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MMC 188/41

Four Axis Linear Motion and Pressure Controller

With Analog and Dedicated Discrete I/O

The MMC 188/41 is a high performance motion control module compatible with the Modicon® 800 series I/O with analog and magnetostrictive transducer feedback plus digital I/O. Each axis is independently programmed to operate in position and/or pressure control modes. The analog inputs may be used either for analog position transducers or for pressure signals. Drive outputs can be configured to work with hydraulic valves and servo drives.

Features

- Modicon 800 I/O compatible
- Analog and magnetostrictive inputs in a single module
- Four axes of independent or coordinated control
- Isolated inputs and outputs
- Pressure override and control
- Digital inputs and outputs
- Pressure profiling and plotting
- RS-232 diagnostic port for tuning parameters and graphic display of motion
- Direct connection to Magnetostrictive Transducers.
- Motion and pressure profiles can be changed on the fly
- Full PID loop control
- Two millisecond control loop
- EEPROM parameter memory

Applications

- Particle board / hard board
- Pinch roller positioning
- Transfer/injection molding
- Investment casting
- End doggers / clamping
- Hydraulic actuators
- Palletizers/Stackers
- Laser positioning
- Robotics
- Tube forging machines

Analog Inputs

- Input range configurable for: 4-20 mA, 0-5 V, 0-10 V, ±5 V, and ±10 V
- 2500 Vdc isolation
- 12 bit resolution

Magnetostrictive Inputs

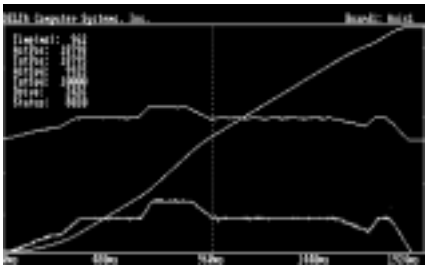
- Resolution to 0.001 inches
- Direct connection to magnetostrictive transducers
- 1,2 or 4 recirculations
- Positive or negative interrogation pulses
- Maximum speeds up to 240 inches per second (0.004" resolution)
- Transducer lengths up to 240 inches (0.004" resolution)

Digital I/O

- 4 inputs & 4 outputs
- 2500 Vdc isolation
- 2 millisecond response
- Direct control of motion commands

DCSMON Diagnostics Program

- Provides graphic display of latest motion profile pressure and position information.



- Calculates SCALE, OFFSET & DIRECTION parameters.
- Provides access to auto tuning function.
- Allows activation of simple motion profiles from a PC.
- 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.
- Programs immediate I/O response.

Delta Computer Systems, Inc., 11719 NE 95th St., Suite D, Vancouver, WA 98682 (360) 254-8688

MMC 188/41

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.
Analog Inputs	Resolution	12 bits
	Input range*	4-20 mA 0-5 V 0-10 V ±5 V ±10 V
		*The range on each channel is independently selected. All axes must be unipolar or bipolar.
	Input isolation	2500 Vdc
	Input impedance	660 kΩ differential 330 kΩ common mode
		2 ms pressure loop
Magnetostrictive Interface	Interface type	Start/Stop digital pulse
	Temposonics™ I and II	Direct connection
	Temposonics II with RPM module	One differential driver board per axis (AMP 10)
	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 bits
Digital I/O	Isolation	2500 VDC optically isolated
	Inputs	5 Volts @ 5 milliamps
	Outputs	5 Volts, 50 milliamps
OURBUS Interface	984 I/O requirements	Traffic copped as a B887 using twelve bi-directional registers in binary format. Requires 192 input and output points per module.
	984 register requirements (Not required with EEPROM option)	34 consecutive registers per axis plus optional motion profiles. Up to sixteen motion profiles can be specified. Each profile requires four registers. A total of 200 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 and +5 VDC @ 100 mA
	External drive	±15 VDC @ 500 mA
	Analog and digital I/O	+24 to +30 VDC ±10% @ 250 mA
Mechanical Specifications	Dimensions (WxHxD)	2.2 x 10.5 x 8.6 in (56 x 266 x 217 mm)
	Weight	2.9 lb. (1.3Kg)
	Connectors	
	Backplane	Direct plug-in to Modicon 800 series I/O rack
	Serial port	DB-9S for RS-232 diagnostic port
	Sensor	DB-25S for sensors
	Drive	DB-15S for drives
	Analog	DB-25P for analog and digital inputs
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
	Pressure Scale	Scale for conversion from analog value to pressure
	Pressure Offset	Offset pressure value from zero
	Pressure Gain	Proportional gain for pressure control
	Pressure Differentiator	Differential gain while in pressure mode
	Pressure Integrator	Integral gain while in pressure mode
	Pressure Low	Minimum pressure set-point
	Pressure Ramp	Change in pressure with respect to time
	Pressure Command	Desired pressure to maintain
Axis Dynamic Control Parameters	Mode	Function selection bits Bit 01-9, 13, 14 and 15 not used Bit 10 Enable pressure mode 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, O, P, R, S) F (70) Auto adjustment of Feed Forward G (71) Move axis H (72) Halt axis O (79) Open loop output P (80) Initialize axis setup parameters R (82) Restore previously saved drive null S (83) Save current drive null Y (89) Retrieve plot information ^ (94) Change command pressure
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
	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)
	Target Speed	Calculated speed
	Null drive	Current value for null drive
	Pressure Actual	Scaled pressure value
	Pressure Counts	Digital value from analog-to-digital converter

MMC 188/41

Wiring Information

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

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

DB-25S to DB-25S cable (10 feet) for analog and digital inputs . Cable uses Belden 9992 or equivalent.

Pin	Function	Wire Color
1	+ Analog input 1	Pair 6 BROWN
14	- Analog input 1	Pair 6 BLACK
2	Analog input 1 cmn.	Pair 6 Shield
15	Analog input 2 cmn.	Pair 4 Shield
3	+ Analog input 2	Pair 4 BLUE
16	- Analog input 2	Pair 4 BLACK
4	+ Analog input 3	Pair 7 ORANGE
17	- Analog input 3	Pair 7 BLACK
5	Analog input 3 cmn.	Pair 7 Shield
18	Analog input 4 cmn.	Pair 5 Shield
6	+ Analog input 4	Pair 5 YELLOW
19	- Analog input 4	Pair 5 BLACK
7	No connection	
20	- Power supply	Pair 1 BLACK *
8	+ Power supply	Pair 1 RED *
21	Digital input cmn.	Pairs 2 & 3 Shields
9	Digital input 16	Pair 2 WHITE
22	Digital input 15	Pair 2 BLACK
10	Digital input 14	Pair 3 GREEN
23	Digital input 13	Pair 3 BLACK
11	Digital output 16	Pair 8 WHITE
24	Digital output 15	Pair 8 RED
12	Digital output 14	Pair 9 GREEN
25	Digital output 13	Pair 9 RED
13	Digital output cmn.	Pairs 8 & 9 Shields

* Pair 1 Shield connected to shell on both end of cable.

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

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

Ordering Information

Part Number: MMC 188/41 - Provided with each MMC 188/40: Reference manual, DB15P and DB25P 6' pigtail cable, DB25S 10' cable, DCSMON software and manual, Example ladder program, and Custom loadable FN10 software package

Options and Accessories

Part Number	Description
MMC 188/40	4 axis motion control module
MMC 188/40E	Motion control module with EEPROM
MMC 188/41E	Motion and pressure controller with EEPROM
AT41	DB25 to Terminal Block interface board
SSS/10	1 axis Servo System Simulator
AMP 10	1 axis RS 422 converter
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
MCCBS-05	10 ft DB-25S to DB-25S cable

Company Profile

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

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