

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

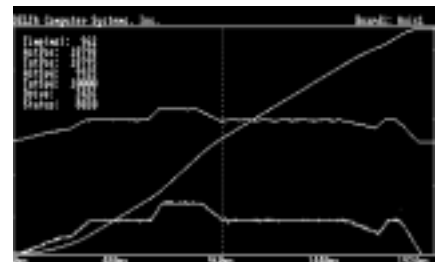
- Resolution to 0.001 inches
- Direct connection to magnetostrictive transducers
- 1,2 or 4 recirculations
- Positive or negative interrogation pulses
- Maximum speeds up to 240 inches per second (0.004" resolution)
- Transducer lengths up to 240 inches (0.004" resolution)

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.



Hardware Information

| | | |
|----------------------------|---|--|
| RS-232 Diagnostic Port | Interface with Delta's DCSSMON setup and diagnostic software | Requires external IBM PC or compatible. Uses standard Modicon RS-232 controller cable. |
| Analog Inputs | Resolution Input range* Input isolation Input impedance | 12 bits 4-20 mA 0-5 V 0-10 V ±5 V ±10 V 2500 Vdc 660 kΩ differential 330 kΩ common mode 2 ms pressure loop |
| | | *The range on each channel is independently selected. All axes must be unipolar or bipolar. |
| Magnetostrictive Interface | Interface type Temposonics™ I and II Temposonics II with RPM module Balluff T&R Electronics Input isolation Recirculations Counters Position update rate Sensor protection | Start/Stop digital pulse Direct connection One differential driver board per axis (AMP 10) One differential driver board per axis with BTL-2-P One recirculation only (Consult Delta before using) 2500 VAC optically isolated Provided by module: 1, 2 or 4 (positive or negative pulse) 27.75 MHz Two milliseconds 4.7 and 15 ohm resistors for sensor power |
| Drive Outputs | Output isolation Current mode Voltage mode Resolution | 2500 VAC optically isolated ±25, ±50, ±100 milliamps ±2.5, ±5, ±10 Volts 12 bits |
| Digital I/O | Isolation Inputs Outputs | 2500 VDC optically isolated 5 Volts @ 5 milliamps 5 Volts, 50 milliamps |
| OURBUS Interface | 984 I/O requirements 984 register requirements (Not required with EEPROM option) | Traffic copped as a B887 using twelve bi-directional registers in binary format. Requires 192 input and output points per module. 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 External magnetostrictive sensor External drive Analog and digital I/O | + 5 VDC @ 500 milliamps maximum ±15 VDC @ 500 mA and +5 VDC @ 100 mA ±15 VDC @ 500 mA +24 to +30 VDC ±10% @ 250 mA |
| Mechanical Specifications | Dimensions (WxHxD) Weight Connectors Backplane Serial port Sensor Drive Analog | 2.2 x 10.5 x 8.6 in (56 x 266 x 217 mm) 2.9 lb. (1.3Kg) Direct plug-in to Modicon 800 series I/O rack DB-9S for RS-232 diagnostic port DB-25S for sensors DB-15S for drives DB-25P for analog and digital inputs |
| Environment | Operating temperature Non-operating temperature Storage temperature Humidity Shock resistance Vibration resistance ESD immunity Magnetic immunity Agency compliance | +32 to +140 F (0 to +60C) -40 to +185 F (-40 to +85C), per IEC 68-2-14, test Nb -40 to +185 F (-40 to +85C), per IEC 68-2-1/2, test Nb 0 to 93% non-condensing, per IEC 68-2-3, test Ca 30 G for 11ms, per IEC 68-2-27, Test Ea. 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 8kV to all user accessible surfaces, per IEC 801-2, level tests Per IEC 801-3, Level 3 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 | | |



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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