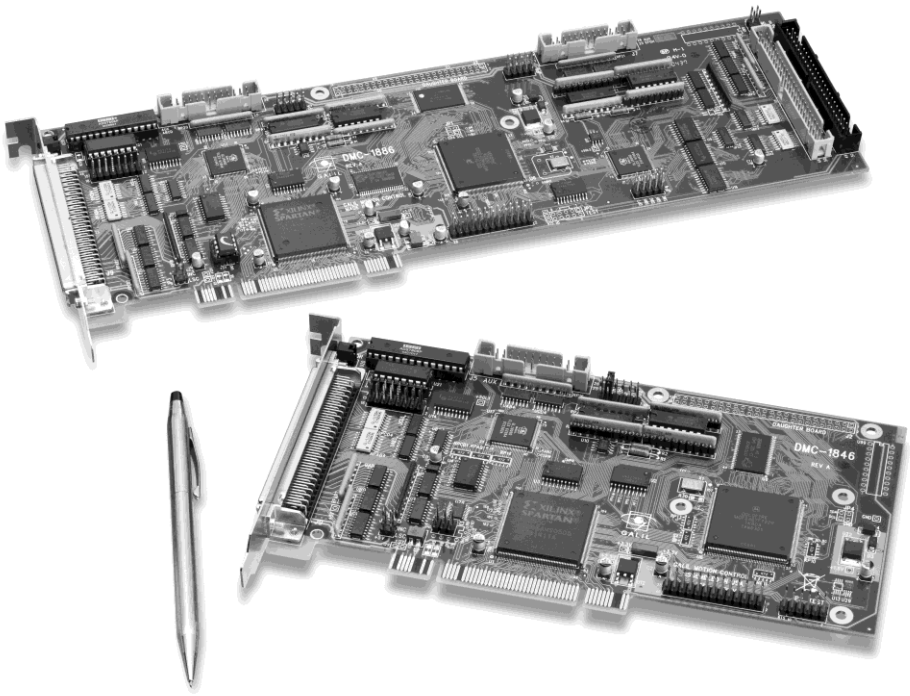
Galil Motion Control



DMC - 18x6

Datasheet

Galil Motion Control 270 Technology Way, Rocklin, CA 1-916-626-0101
(US ONLY) 1-800-377-6329

Product Description

The DMC-18x6 PCI bus motor controllers belong to Galil's latest generation motion controller family: The Accelera Series. Incorporating a 32-bit RISC-based microcomputer, these controllers offer high-speed performance and processing power. Speed improvements include acceptance of encoder inputs up to 22 MHz, servo update rates as low as 31 microseconds/axis, and command execution times as low as 40 microseconds. While the DMC-18x6 offers performance enhancements compared to prior generation PCI controllers, the programming language and 100-pin SCSI connector are virtually the same, making conversion to the DMC-18x6 quick and easy.

The DMC-18x6 is available in one through eight-axis formats, and each axis is user-configurable for stepper or servo motor operation. The controller includes optically isolated inputs including a forward limit, reverse limit, and home input for each axis, in addition to uncommitted analog and digital I/O. Up to two encoders are accepted for each servo axis.

Standard programming features include PID compensation with velocity and acceleration feed forward, multitasking for simultaneously running up to eight programs, and I/O processing commands for synchronizing motion with external events. Modes of motion include point-to-point positioning, position tracking, jogging, linear and circular interpolation, contouring, electronic gearing, and ECAM. Like all Galil controllers, the DMC-18x6 controllers use Galil's popular, intuitive command language which makes them very easy to program.

Features

- PCI card in 1 through 8 axis versions: DMC-18x6 where x=1,2,3,4,5,6,7,8 axes.
- User-configurable for stepper or servo motors on any combination of axes. Optional firmware for piezo-ceramic motors. Configurable for sinusoidal commutation.
- Accepts up to 22 MHz encoder frequencies for servos. Outputs up to 6 MHz for steppers.
- PID compensation with velocity and acceleration feed forward, integration limits, notch filter, and low-pass filter.
- Modes of motion include jogging, point-to-point positioning, contouring, linear and circular interpolation, electronic gearing, and ECAM. Features elliptical scaling, slow-down around corners, infinite segment feed and feed rate override.
- Over 200 English-like commands including conditional statements and event triggers.
- Non-volatile memory for programs, variables and arrays. Multitasking for concurrent execution of up to eight programs.
- Optically isolated home input and forward and reverse end-of-travel limits accepted for every axis.
- 1-through 4-axis: 8 isolated inputs and 8 outputs; 5- through 8-axis: 16 isolated inputs, 16 outputs, 8 digital inputs.
- High speed position latch for each axis and output compare.
- 8 uncommitted analog inputs.
- Dual encoder inputs for each servo axis.
- Expansion for 64 I/O with optional DB-14064 board.
- 100-pin SCSI connectors for each set of 4 axes. ICM-2900 or ICM-1900 breaks-out 100-pin cable into screw terminals.
- AMP-19540 connects to PCI controller with 100-pin cable and provides four amplifiers for 500 W servos.

Motion Controller	
Processor	RISC-based clock multiplying processor with DSP functions
Communication	PCI with bi-directional FIFO and Dual Port Ram, 32-bit PCI interface. 64-bit compatible. 5 V/3.3 V
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	Up to 22 million counts/s
Maximum Acceleration	Up to 1 billion counts/s^2

Power and Mechanical	
Power requirements	+5V 700mA, +3.3V 600mA, +12V 150mA, and -12V 40mA
Operational temperature	0 – 70 deg C
Humidity	20 – 95 % RH, non-condensing
Dimensions	
1-4 axes models	7.85" x 4.2"
5-8 axes models	12.28" x 4.2"

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RoHS Compliant

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
Closed loop control of piezo-ceramic and hydraulic systems are also available.		

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 segments and linear segments. Tangent motion profiles and
Linear Interpolation	2-8 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	Moves along mathematically prescribed potions in addition to teach and playback functions.

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

Amplifier Options	See AMP Modules for options and specifications.

General Purpose I/O				
	Number of I/O		Voltage	Details
	1-4 axis	5-8 axis		
Inputs	8	24	1-16 are optoisolated 4-28 V_{DC}; 17-24 are 5 V_{DC} TTL	
Outputs	8	16	5 V_{DC} TTL	20mA Sinking (Standard)
Analog Inputs	8	8	±10	12-bit, 16-bit optional, can be used as position feedback
Extended I/O	64 with DB-14064		5 V_{DC} TTL	I/O configurable in banks of 8

Functional I/O				
	Number of I/O		Voltage	Details
	1-4 axis	5-8 axis		
Reverse/Forward Limit Switches	per Axis		4-28 V_{DC} (Above 24 V_{DC} requires additional resistor)	optoisolated
Home Input	per Axis		4-28 V_{DC} (Above 24 V_{DC} requires additional resistor)	optoisolated
Amplifier Enable Output	per Axis		5 V_{DC} TTL	
Stepper (Step/Dir signals)	per Axis		0-5 V_{DC} 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[1]		+/-12V_{DC} or TTL	22 MHz input max
Index pulse	per Axis		0-5V TTL input	
Hall inputs	per Axis		3x 0-5V TTL inputs	AMP-19540 Only
Abort	1		4-28 V_{DC} (Above 24 V_{DC} requires additional resistor)	optoisolated
Reset	1		0-5V TTL	
Electronic lock-out	1		5-24V_{DC} optoisolated	AMP-19540 Only
Output compare	1	2	0-5V TTL	Also known as pulse on position
Error out	1		0-5V TTL	
[1] Each unused auxiliary encoder can be used as 2 additional digital inputs.				

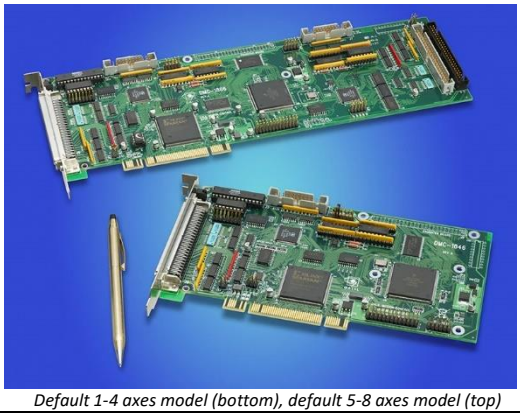
Ordering Options

There are several amplifiers, accessories and cables that can be ordered with the DMC-18x6 that change the mechanical layout, pin-out, and functionality of the unit. Interconnect modules must be specified for 1-4 axis. 5-8 axis models require the specification of an additional ICM module. Both 1-4 and 5-8 axis models have options for internal servo (AMP) modules. In addition to the flexibility of choosing various modules, each module comes with additional options.

Example Part Numbers

DMC-1836 ICM-1900 Cable-100-4m	3-Axis PCI Controller 1900: Interconnect for 4 axes 4 meter cable
DMC-1866 ICM-1900-Opto ICM-1900-Opto Cable-100-2m Cable-100-2m CB-50-100-1800	6-Axis PCI Controller 1900: ICM with isolated outputs (qty 2) 2 meter cable (qty 2) 50-pin to 100-pin converter board for DMC-1856 through DMC-1886

DMC-18x6



Default 1-4 axes model (bottom), default 5-8 axes model (top)

Options

Part Number	Description
16bit	16-bit analog inputs
DB-14064	64 I/O expansion board

ICM Modules

The ICM-2900 interconnect module provides easy connections between the DMC-18x6 series controllers and other system elements, such as amplifiers, encoders, and external switches.

Modules	Description
ICM-1900	Interconnect for 4 axes
ICM-1900-OPTO	ICM with isolated outputs
ICM-2900-FL	ICM with flange mount
ICM-2900-FL-OPTO	ICM with flange mount and isolated outputs and

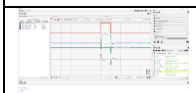
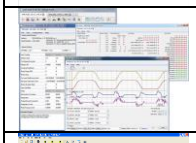
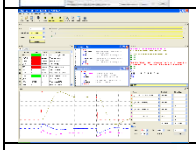
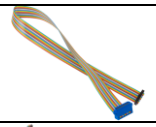
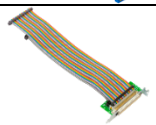
AMP Modules

It interfaces to Galil's DMC-18xx PCI bus controller with a single, 100-pin high density SCSI cable. Signals for each axis are brought out through D-type connectors located on the AMP-19540. For applications with less than three axes, the AMP-19520 two-axis model is available.

	AMP-19520	**AMP-19540**
Motor type	2 Brushed and/or 2 Brushless	4 Brushed and/or 4 Brushless
	PWM drives	PWM drives
Drive Mode	Inverter or Chopper	Inverter or Chopper
Power per axis	500 watts	500 watts
Cont. Current	7 A	7 A
Peak Current	10 A	10 A
Bus Voltage	18-80 V_{DC}	18-80 V_{DC}
Gains	0.4, 0.7, or 1.0 A/V (jumper adjustable)	0.4, 0.7, or 1.0 A/V (jumper adjustable)
Switching Freq.	60 kHz[1]	60 kHz[1]
Current loop bandwidth	8 kHz	88 kHz
Min. Inductance	0.5 mH[2]	0.5 mH[2]
Over-Voltage	Yes	Yes
Under-Voltage	Yes	Yes
Over-Current	Yes	Yes
Short Circuit	Yes	Yes
Over-Temperature	110 degrees C	110 degrees C
ELO	Yes	Yes
Adjustable Current Loop	Yes	Yes
Shunt Option	Yes	Yes
SSR Option	No	No

[1] Contact Galil for higher Switching Frequencies.

[2] Low inductance option available.

Cables and Accessories		
	Part Number	**Description**
	GDK | Galil Design Kit	Galil's newest generation software package for Galil Motion controllers and PLCs
	GalilSuite Software	Servo Tuning and Analysis with Program Editor and Terminal
	GalilTools Software	GalilTools programming software for Galil controllers
	BLM-N23-50-1000-B	Nema 23 Brushless Motor with 1000-line encoder
	CABLE-100-1M	100-pin cable 1 meter
	CABLE-100-2M	100-pin cable 2 meter
	CABLE-100-4M	100-pin cable 4 meter
	CABLE-26-25	26-pin to 25 pin (aux encoder)
	CB-50-100-1800	50-pin to 100-pin (for 5 thru 8 axes)
	ICM-1900	Interconnect for 4 axes
	ICM-1900-OPTO	ICM with isolated outputs
	ICM-2900	Interconnect for 4 axes
	ICM-2900-FL	ICM with flange mount
	ICM-2900-FL-OPTO	ICM with opto & flange mount