

# Galil Motion Control



## DMC - 42x0

### Datasheet

## Product Description

The DMC-42x0 is part of Galil's highest performance, stand-alone motion controller Accellera family. Similar to the rest of Galil's latest generation motion controllers, it accepts encoder inputs up to 22 MHz, provides servo update rates as high as 16 kHz, and processes commands in as fast as 40 microseconds—10 times faster than prior generation controllers.

The DMC-42x0 is a full-featured motion controller that operates stand-alone or interfaces to a PC with Ethernet 10/100Base-T or RS232. The controller includes optically isolated inputs, TTL outputs (isolation possible with ICM), TTL extended I/O, and analog inputs for interfacing to analog sensors.

The DMC-42x0 is available in one through eight axis formats, and each axis is user-configurable for stepper or servo motor operation. Standard programming features include PID compensation with velocity and acceleration feedforward, multitasking for simultaneously running up to eight programs, and I/O processing for synchronizing motion with external events. Modes of motion include point-to-point positioning, position tracking, jogging, linear and circular interpolation, PVT, contouring, electronic gearing and electronic cam (ECAM). Like all Galil controllers, the DMC-42x0 controllers use Galil's popular, intuitive command language, making them very easy to program. GalilTools servo design software further simplifies system set-up with "one-button" servo tuning and real-time display of position and velocity information



## Features

- Packaged controller in 1 through 8 axis versions: DMC-42x0 where x=1,2,3,4,5,6,7,8 axes
- (2) 10/100 Base-T Ethernet port with Auto MDIX; (2) RS232 ports up to 115 kbaud
- User-configurable for stepper or servo motors on any combination of axes.
- Accepts up to 22 MHz encoder frequencies for servos; Outputs up to 6 MHz for steppers
- Sample times as low as 31 microseconds per axis; fast command processing
- Advanced PID compensation with velocity and acceleration feedforward, integration limits, notch filter and low-pass filter
- Modes of motion include jogging, point-to-point positioning, position tracking, contouring, linear and circular interpolation, electronic gearing and electronic cam.
- Ellipse scaling, slow-down around corners, infinite segment feed and feedrate override
- Multitasking for concurrent execution of up to eight application programs. Ultra-fast command processing
- Expanding, non-volatile memory for application programs, variables and arrays
- Optically isolated home input, forward and reverse limits for every axis
- Uncommitted I/O:
  - 1-4-axis: 8 optoisolated inputs and 8 TTL outputs
  - 5-8-axis: 16 optoisolated inputs and 16 TTL outputs
  - 8 uncommitted analog inputs
  - High speed position latch and output compare
  - 64 additional 5V TTL I/O; Add more I/O with RIO-471xx PLC
- Accepts 90–250 V AC, 50–60 Hz input
- Communication drivers for Windows, Mac and Linux
- Custom hardware and firmware options available

Motion Controller	
Processor	RISC-based clock multiplying processor with DSP functions, Gallil's 5th generation ASIC
Communication	10/100 Base-T Ethernet with Auto MDIX Main and Aux RS232 serial ports More options available see below.
Program memory size	4000 lines x 80 characters
# of Variables	510
# of Arrays	24000 array elements in 30 arrays
Position Range	32-bit, automatic rollover
Maximum Velocity	22 million counts/s
Maximum Acceleration	1 billion counts/s <sup>2</sup>

Power and Mechanical	
Power requirements	90-250 V <sub>AC</sub> (50-60 Hz)
Operational temperature	0 – 70 deg C
Humidity	20 – 95 % RH, non-condensing
Dimensions	<b>1-4 axes models:</b> 8.05" x 7.25" x 1.41" <b>5-8 axes models:</b> 11.5" x 7.25" x 1.41"



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	1-8 axes of 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.

Minimum Servo Update Rate	
# of axes	Standard Firmware
1-2	62 usec, 16 kHz
3-4	125 usec, 8 kHz
5-6	156 usec, 6.4 kHz
7-8	187 usec, 5.4 kHz

General Purpose I/O				
	Number of I/O		Voltage	Details
	1-4 axis	5-8 axis		
Opto-isolated inputs <sup>1</sup>	8	16	5-24 V <sub>DC</sub>	Can be configured for use as high-speed latch (position capture).
TTL outputs	8	16	5 V <sub>DC</sub>	TTL (optoisolated option available with ICM-1900 or ICM-2900)
Analog Inputs	8	8	±10, ±5, 0-5, 0-10 V	12-bit, 16-bit optional, can be used as position feedback
Extended I/O <sup>1</sup>	64	64	5V <sub>DC</sub>	Input or Output configurable in banks of 8

Feature Specific I/O				
	Number of I/O		Description	Details
	1-4 axis	5-8 axis		
Reverse/Forward Limit Switches	per Axis		5-24 V <sub>DC</sub> opto-isolated	
Home Input	per Axis		5-24 V <sub>DC</sub> opto-isolated	
Amplifier Enable Output	per Axis		TTL, Active High	See ICM Modules for different AMP enable configurations
Stepper (Step/Dir signals)	per Axis		0-5 V <sub>DC</sub> Step/Dir TTL Signal	6 MHz max output
Servo control (Motor command line)	per Axis		±10V analog output	16-bit resolution
Quadrature Encoder Inputs	2 per Axis <sup>1</sup>		+/-12V <sub>DC</sub> or TTL	22 MHz input max See ICM Modules for all feedback options
Hall inputs	per Axis		3x 0-5V TTL inputs	When equipped with some AMP Modules
Abort	1		5-24V <sub>DC</sub> opto-isolated	
Reset	1		5-24V <sub>DC</sub> opto-isolated	
Electronic lock-out	1		5-24V <sub>DC</sub> opto-isolated	When equipped with AMP Modules
Output compare	1	2	0-5V TTL	Also known as pulse on position
Error out	1		0-5V TTL	




<sup>1</sup> Each unused auxiliary encoder can be used as 2 additional digital inputs.


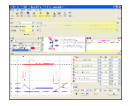
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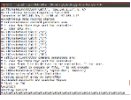
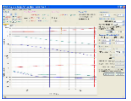
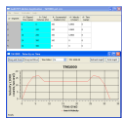











Use the Part Number Generator for building the DMC-42x0  
<http://www.galil.com/order/part-number-generator/dmc-42x0>



DMC-42x0 Options	
Part Number	Description
16bit	16-bit analog inputs
4-20mA	4-20mA analog inputs
TRES	Encoder terminating resistors
SSI	SSI feedback
BISS	BiSS feedback

Accessories - Hardware		
Image	Part Number	Description
	BLM-N23-50-1000-B	Nema 23 Brushless Motor with 1000-line encoder
	AMP-19520	2-axis amplifier for 500 W servo motors Use following link for AMP-19520 accessories: <a href="http://www.galil.com/accessory/amp-195x0#info=3">http://www.galil.com/accessory/amp-195x0#info=3</a>
	AMP-19540	4-axis amplifier for 500 W servo motors Use following link for AMP-19540 accessories: <a href="http://www.galil.com/accessory/amp-195x0#info=3">http://www.galil.com/accessory/amp-195x0#info=3</a>

Accessories - Software		
Image	Part Number	Description
	GALILSUITE SOFTWARE	Servo Tuning and Analysis with Program Editor and Terminal
	GALILTOOLS SOFTWARE	GalilTools programming software for Galil controllers

	EPICS SOFTWARE	Communication Drivers and Device Support to create a Galil EPICS IOC
	FREQUENCY ANALYSIS SOFTWARE	Servo Tuning in Frequency Domain
	GALILPVT	Galil PVT Software for PVT mode of Motion
<b>Accessories - Cables and Breakout Boards</b>		
<b>Image</b>	<b>Part Number</b>	<b>Description</b>
	CABLE-100-1M	100-pin cable 1 meter
	CABLE-100-2M	100-pin cable 2 meter
	CABLE-100-3M	100-pin cable 3 meter
	CABLE-36-1M	Auxiliary encoder cable 1 meter
	CABLE-36-3M	Auxiliary encoder cable 3 meter
	CABLE-9-PIN-D	RS232 female to female straight through cable
	CABLE-80-1m	Extended I/O cable 1 meter
	CABLE-80-4m	Extended I/O cable 4 meter
	ICM-2900	Interconnect for 4 axis
	ICM-2900-FL	ICM with flange mount
	ICM-2900-OPTO	ICM with opto outputs
	CB 36-25	36-pin Aux Encoder to D-Sub breakout
	CB 50-80	80-pin Extended I/O to ribbon cable breakout