

Galil Motion Control



DMC – 3x01x

Datasheet

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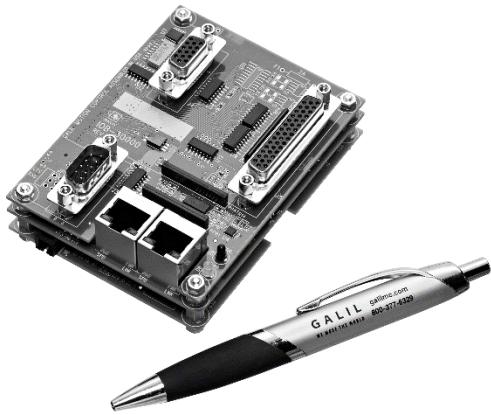
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Product Description

The DMC-3x01x Pocket Motion Controller Series is Galil's latest generation single-axis motion controller. It uses a 32-bit RISC processor to provide higher speed than older models. The DMC-3x01x is available as a compact card-level or box-level unit and connects to a stepper or servo motor amplifier of any power range. Alternatively, the DMC-3x01x can be purchased with an internal 800-Watt brushless sine drive or stepper drive which minimizes space, cost and wiring. The DMC-3x01x operates stand-alone or can be networked to a PC via Ethernet.

Features include PID compensation with velocity and acceleration feedforward, program memory with multitasking for concurrent execution of four programs, and uncommitted optically isolated inputs and outputs for synchronizing motion with external events. Modes of motion include point-to-point positioning, jogging, contouring, PVT, electronic gearing and electronic cam.

Like all Galil motion Controllers, these controllers use a simple, English-like command language which makes them very easy to program. Galil's software further simplifies system set-up with "one button" servo tuning and real-time display of position and velocity information.



Features

- Single-axis motion controller with optional servo or stepper motor drive in compact enclosure:
 - DMC-3x012 —Brushed/brushless sine drive; 10 A cont., 15 A peak, 20-80 V_{DC}
 - DMC-3x014 —Brushed/brushless linear drive; 1 A cont., 2 A peak, 15-40 V_{DC}
 - DMC-3x016 —Stepper drive; 1.4 A/phase, 12-30 V_{DC}
 - DMC-3x017 —Microstep drive; 6 A/phase, 20-80 V_{DC}
- Also available as card-level or box-level unit which can connect to external stepper or servo amplifier of any power range
- Two daisy-chainable Ethernet 100 Base-T ports:
 - One 115kbaud RS232 port
- Ethernet supports multiple masters and slaves. TCP/IP, UDP and Modbus TCP master and slave protocol for communication with I/O devices
- Encoder feedback up to 15 MHz. Quadrature standard; SSI, BiSS, sine/cosine, and sinusoidal encoder options. Main and auxiliary encoder inputs
- PID compensation with velocity and acceleration feedforward, integration limits, notch filter and low-pass filter
- Modes of motion include jogging, point-to-point positioning, contouring, PVT, electronic gearing and electronic cam
- Over 200 English-like commands including conditional statements and event triggers
- Non-volatile memory for programs, variables and arrays. Concurrent execution of up to four programs
- Optically isolated forward and reverse limit inputs and homing input
- 8 uncommitted, isolated digital inputs and 4 digital isolated outputs
- High speed position latch and output compare (pulse on position)
- 2 uncommitted analog inputs and 1 analog output
 - 16-bit analog input option available (DMC-3101x)
- Controller available with optional dc-to-dc converter for 20–80 V_{DC} input
- Dimensions:
 - DMC-3x010/DMC-3x011-CARD: 3.0"×4.0"
 - DMC-3x010/DMC-3x011-BOX: 3.9"×4.2"×1.4"
 - DMC-3x012/3x014/3x016/3x017-BOX: 3.9"×5.0"×1.5"
- Custom hardware and firmware options available

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Motion Controller	
Processor	RISC-Based with DSP functions
Communication	Two Ethernet 10/100 Base-T Ports - RS232 port up to 115 kbaud Commands are sent in ASCII. Daisy-chain Ethernet (no external hub required).
Program memory size	1000 lines x 80 characters
# of Variables	254
# of Arrays	3000 array elements in up to 6 arrays
Position Range	32-bit, automatic rollover
Maximum Velocity	15 million counts/s
Maximum Acceleration	67 million counts/s ²

Environmental	
Operational temperature	0 – 70 deg C
Humidity	20 – 95 % RH, non-condensing

Configurable Filter Features
Proportional
Torque limit
Backlash compensation
Integral
Offset
Profile filtering
Derivative
Feed-forward acceleration
Low-pass filter (Pole)
Notch
Dual-loop feedback mode
Feed-forward velocity

Modes of Motion	
Position Relative & Position Absolute	Absolute and relative positioning following a trapezoidal velocity profile. Phase correction and profile smoothing available.
Jogging	Velocity control where no final endpoint is prescribed.
Vector Mode	2D motion path consisting of linear and arc segments. Motion along the path is continuous at the prescribed vector speed even at transitions between linear and circular segments.
Linear Interpolation	Coordinated linear profiling.
Gearing & Gantry Mode	Electronic gearing and gantry mode with ramped gearing.
Electronic camming (ECAM)	Following an arbitrary trajectory based upon a master encoder position.
Contour	Allows any arbitrary profile and any set of axes to be prescribed.
PVT	Motion path described in incremental position, velocity, and change of time.



General Purpose I/O			
I/O	Quantity	Voltage	Details
Opto-isolated inputs	8	5-24 V _{DC}	Can be configured for use as high-speed latch (position capture).
Opto-isolated outputs	4	5-24 V _{DC} , 12-24 V _{DC} optional	4mA Sinking default (25mA Sourcing or Sourcing options available) (500mA Sinking or Sourcing options available). Can be configured as brake output.
Analog Inputs	2	0-5 V _{DC}	12-bit, 16-bit optional, can be used as position feedback
Analog Outputs	1	± 10 V _{DC}	Used as motor command line for DMC-3x010 and DMC-3x011

Power and Mechanical				
Controller	Supply Voltage	Amplifier/Motor Type	Current Spec	Dimensions
DMC-3x010	5 V _{DC} , ± 12 V _{DC}	N/A	N/A	CARD: 3.0" x4.0" BOX: 3.9" x4.2" x1.5"
DMC-3x011	9-48 V _{DC}			
DMC-3x012	20-80 V _{DC}	PWM; Brushed or Brushless Servos	10 A continuous, 15 A peak	BOX: 3.9" x5.0" x1.5"
DMC-3x014	15-40 V _{DC}	Linear; Brushless Servos	1 A continuous, 2 A peak	
DMC-3x016	12-30 V _{DC}	Stepper; Two-Phase Steppers	1.4 A/phase	
DMC-3x017	20-80 V _{DC}	Micro-Stepper or PWM; 2-Phase Steppers, 3-Phase Brushless or 2-Phase Brushless	2-Stepper: 6 A/phase 3-Phase & 2-Phase Brushless: 10 A continuous, 15 A peak	

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Feature Specific I/O Local Axes			
I/O	Quantity	Description	Details
Reverse/Forward Limit Switches	2	5-24 V _{DC} opto-isolated	
Home Input	1	5-24 V _{DC} , opto-isolated	
Amplifier Enable Output	1	+5, +12V _{DC} controller powered	opto-isolated amp enable depends on out option
Stepper (Step/Dir signals)	1	0-5 V _{DC} Step/Dir TTL Signal	3 MHz max output
Servo control (Motor command line)	1	±10 V _{DC} analog output	16-bit resolution
Quadrature Encoder Inputs	2	+/-12 V _{DC} or TTL	15 MHz input max
Hall inputs	1	3x 0-5 V _{DC} TTL inputs	
Abort	1	5-24 V _{DC} opto-isolated	
Reset	1	5-24 V _{DC} opto-isolated	
Electronic lock-out	1	5-24 V _{DC} opto-isolated	
Output compare	1	0-5 V _{DC} TTL	Also known as pulse on position
Error out	1	0-5 V _{DC} TTL	

Ordering Options

The DMC-3x01x is internally composed of up to three different boards: the I/O board which also acts as a break-out board, the DMC controller board, and the optional internal amplifier (AMP/SDM). Figure 1 below shows how the internal DMC-3x01x is laid out.

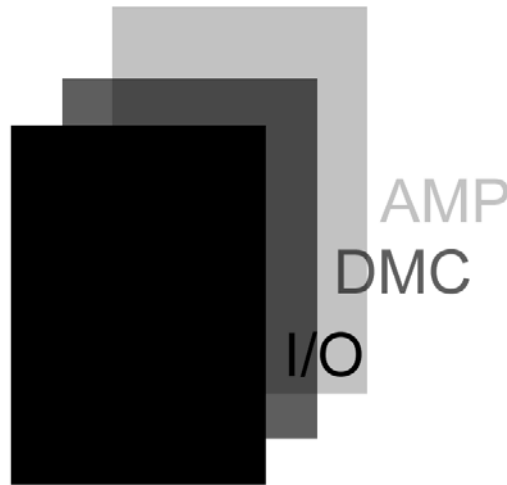


Figure 1: Abstract internal layout of the DMC-3x01x PCBs

The DMC-3x01x part number modifies each of these boards. As shown in Figure 2 the first “X” (DMC-3X01x) modifies which I/O board is used, while the last “X”, (DMC-3x01X) modifies either the optional amplifier board and/or how the unit is powered. In addition, the user also can specify whether the DMC-3x01x comes in a card or box form factor by specifying either “-CARD” or “-BOX” in the “-XXXX” place holder. Lastly, the DMC-3x01x has several additional configuration options that can be added to the “Y” place holder. Note, several Y options can be added by placing a comma between options. Only the DMC-3x010 and DMC-3x011 are available as card level controllers.

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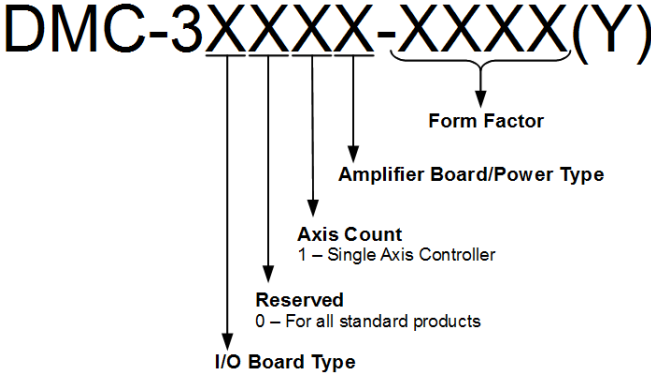
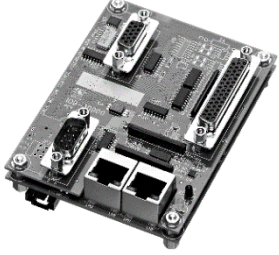


Figure 2: DMC-3x01x Part Number Layout

I/O Board Options	
DMC-3X01x, where X is	Description
0	Default Option
1	Adds ±10 V _{DC} configurable 16-bit analog inputs and Sin/Cos feedback

Amplifier Board/Power Type Options	
DMC-3x01X, where X is	Description
0	Amplifier: None Power: 5, ±12 V _{DC}
1	Amplifier: None Power: 9-48 V _{DC} Default
2	Amplifier: 800W sine drive Power: 20-80 V _{DC}
4	Amplifier: 20W Linear sine drive Power: 20-80 V _{DC}
6	Amplifier: 1.A stepper drive Power: 12-30 V _{DC}
7	Amplifier: Servo and stepper drive Power: 20-80 V _{DC}

Form Factor Options		
DMC-3x01x-XXXX, where -XXXX is	Image	Dimensions
-CARD		3.0" x4.0"
-BOX		3.9" x5.0" x1.5"

Additional Options	
DMC-3x01x(Y), where Y is	Description
LSNK	25mA Sinking outputs
LSRC	25mA sourcing outputs
HSRC	500mA sourcing outputs
HSNK	500mA sinking outputs
4-20mA	4-20mA analog inputs
TRES	Encoder Input Termination Resistors
SR90	Shunt regulator
SER	SSI and BiSS Feedback
HALLF	Filtered Hall Sensor inputs
ISCNTL	Isolate controller and AMP power
422	RS-422 on Serial Port
DIN	DIN Rail Mounting Clips *-BOX required
MO	Motor-off jumper installed
2PB	2-phase brushless servo *Only with the DMC-30017

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Cables and Accessories		
Image	Part Number	Description
	GDK Galil Design Kit	Galil's newest generation software package for Galil Motion controllers and PLCs
	PSR-12-24	12A-24 V _{DC} Power supply
	PSR-6-48	6A-48 V _{DC} Power Supply
	BLM-N23-50-1000-B	Nema 23 Brushless Motor with 1000 line/rev encoder
	CABLE-15-1M	15-pin HD male D to discrete wires-1 meter
	CABLE-15-2M	15-pin HD male D to discrete wires-2 meter
	CABLE-44M-1M	44-pin HD male D to discrete wires-1 meter
	CABLE-9-PIN-D	RS232 female to female straight through cable
	ICS-48015-M	15-pin D HD male to screw term
	ICS-48044-M	44-pin D HD male to screw terminals