Dual axis stepper/HSC module

MC | M3-40C

2 axis stepper controller and high-speed counter
5V step/dir interface

- *Step rates up to 4 MHz*
- *Advanced floating point position loop*
- *Encoder rate 17.5 MHz*
- *< 1 µsec registration response*
- *High-speed, on-board motion processor*
- *Closed-loop stepper control*
- *Optically and electrically isolated*
- *16 inputs configurable as 10 MHz counters*
- *6 position-based outputs*

General specifications

Number of axes	2
Axis type	Stepper
Command type	Step/direction
Digital inputs	10
Digital outputs	10
Encoder inputs	2(A, B, Z)
Counter inputs	16 @ 10 MHz
Connection	Removable terminal block
Connection type	Tension clamp
Terminal block part number	069-622210
Terminal wire size (UL 1059)	18 - 22 AWG
Test point	All connections
Status indicator	One LED per channel
Module size	1 rack slot (0.75"/19 mm)
Bus power required (5 VDC)	0.26 mA
Isolation rating	500 VDC
Operating temperature	
Horizontal installation	0 - 50°C
Vertical installation	0 - 35°C
Storage temperature	-25 – 85°C
Humidity	5 – 95% non-condensing

Actual size

Minimum hardware revision	A
Minimum firmware revision	1.02
Minimum operating system revision	5.00.90
Documentation number: 950-534003-002	

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Performance specifications

Parameter	Value
Position range	64-bit
Position resolution	±1 step
Velocity range	±4M steps/sec
Velocity resolution	±1 step/sec
Position loop update	500 µsec/2 axes
Command resolution	1 step
Closed loop feature	Encoder
Encoder feedback type	5 V - differential quadrature
Max encoder rate	17.5 MHz

Electrical specifications

Parameter	Value
Max encoder input voltage	6 VDC
Encoder Turn ON/OFF threshold	±200mV
Encoder termination resistor	100Ω (10%)
Registration input type	VDC sourcing
Registration response	<1 µsec
Registration Turn ON threshold	0.53 * VS
Registration Turn OFF threshold	0.32 * VS
Max registration voltage	VS
Max ON registration current	2.6 mA DC
Registration input resistance to VDC RTN	10 KΩ (10%)
Output current:	
per channel	±0.5 A
per module	±3 A
per controller	±8 A
Output voltage:[4]	
V_{OL} (sinking) @100 mA	0.4 VDC
V_{OL} (sinking) @ 0.5 A	2 VDC
V_{OH} (sourcing) @ 100 mA	VS – 0.4 VDC
V_{OH} (sourcing) @ 0.5 A	VS – 2 VDC

Additional features

Parameter	Value
Per module motion I/O	
Inputs:	
Assignable[1]	10
Registration[2]	4
Capture speed	< .25 µsec
Outputs:	
Assignable[3]	10
Move types:	Linear, Cam, Spline, Gear, Segmented moves

Application notes

1. *General purpose inputs and outputs can be assigned special functions such as limits, enable, running, etc. or used programmatically. They can also be configured as high-speed (10 MHz) counters. See Doc. No. 951-530017: QuickMotion Reference Guide for details.*
2. *Any two inputs can be configured as high-speed registration inputs (response time < 0.25 µsec).*
3. *Three pairs of digital outputs can be used for stepper drive control or used as standard outputs.*
4. *VS for Step/Dir A, B outputs is 5V.*

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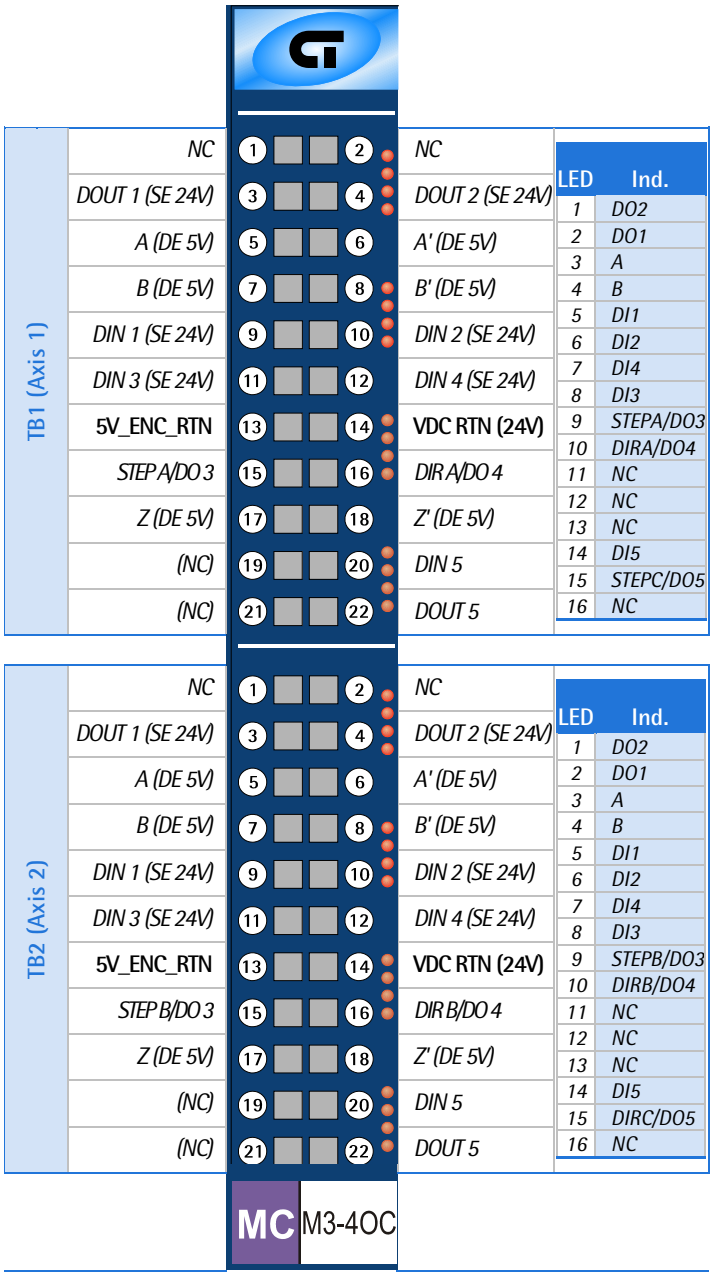
Terminal block connections



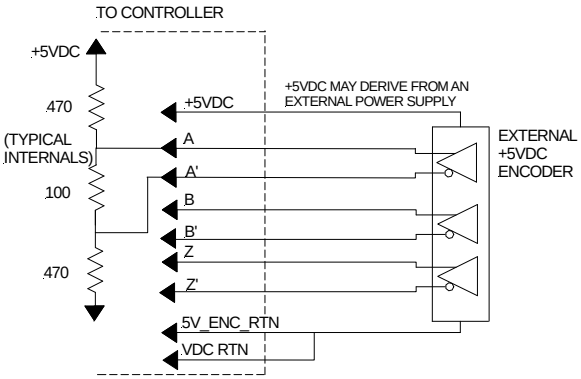
1. *Step A/B and Dir A/B connections are single-ended 5V.*

Special I/O Functions

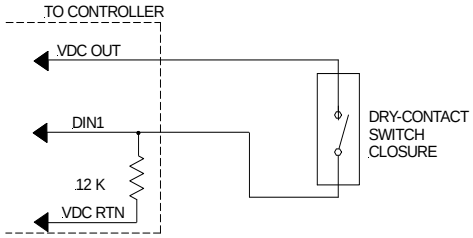
- **16 HS Counters (10 MHz):** *All five inputs as well as the A, B, and Z signal pins on each axis connector can be configured as high-speed counters.*
- **Period Measurement (0.1 µsec accuracy):** *Two pairs of inputs on each axis can be set up to measure the time between activation of the first and second input in the pair. Ideal for high-speed measurement and frequency measurement.*
- **Frequency Outputs:** *Three outputs on each axis can generate a programmable frequency up to 500 KHz.*
- **Pulse Outputs:** *All ten outputs can be pulsed for a programmable time value with an accuracy of 0.5 msec.*
- **Programmable Limit Switch Outputs:** *Three outputs on each axis can be configured to automatically turn on and off as a function of the encoder position. Up to sixteen on/off positions can be configured per axis. The on/off positions can be changed programmatically on-the-fly. This is especially useful to compensate for lead or lag time based on operating speed.*

Application Information

Differential Encoder/Counter Application

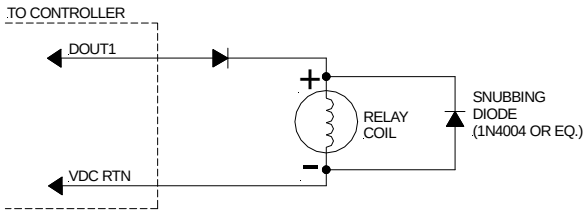


All Single-ended Inputs Application



Digital Outputs & Stepper Command

Sourcing



Notes

1. *If an output is used to drive transistor loads, proper current limiting must be observed.*
2. *When a digital device is powered via an external power source, it may be necessary to tie the ground of this power source to the controller's voltage supply return (VDC RTN)*
3. *For register and programming information, refer to the appropriate controller Applications Guide.*
4. *The information and illustrations contained herein are the property of Control Technology Corporation and are subject to change without notice. Data based on VS = 24 VDC @ 25°C unless otherwise noted. For additional information and/or updates, visit www.ctc-control.com.*
5. *VS refers to the voltage supply of the controller.*
6. *For single-ended counter or encoder input signals, tie A', B', and Z' to 5V_ENC_RTN.*