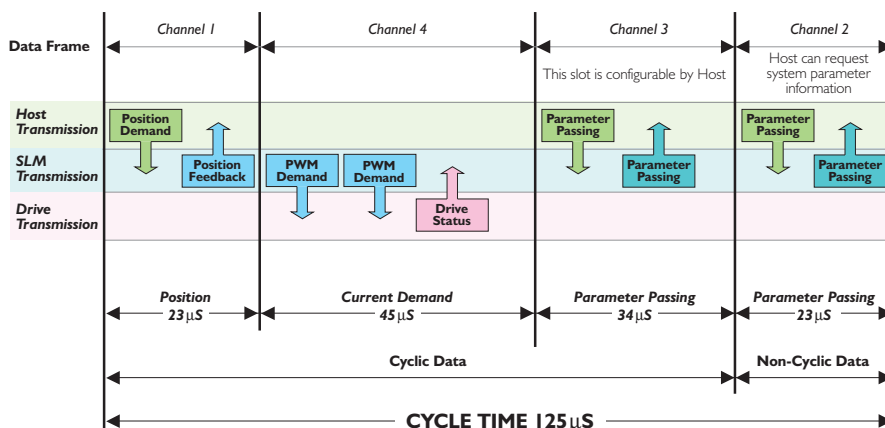


(SLM) technology - Your Control Benefits

- Perfect trajectory following - high resolution feedback
- Perfect linearity on velocity feed forward
- Perfect dynamic response on acceleration feed forward
- High control loop bandwidth to achieve sub micron precision on position
- Reduced machine vibration - ultra smooth operation

M'Ax offers 12 Menus "Standalone"

(SLM) Communications Protocol - Fundamental Cycle



M'Ax Menu Structure (Standalone only)

- Menu 0 – Basic Set up
- Menu 1 – Speed Reference Selection
- Menu 2 – Ramp Selection
- Menu 3 – Speed Loop PID Gains
- Menu 4 – Torque Control
- Menu 5 – Motor Control
- Menu 6 – Sequencer Functions
- Menu 7 – Analogue I/O Settings
- Menu 8 – Digital I/O Settings
- Menu 10 – Status and Diagnostic
- Menu 11 – Serial Communications
- Menu 13 – Pulse reference selection and scaling

UMAC - Design Features



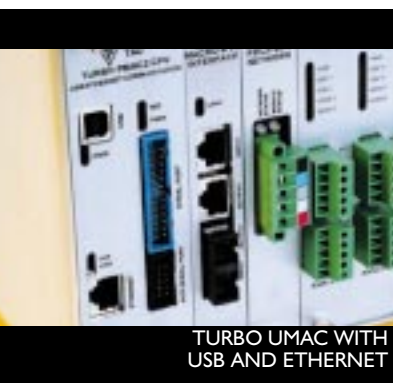
12 AXIS (SLM) WITH UMAC

Features

- Advanced PID and pole placement servo algorithms
- Multitasking of up to 16 motion programs and 64 PLC
- Up to 32 axes of control in 16 coordinate systems (multi-axis trajectory control, multitasking)
- Dynamic multi-block lookahead for robust acceleration control
- Forward and inverse kinematics (robotics and other non-Cartesian actuators)
- Reverse and retrace capabilities (welding, cutting, EDM)
- Acceleration and jerk control (smooth, jerk-free motion)
- Cascaded servo loops (tight coupling of velocity/force loop)
- True S-curve acceleration-splines (smooth trajectory control)
- Coordinate translation and rotation (2D and 3D)
- Lead screw and backlash compensation
- 24-bit hardware position- and compare capture
- 48-bit floating point and integer calculations (precision)
- User-written servo capabilities for custom servo algorithms
- Servo loop update rate up to 6.25 microseconds per axis
- Types of communications: USB, Ethernet (UDP/TCP/IP) or RS232



UMAC MACRO



TURBO UMAC WITH USB AND ETHERNET

The ACC-69E (SLM) Interface Board

Up to six ACC-69E boards may be connected to one UMAC, providing up to 32 axis channels of servo interface circuitry. The ACC-69E board contains a micro-controller and it has a highly integrated 6-channel PMAC2-style memory map. The ACC-69E plugs into the back plane and uses one slot a UMAC Rack. The ACC-69E comes standard with 6 servo interface channels, which are brought out on high density 15-pin DSUB connectors.

- Velocity-based output commands (selectable to Torque mode by user)
- High-resolution absolute encoder feedback (up to 22 bits)
- 4 channels of timestamp based trigger position capture capability
- 4 differential trigger inputs provided for position capture.
- Interface for the communication to/from the M'Ax™ or MultiAx™ drives
- 3 input flags (PLIM, MLIM, HOME) per channel

M'Ax - Design Features



Digital I/O

- Opto-isolated
- Eight digital inputs
- Four digital outputs
- 24V user supply

Keypad

- 7 segment removable display
- Memory Pad stores identical set of parameters for easy upload
- 16 bit high precision, $\pm 10V$ differential

Compact Design

- One size for the range 3.5 to 12.5 Amps
- Protection to IP20
- Only 62mm wide

DC Bus

- Can be supplied from a common DC power supply in parallel with other models
- Reduced DC bus running with drive backup supply

Easy Start

- Automatic motor mapping
- Gains calculator
- MaxSoft with Wizard

'Electronic' Thermistor

- Intelligent thermal modelling
- Accurate monitoring and protection
- Serial data link employed – NO need for thermistor in motor and NO extra cabling requirements

Advanced Feedback

- SinCos encoder as standard
- Reduced cabling 4 wire system – up to 50 metres
- Intelligent capability
- High resolution (8.3 million points per revolution)

Back-up Power Supply

- 24Vdc for (SLM) encoder
- 28/32Vdc for drive logic suitable for standby, evacuation system - reduced dc bus running

Standalone

- Frequency & direction or quadrature inputs
- 16 bit High precision $\pm 10V$ differential (if keypad fitted)
- (SLM) and user back up supply
- 24V user supply

Simulated Encoder

- Encoder quadrature A, B plus Zmarker-pulse outputs (4096, 2048, 1024 ppr)
- Two analogue outputs
- Standard-precision analogue differential reference input (12 bit)

Communications Port

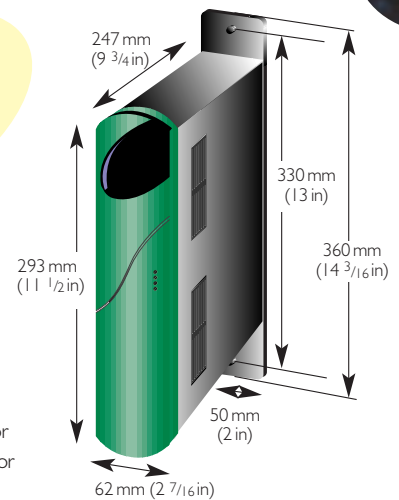
- RS232 ● RS485 ● ANSI 3.28/Modbus RTU

Braking

- Standard internal resistor 'failsafe' design
- Electronic I²t protection for internal braking resistor
- External resistor connectable

Practical Grounding Bar and Cable Support

- Pluggable terminals for - mains supply - motor power - external braking resistor
- Earthing clamps for motor cable screen



Electrical Data

	Output Current		External RFI Filter (IP20) Complies with EN50081/1 or 2					Internal Braking Resistor				
	Continuous Amps	Peak Current Amps (2sMax)	Part Number	Max Power Dissipation (W)	L (mm)	W (mm)	D (mm)	Value (mm)	Operating Voltage	Peak Current Amps	Peak Power (kW)	Max. Cont Braking Power (W)
M'Ax 403	3.5	7	4200-1645	6	250	45	70	75 ohm	780V	10.9	8.9	125
M'Ax 406	6.5	13										
M'Ax 409	9.5	19										
M'Ax 412	12.5	25										

Supply Voltage 380 - 480V $\pm 10\%$, 47.5 to 63 Hz
 Rated ambient 45°C (up to 55°C with derating)

Altitude: derate above 1000 m
 Relative humidity: 95% non-condensing



MultiAx - Design Features



MC/ EIA485

- (SLM) technology I/O to the motion controller
- Hardware enable input
- Status relay contact
- (SLM) and user back-up supply
- 24V user supply

Compact Design

- One size for the range
- Protected to IP20
- Only 92 mm for three axes
- Single power input, 3 axes output
- Each axis dual rated

Easy Start

- Automatic motor mapping

Practical Grounding Bar and Cable Support

- Pluggable terminals for - mains supply, motor power, external braking resistor
- Earthing clamps for motor cable screen



Digital I/O

- 4 Opto Isolated inputs
- 24V User supply

Back-up Power Supply

- 24Vdc for (SLM) encoder
- 24-32Vdc for drive logic suitable for stand-by

Advanced Feedback

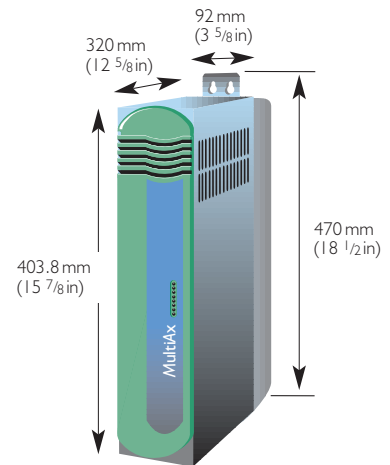
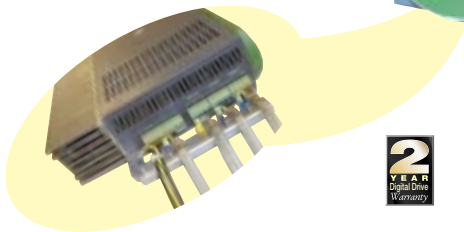
- SinCos encoder
- Reduced cabling
- 4 wire system - up to 50 metre per axis
- Intelligent capacity
- High resolution (8.3 million points per revolution)

Braking

External resistor connectable

DC Bus

- Can be supplied from a common DC power supply in parallel with other models
- Reduced DC bus running with drive back up supply



MultiAx Ratings Table

Drive	Rating	Output Current						RFI Filter (IP20) Complies with EN50081/1 or 2				
		Maximum Continuous Amps			Peak Current (2 sec Max) Amps			Part number	Maximum power dissipation (W)	L mm	W mm	D mm
MultiAx SAC/SDC	Low	2.5	2.5	2.5	5.0	5.0	5.0	4200-3258	11.83	270	50	87
MultiAx SAC/SDC	High	9.375	9.375	9.375	18.75	18.75	18.75					
MultiAx HAC/HDC	Low	2.5	2.5	2.5	5.0	5.0	5.0					
MultiAx HAC/HDC	High	15	9.375	9.375	30	18.75	18.75					

AC supply 380 - 480Vac \pm 10%, 47.5 to 63Hz
9.75 kW continuous from system

Rated ambient 0 - 50°C
Altitude: derate above 1000m
Relative humidity: 95% non condensing

