MMC 188/40

Four Axis Motion Control Module

For Modicon 984® Series Controllers

The MMC 188/40 motion control module is an intelligent linear motion control sub-system for use with the Modicon® 800 series I/O. The module provides a highly integrated solution to control the position of four servo axes. The MMC 188/40 senses position using magnetostrictive linear displacement transducers (Temposonics™) and controls the associated output based on programmable parameters. Drive outputs can be configured to work with hydraulic valves and servo drives.

Features

- Modicon 800 I/O compatible
- Four axes of independent or coordinated control
- Optically isolated inputs and outputs
- RS-232 diagnostic port for tuning parameters and graphic display of motion
- Direct connection to Magnetostrictive (Temposonics™) sensing devices
- Motion profiles can be changed on the fly
- Full PID loop control
- Two millisecond control loop
- Front panel status indicators

Applications

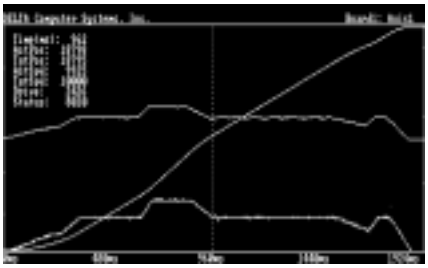
- Headrigs, carriages, and other Forest Industry machinery
- Hydraulic actuators
- Palletizers/Stackers
- Laser positioning
- Robotics
- Tube forging machines
- Pinch roller positioning

Magnetostrictive Inputs

- Resolution to 0.001 inches
- Direct connection to magnetostrictive transducers (Temposonics)
- 1,2 or 4 recirculations
- Positive or negative interrogation pulses
- Maximum speeds up to 240 inches per second (0.004" resolution)
- Transducer lengths up to 240 inches (0.004" resolution)

Diagnostic Program (requires PC or compatible)

- Provides graphic display of previous motion profile information



- Provides utilities to calculate motion parameters SCALE, OFFSET & DIRECTION
- Provides access to auto tuning function
- Allows user to activate simple motion profiles from a keyboard
- Permits user to change control parameters from a keyboard
- Displays parameter and status information for multiple axes
- Saves and retrieves graphic diagnostic information to and from disk
- Provides a mode to display previously saved diagnostic graphic information using a PC.

Hardware Information

RS-232 Diagnostic Port	Interface with Delta's DCSMON setup and diagnostic software	Requires external IBM PC or compatible. Uses standard Modicon RS-232 controller cable.
Magnetostrictive Interface	Interface Type	Start/Stop digital pulse
	Temposonics I and II	Direct connection
	Temposonics II & RPM module	One differential driver board per axis (AMP 10)
	Norstat	Direct connection
	Balluff	One differential driver board per axis with BTL-2-P
	T&R Electronics	One recirculation only (Consult Delta before using)
	Input Isolation	2500 VAC optically isolated
	Recirculations	Provided by module: 1, 2 or 4 (positive or negative pulse)
	Counters	27.75 MHz
	Position update rate	Two milliseconds
	Sensor protection	4.7 and 15 ohm resistors for sensor power
Drive Outputs	Output Isolation	2500 VAC optically isolated
	Current Mode	±25, ±50, ±100 milliamps
	Voltage Mode	±2.5, ±5, ±10 Volts
	Resolution	12 bit
OURBUS Interface	984 I/O Requirements	Traffic copped as a B886 using eight bi-directional registers in binary format. Requires 128 input and output points per module.
	984 Register Requirements	24 consecutive registers per axis plus optional motion profiles. Up to sixteen motion profiles can be specified. Each profile requires four registers. A total of 160 registers are required if all four axis and all sixteen profiles are used.
Power Requirements	OURBUS	+ 5 VDC @ 500 milliamps maximum
	External Magnetostrictive sensor	±15 VDC @ 500 mA, +5 VDC @ 500 mA
	External drive	±15 VDC @ 500 mA
Mechanical Specifications	Dimensions (WxHxD)	2.2 x 10.5 x 8.6 in (56 x 266 x 217 mm)
	Weight	2.4 lb. (1.1Kg)
	Connectors	
	Backplane	Direct plug-in to Modicon 800 series I/O rack
	Serial Port	DB-9S for diagnostic port
	Sensor	DB-25S for sensors
	Drive	DB-15S for drives
Environment	Operating Temperature	+32 to +140 F (0 to +60C)
	Non-Operating Temperature	-40 to +185 F (-40 to +85C), per IEC 68-2-14, Test Nb
	Storage Temperature	-40 to +185 F (-40 to +85C), per IEC 68-2-1/2, Test Nb
	Humidity	0 to 93% non-condensing, per IEC 68-2-3, Test Ca
	Shock Resistance	30 G for 11ms, per IEC 68-2-27, Test Ea
	Vibration Resistance	1 G at 3 to 500 Hz for 23 minutes per plane, 1 octave/minute in all three planes, per IEC 68-2-6, Test Fc
	ESD Immunity	8kV to all user accessible surfaces, per IEC 801-2, level tests
	Magnetic Immunity	Per IEC 801-3, Level 3
	Agency Compliance	UL and CSA listing pending

Programming Parameters

Axis Setup Parameters	Direction	Sign of position units with respect to Transducer Counts
	Scale	Measured position conversion number
	Offset	Fixed position offset
	Extend Limit	Maximum length allowed
	Retract Limit	Minimum length allowed
	Static Gain	Proportional gain at rest
	Extend Gain	Proportional gain when extending
	Retract Gain	Proportional gain when retracting
	Extend Feed Forward	Feed forward drive when extending
	Retract Feed Forward	Feed forward drive when retracting
	Feed Forward Advance	Time shift in milliseconds for Feed Forward term
	Hysteresis	Drive deadband
	Dither	Static friction drive in percent of full drive
	Differential Gain	Differential gain while in motion
	Integral Gain	Integral gain while in motion
	Null Update	Null calculation interval in milliseconds
	New Null	Preset drive offset value
	Maximum Position Error	Set point for position error indication
	Halt Mask	Disable for ramped stop on errors
	Emergency Stop Mask	Disable for quick stop on errors
	Primary Set Complete	Position set point for status bit
	Secondary Set Complete	Secondary position set point for status bit
Axis Dynamic Control Parameters	Mode	Function selection bits Bit 01-10, 13, 14 and 15 not used Bit 11 Synchronization bit B (Axis 3 & 4) Bit 12 Synchronization bit A (Axis 1 - 4) Bit 16 Acceleration as ramp length or ramp rate
	Acceleration	Acceleration rate or distance
	Deceleration	Deceleration rate or distance
	Maximum Speed	Maximum speed during a move
	Requested Position	Destination position in position units
	Command	Command to be executed (F,G,H,P,R,S) F Auto adjustment of Feed Forward G Move axis H Halt axis P Initialize axis setup parameters R Restore previously saved drive null S Save current drive null
Axis Status Information (Read only)	Actual Position	Measured position based on current Transducer Counts that have been Scaled, Offset and changed by Direction
	Status Word	Axis error and status Bit 01 - Parameters initialized Bit 02 - Lag error Bit 03 - Lead error Bit 04 - Overdrive error Bit 05 - Valve out of null Bit 06 - Transducer not responding Bit 07 - Position overflow Bit 08 - Parameter error Bit 09 - Command acknowledge Bit 10 - Stopped Bit 11 - Decelerating Bit 12 - At maximum speed Bit 13 - Accelerating Bit 14 - Halted Bit 15 - Secondary set complete Bit 16 - Primary set complete
	Command Position	Requested Position with limits checked
	Target Position	Calculated position of axis
	Transducer Counts	Raw transducer counts
	Target Speed	Calculated speed
	Drive	Output drive in raw A/D counts (12 bit)

Wiring Information

DB-15P to pigtail cable (6 feet) for Drive outputs. Cable uses Alpha 1181/15 or equiv.

Pin	Function	Wire Color
1	+15 input	RED
2	Power Supply Common	BLACK
3	-15 input	WHITE
4	Common	GREEN
5	Drive Out 1	ORANGE
6	Common	BLUE
7	Common	BROWN
8	Drive Out 2	YELLOW
9	Common	RED/BLACK
10	Drive Out 4	RED/YELLOW
11	Common	RED/GREEN
12	Common	TAN
13	Drive Out 3	PINK
14	Common	GRAY
15	Common	VIOLET

DB-25P to pigtail cable (6 feet) for magnetostrictive sensor inputs . Cable uses Alpha 1181/25 or equiv.

Pin	Function	Wire Color
1	+15 input	RED
2	Power supply common	BLACK
3	-15 input	WHITE
4	+5 input	GREEN
5	+12 output	ORANGE
6	Common	GRAY
7	Interrogation pulse 1	BROWN
8	+15v axis 1	PINK
9	Return pulse 1	YELLOW
10	-15v axis 1	VIOLET
11	Common	TAN
12	Interrogation pulse 2	BLUE
13	+15v axis 2	RED/BLACK
14	Return pulse 2	RED/YELLOW
15	-15v axis 2	RED/GREEN
16	Common	WHITE/BLACK
17	Interrogation pulse 3	WHITE/BLUE
18	+15v axis 3	WHITE/RED
19	Return pulse 3	WHITE/YELLOW
20	-15v axis 3	WHITE/GREEN
21	Common	WHITE/GRAY
22	Interrogation pulse 4	WHITE/BROWN
23	+15v axis 4	WHITE/ORANGE
24	Return pulse 4	WHITE/BLACK/RED
25	-15v axis 4	WHITE/VIOLET

Ordering Information

Part Number: MMC 188/40 - Provided with each MMC 188/40: Reference manual, DB15P and DB25P 6' pigtail cable, DCSMON software and manual, Example ladder program, and Custom loadable FN10 software package

Contact: Herb (Joh) Johanson at 206-254-8688

Options and Accessories

Part Number	Description
SSS/10	1 axis Servo System Simulator
AMP 10	1 axis RS 422 converter(two required)
MCCBS	6 ft cable set (DB-15P and DB-25P with pigtails)
MCCBS-01	6 ft DB-15P cable with pigtails
MCCBS-02	6 ft DB-25P cable with pigtails

Company Profile

Delta Computer Systems, Inc. manufactures motion controllers and other industrial controls providing high performance automation solutions to a wide range of industries.

The following are registered trademarks of Modicon, Inc.: Modicon, ModConnect and 984

Temposonics is a trademark of MTS Systems, Inc.

Printed in USA 8/25/92