

# MMC120

## Two Axis Linear Motion Control Module

The MMC120 is a high performance motion control module compatible with the Modicon® TSX Quantum Automation Series™ Programmable Controllers. The module provides an effective way to control the position of two axes. The MMC120 senses position using magnetostrictive displacement transducers and controls the associated output based on programmable parameters.

### Features

- ModConnect® Certified
- Quantum compatible
- Two axes of control
- Isolated inputs and outputs
- RS-232 diagnostic port for tuning parameters and graphic display of motion
- Direct connection to Magnetostrictive Transducers and proportional/servo valves
- Motion profiles can be changed on the fly
- Full PID loop control
- Velocity and Acceleration Feed-Forward terms
- One millisecond control loop
- FLASH memory for parameter storage

### Applications

- Forest Industry machinery
- Pinch roller positioning
- Hydraulic actuators
- Palletizers/Stackers
- Laser positioning
- Tube forging machines

### Magnetostrictive Inputs

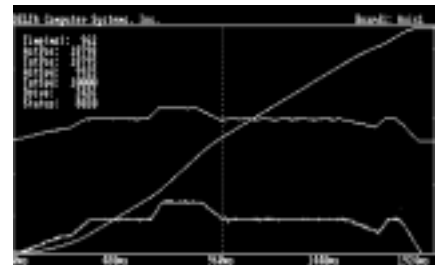
- Resolution to 0.001 inches
- Direct connection to Start/Stop and Gated magnetostrictive transducers
- 1 circulation at 120 MHz
- Differential line receiver or single-ended inputs
- Maximum speeds up to 200 inches per second (0.004" resolution)
- Transducer lengths up to 240 inches (0.004" resolution)
- 2500 VAC isolation

### Drive Outputs

- ±10 volts
- 1 millisecond update
- 2500 VAC isolation
- Current output available with optional VC2100 module

### Tuning/Diagnostics Program

- DCS120 provides a graphic display of latest motion profile position and drive information



- Calculates Scale & Offset 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 both axes
- Saves and retrieves graphic diagnostic information

### Event Control

- Designed for time-critical applications
- Repeatable 1 millisecond execution of motion commands
- Provides easy, spreadsheet-style programming
- Responds to time delays, status bit conditions, or positions
- 256 event steps

## Hardware Information

<b>RS-232 Diagnostic Port</b>	Interface with Delta's DCS120 setup and diagnostic software	Requires external IBM PC or compatible. Uses standard Modicon RS-232 controller cable.
<b>Magnetostrictive Interface</b>	Interface type	Start/Stop digital pulses or Gated Differential or single-ended
	Input isolation	2500 VAC optical isolation
	Recirculations	1 (provides resolution of 0.001 inch)
	Counters	120 MHz count rate
	Position update time	One millisecond
<b>Drive Outputs</b>	Type	±10 volts (VC2100 current option available)
	Resolution	12 bits
	Output isolation	2500 VAC optical isolation
<b>Quantum Bus Interface</b>	Quantum I/O requirements	I/O mapped as an <b>MMC 120 0X</b> using four input and four output registers in binary format. Requires 64 input and 64 output points per module.
	Register requirements	16 consecutive registers per axis plus optional motion profiles. Up to eight motion profiles can be specified. Each profile requires four registers. A total of 64 registers are required if both axes and all eight profiles are used.
<b>Power Requirements</b>	Backplane	+ 5 VDC @ 1 A maximum
<b>Mechanical Specifications</b>	Dimensions (WxHxD)	1.59 x 9.84 x 4.09 in (40.34 x 250 x 103.85 mm)
	Weight	1 lb. (0.5 kg) max
	Connectors:	
	Backplane	Direct plug-in to Quantum rack
	Serial port	DB-9S for RS-232 diagnostic port
	Sensor	9 position plug-in terminal block
	Drive	3 position plug-in terminal block
<b>Environment</b>	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 11 ms, 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	8 kV to all user-accessible surfaces, per IEC 801-2 level tests
	Magnetic immunity	Per IEC 801-3, Level 3
	Agency compliance	UL, CSA, CE

## Programming Parameters

### Axis Setup Parameters

Configuration	Module operating configuration
Scale	Measured position conversion number
Offset	Fixed position offset
Extend Limit	Maximum position allowed
Retract Limit	Minimum position allowed
Proportional Gain	Proportional gain for PID loop
Integral Gain	Integral gain for PID loop
Differential Gain	Differential gain for PID loop
Extend Vel. Feed Forward	Velocity Feed Forward for extend direction
Retract Vel. Feed Forward	Velocity Feed Forward for retract direction
Extend Accel. Feed Fwd	Acceleration Feed Forward for extend direction
Retract Accel. Feed Fwd	Acceleration Feed Forward for retract direction
Dead Band Eliminator	Valve dead band compensation
In Position	Position set point for status bit
Following Error	Window for following error indication
Automatic Stop Enable	Enable for stop on errors

### Axis Dynamic Control Parameters

Mode	Function selection bits Bit 01: Graph disable Bits 02-09: Not used Bit 10: Sync Bit 11: Quick Mode Bit 12: Unwind Integrator Bits 13 and 14: Integrator mode Bits 15 and 16: Acceleration mode
Acceleration	Acceleration rate, distance, or time
Deceleration	Deceleration rate, distance, or time
Speed	Maximum speed during a move
Command Value	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 (Refer to manual for additional commands)

### Axis Status Information (Read only)

Command Position	Requested position with limits checked
Target Position	Calculated desired position of axis
Actual Position	Measured position based on current Transducer Counts that have been Scaled and Offset
Transducer Counts	Raw transducer counts
Status Word	Axis errors and status
Actual Speed	Calculated speed
Drive	Output drive in millivolts
Null Drive	Current value for null drive

# MMC120

---

## Wiring Information

Magnetostrictive Displacement Transducer:

Pin	Function
1	Axis 1 + Interrogation
2	Axis 1 - Interrogation
3	Axis 1 + Return
4	Axis 1 - Return
5	Transducer Common
6	Axis 2 + Interrogation
7	Axis 2 - Interrogation
8	Axis 2 + Return
9	Axis 2 - Return

Drive Outputs:

Pin	Function
1	Axis 1 Drive
2	Drive Common
3	Axis 2 Drive

Serial Port:

Pin	Function
2	Receive
3	Transmit
5	Common
Shell	Shield

---

## Ordering Information

Part Number: MMC 120 00 - Provided with each MMC120: manual, plug-in terminal blocks, DCS120 tuning/diagnostic program, and example ladder program.

---

## Options and Accessories

Part Number	Description
VC2100	Voltage to current converter
PPS/14	Position/Pressure Simulator
SSS/10	Servo System Simulator
AMP/10	1 axis RS-422 converter

---

## Company Profile

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