



## M'Ax Servo -

Precision AC servo performance  
with Unimotor 

# 1 2 3 4 5

reasons for choosing the ultimate servo- **M'Ax...**

## ...1 Easy Start Up

with automatic motor mapping

### Easy Start

M'Ax's Automatic Motor Mapping sets itself and gets you going in minutes... No longer do you need to worry about determining and programming the motor type, current, phase angle, inertia, Kt, Ke etc. It is automatic, immediately at power up, even without the need for a PC, thereby ensuring a trouble free and fast start up - Easy Start!

### Tuning Is Easy With M'Ax's Gains Calculator...

One step keypad programming calculates the PID gains and gets you running. Better still, if you know your machinery inertia then simply dial it in and one step recalculates the optimal gains for best running.



### With A PC It Is Even Easier With M'AxSoft...

M'AxSoft is a windows based drive set-up program that is designed to enable the complete control and display of all parameters within M'Ax.

...And if that is not easy enough, then the Wizard walks you through the setup...

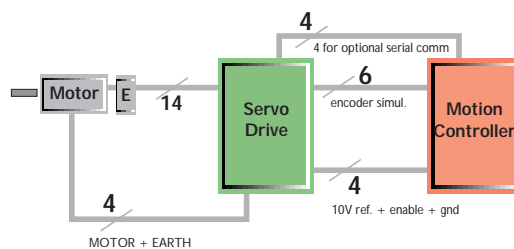


## ...2 Total System Costs Reduced!

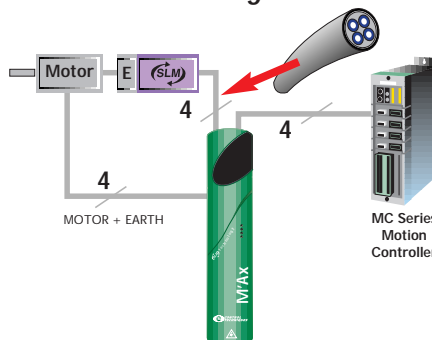
M'Ax cuts the costs of multi axes servo systems by:-

- **Reducing** wiring in the feedback loop - 4 wire system offers significant advantage over the conventional encoder requiring 14 wires
- **Reducing** cubicle size - M'Ax is compact, only 62mm wide, the minimum of machinery space required for multi axes installation
- **Reducing** AC supply connections as M'Ax's can be DC supply fed in parallel connection
- **Reducing** cabling as motor thermistors are no longer required - M'Ax offers intelligent thermal modelling for accurate and reliable protection of the motor

### Conventional Servo Wiring = 32 Connections



### M'Ax Servo Wiring = 12 Connections



# M'Ax - Simplicity, Flexibility and Performance

## M'Ax redefines what you expect from a servo

The quantum leap in servo design that is M'Ax, redefines totally what a User can and should expect from a servo system in terms of simplicity to use and install, installation costs, set up times, axis performance, precision and resolution.

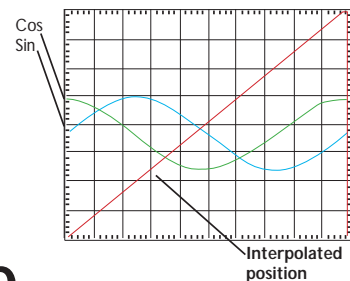
By achieving substantial advances in all of these crucial areas, M'Ax provides machine builders with a simple, powerful, and cost effective way of improving the competitiveness and performance of their own machines!

## ...3 Highest Resolution Feedback

"Perfect" feedback and at an affordable price level!

- Advanced Sin Cos encoders are **standard** and with **(SLM) technology** the sensitive signals are processed at source to produce the highest resolution in digital form.
- Digital clarity is maintained by use of high speed serial link (2.5Mbaud, 4 wire system) to interface between the drive and motor - supports cable runs of up to 50 metres with high level of noise immunity.

- M'Ax feedback is "intelligent" and enables vital dataflow between the motor, drive and also host motion controller if required. For example condition monitoring of motor temperature, performance data and many more control parameters.

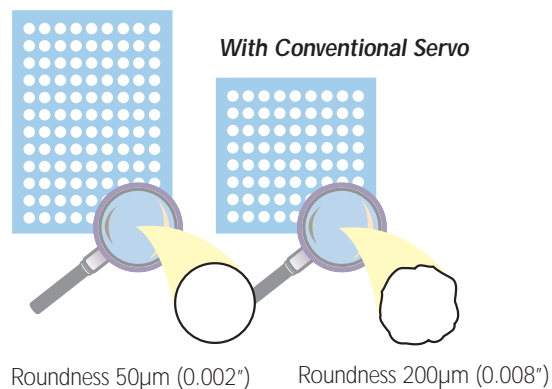


## ...4 Higher Performance and Precision

Superb precision performance is standard thanks to the revolutionary **(SLM) technology**! M'Ax's feedback provides 8.3 million points per revolution for the speed loop control. With this high resolution we are able to track the smallest deviation and work with gains that do not reach the threshold of instability. The result is high dynamic response with good motion regularity and ultra smoothness in rotation. M'Ax can give your machinery that extra competitive edge through improved machinery performance!

The graphic opposite shows how **(SLM) technology** makes the difference for a hole cutting machine. In 1 minute - Higher productivity, cuts faster, better accuracy and quality (roundness) is up fourfold.

With **(SLM) technology**



## ←...5 inside

# ...5 (SLM) technology

## Tomorrow's Technology NOW!

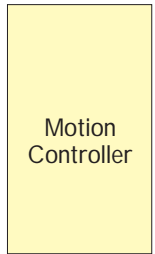
The (SLM) technology uses a combination of Control Techniques 4-wire, DriveLink ASIC and motor-mounted SinCos encoders to achieve an application invariant 20-fold increase in position feedback resolution (over 8.3 million points per revolution). This is achieved by integrating speed & position control 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.

### (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

(Traditional ±10V)



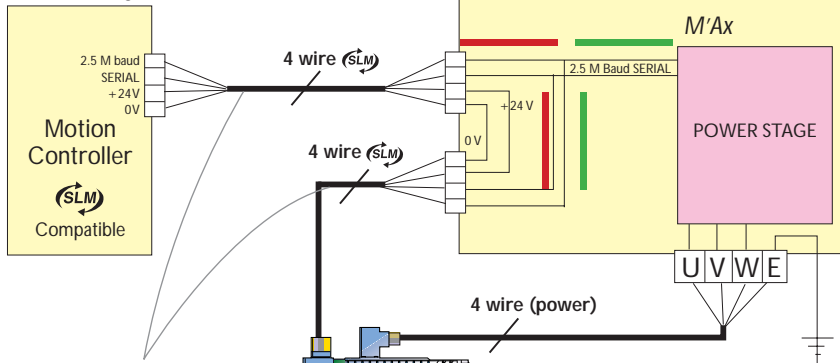
the (SLM) is able to overcome the degradation in performance experienced

10V & Encoder Simulation

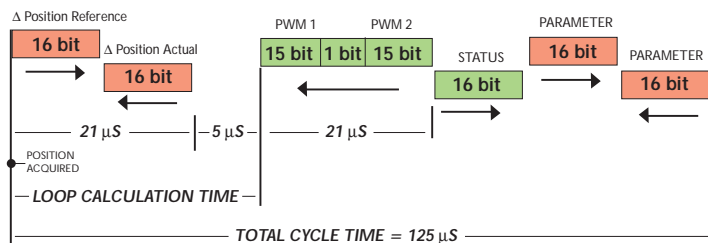
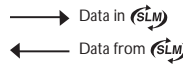
~10-14 wire

M'Ax offers 12 Menus "Standalone"

(Alternative Digital Interface)



### Dataflow Chart

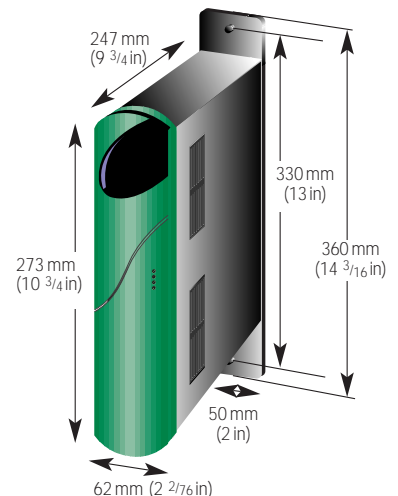


### M'Ax Menu Structure

- 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

### Dimension M'Ax 403-412



# Key Design Features

## 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, 1024ppr)
- 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 I<sup>2</sup>t 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

## 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 12.5Amps
- Protection to IP20
- Only 62mm wide

## 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

## DC Bus

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

## 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)



## Electrical Data

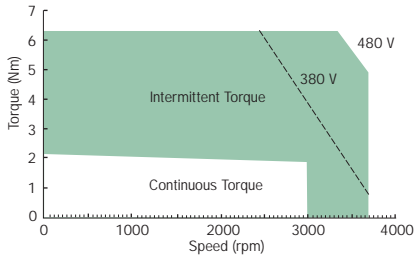
	Output Current		External RFI Filter (IP20) Complies with EN50081/1 or 2				Internal Braking Resistor					
	Continuous Amps	Peak Current Amps (2sMax)	Part Number	Max Power Dissipation	L (mm)	W (mm)	D (mm)	Value (mm)	Operating Voltage (Vr)	Peak Current Amps (Vr)	Peak Power (kW)	Max.Cont Braking Power (Wr)
M'Ax 403	3.5	7										
M'Ax 406	6.5	13										
M'Ax 409	9.5	19										
M'Ax 412†	12.5	25										

Supply Voltage 380 - 480V  $\pm 10\%$   
 Rated ambient 45°C (up to 55°C with derating)  
 Altitude: derate above 1000m

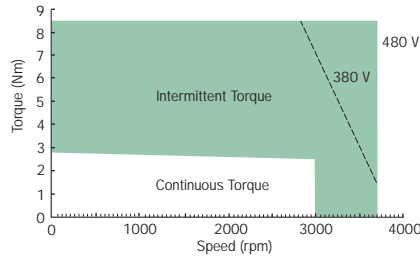
Relative humidity: 95% non-condensing  
 †Under certain conditions AC line chokes may be required

# Speed Torque Characteristics

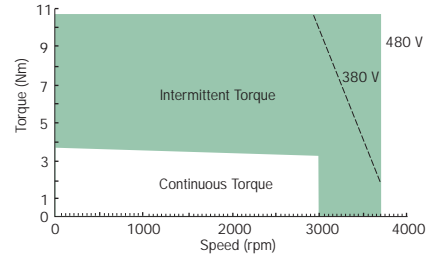
(2) 75SLB300 with M'Ax 403



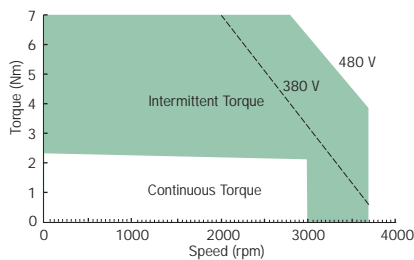
(3) 75SLC300 with M'Ax 403



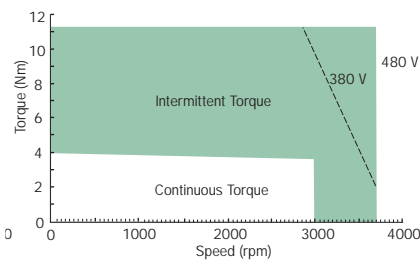
(4) 75SLD300 with M'Ax 403



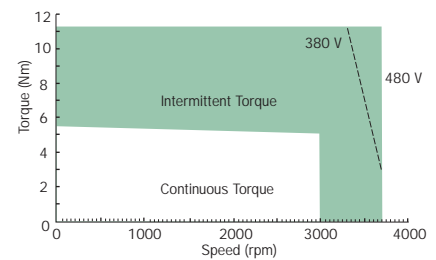
(5) 95SLA300 with M'Ax 403



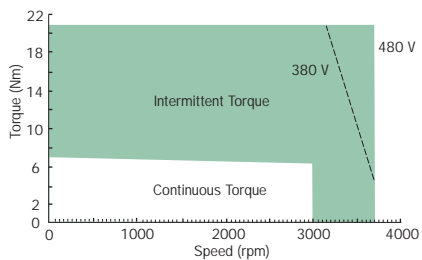
(6) 95SLB300 with M'Ax 403



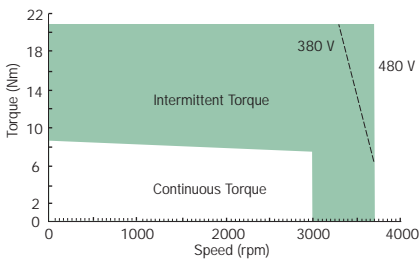
(7) 95SLC300 with M'Ax 403



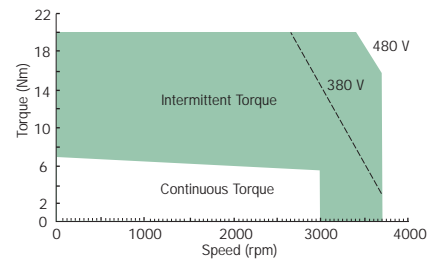
(8) 95SLD300 with M'Ax 406



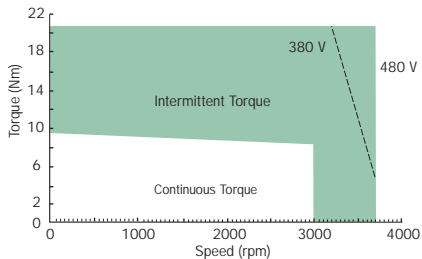
(9) 95SLE300 with M'Ax 406



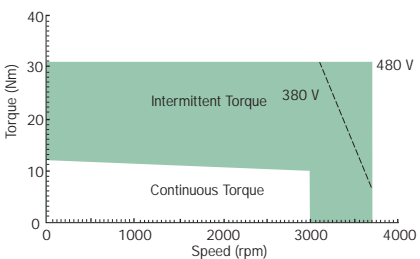
(11) 115SLB300 with M'Ax 406



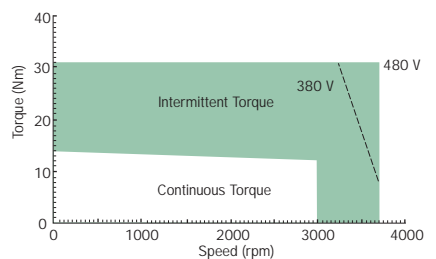
(12) 115SLC300 with M'Ax 406



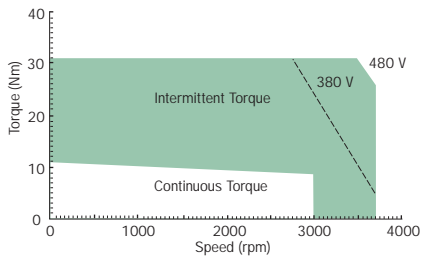
(13) 115SLD300 with M'Ax 409



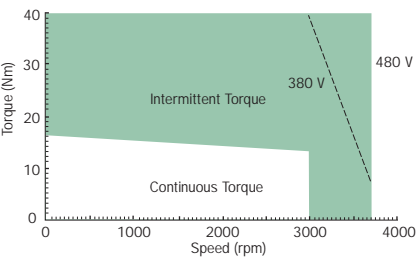
(14) 115SLE300 with M'Ax 409



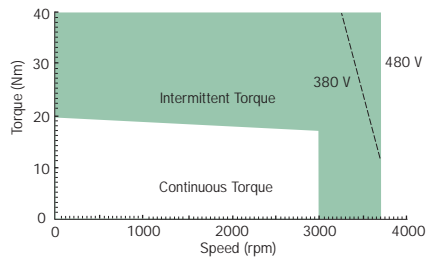
(16) 142SLB300 with M'Ax 409



(17) 142SLC300 with M'Ax 412



(18) 142SLD300 with M'Ax 412



40°C Ambient, up to  $\Delta T100$ ; 10% tolerance on all performance data

# Performance Matched Motors & Drives

## Unimotor (SLM) - M'Ax Combinations

Reference No.	Motor Type (#) 3000rpm Kt (1.6Nm/A rms)	Drive Type	Stall Torque (Nm)	Stall Current (Arms)	Peak Torque (Nm)	Torque @ 3000rpm (Nm)	Standard Inertia(*) (kgcm <sup>2</sup> )	Motor Weight (kg)
1	75SLA300CBPAA	M'Ax 403	1.2	0.73	3.6	1.1	0.6	3
2	75SLB300CBPAA	M'Ax 403	2.1	1.29	6.3	1.9	1.0	3.7
3	75SLC300CBPAA	M'Ax 403	2.8	1.74	8.4	2.5	1.5	4.4
4	75SLD300CBPAA	M'Ax 403	3.6	2.25	10.8	3.3	1.9	5.1
5	95SLA300CBPAA	M'Ax 403	2.3	1.42	6.9	2.1	1.4	5
6	95SLB300CBPAA	M'Ax 403	3.9	2.45	11.2 (†)	3.6	2.5	6.1
7	95SLC300CBPAA	M'Ax 403	5.5	3.41	11.2 (†)	5.0	3.6	7.2
8	95SLD300CBPAA	M'Ax 406	6.9	4.32	20.7	6.3	4.7	8.3
9	95SLE300CBPAA	M'Ax 406	8.4	5.23	20.8 (†)	7.6	5.8	9.5
10	115SLA300CBPAA	M'Ax 403	4.1	2.53	11.2 (†)	3.3	3.2	6.5
11	115SLB300CBPAA	M'Ax 406	6.7	4.16	20.1	5.5	5.5	8.2
12	115SLC300CBPAA	M'Ax 406	9.5	5.91	20.8 (†)	7.7	7.8	9.9
13	115SLD300CBPAA	M'Ax 409	12.0	7.48	30.4 (†)	9.7	10.0	11.6
14	115SLE300CBPAA	M'Ax 409	14.1	8.83	30.4 (†)	11.4	12.3	13.2
15	142SLA300CBPAA	M'Ax 406	6.3	3.94	18.9	5.4	7.8	10.9
16	142SLB300CBPAA	M'Ax 409	10.8	6.75	30.4 (†)	9.0	14.1	13.2
17	142SLC300CBPAA	M'Ax 412	15.3	9.56	40.0	12.2	20.5	15.5
18	142SLD300CBPAA	M'Ax 412	19.8	12.38	40.0	15.8	26.8	17.8

Preferred stocking frames are B and D. For other combinations - consult Drive Centre.

(#): Motors in table are connectorised, no brake, no key - plain shaft, IEC flange, standard inertia.

Other base speeds are 2000rpm (2.4Nm/A rms), 4000rpm (1.2Nm/A rms); 6000rpm also available

Options available: Brake, cable assemblies, fan cool cowlings, planetary gearboxes, keyed shaft

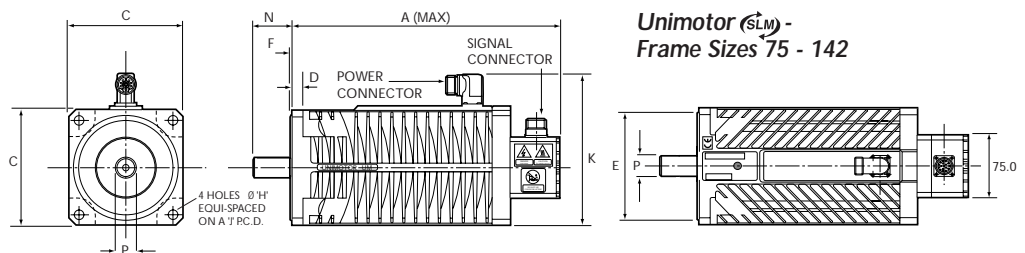
(†): Motor is capable of higher peak torques when used with next higher rating M'Ax.

(\*): Higher inertia stators are available as options.

## Unimotor (SLM)

The Unique 'finned' design improves heat dissipation, and with its single piece design optimises torque output and reduces cogging torque. The compact design gives additional torsional stiffness.

Laminations and coils are optimised to give high efficiency and low harmonic distortion. All this combined with high energy magnets and a choice of rotor inertia, give Unimotor (SLM) truly dynamic performance to suit all applications.



## Unimotor Dimensions

Ref	Description	75B	75C	75D	95A	95B	95C	95D	95E	115B	115C	115D	115E	142B	142C	142D
A	Length overall (unbraked)	241	271	301	222	252	282	312	342	272	302	332	362	255	285	315
A	Length overall (braked)	271	301	331	252	282	312	342	372	302	332	362	392	315	345	375
C	Flange Square	75	75	75	95	95	95	95	95	115	115	115	115	142	142	142
D	Flange Thickness	7	7	7	9	9	9	9	9	11	11	11	11	12.3	12.3	12.3
E	Register Diameter (ø6)	60	60	60	80	80	80	80	80	95	95	95	95	130	130	130
F	Register Length	2.4	2.4	2.4	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	3.4	3.4	3.4
H	Fixing Holes Diameter (H14)	5.8	5.8	5.8	7	7	7	7	7	10	10	10	10	12	12	12
J	Fixing Hole p.c.d	75	75	75	100	100	100	100	100	115	115	115	115	165	165	165
K	Overall Height	126	126	126	146	146	146	146	146	166	166	166	166	193	193	193
N	Shaft Length (front)	30	30	30	30	40	40	40	40	40	40	50	50	50	50	50
P	Shaft Diameter (front)	14	14	14	14	19	19	19	19	19	19	24	24	24	24	24