

PC/104, cPCI, ISA Optima 1–8 axes

DMC-12x0, DMC-16x0, DMC-17x0 Series

Product Description

The DMC-12x0, 16x0, and DMC-17x0 are Optima motion controllers designed for multi-axis applications. The controllers differ only in their communication interface: DMC-12x0 is for PC/104; DMC-16x0 for cPCI and DMC-17x0 for ISA bus. For single axis applications, Galil's Econo DMC-1410 (ISA), DMC-1411 (PC/104), DMC-1412 (RS232), or DMC-1417 (PCI) controllers should be considered.

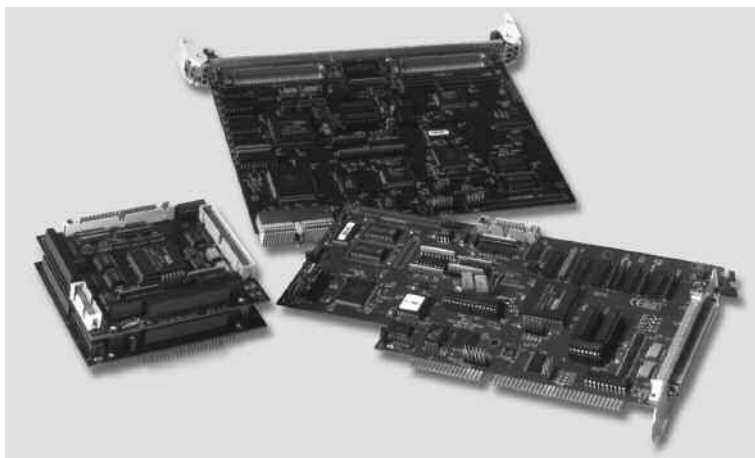
The controllers incorporate a 32-bit microcomputer and provide such advanced features as PID compensation with velocity and acceleration feedforward,

Left to right:

DMC-12x0 PC/104

DMC-16x0 CompactPCI

DMC-17x0 ISA



programmable notch, program memory with multitasking for simultaneously running up to eight applications programs, and uncommitted I/O for synchronizing motion with external events. They handle various modes of motion including point-to-point positioning, jogging, linear and circular interpolation, contouring, electronic gearing and ECAM. Additionally, the controllers are user-configurable for stepper or servo motor control on any combination of axes.

Like all Galil controllers, the controllers use a simple, English-like command language which makes them very easy to program. Galil's WSDK servo design software further simplifies system set-up with "one-button" servo tuning and real-time display of position and velocity information. Communication drivers are available for DOS, Linux and all current Windows operating systems.

Features

- Available in various communication and axes formats:
DMC-12x0: PC/104 $x=1,2,3,4,5,6,7,8$ axes
DMC-16x0: cPCI $x=1,2,3,4$ axes plus 64 extended I/O
DMC-17x0: ISA $x=1,2,3,4,5,6,7,8$ axes
- User-configurable for stepper or servo motors on any combination of axes. Optional firmware for piezo-ceramic motors. Sinusoidal commutation for brushless servo motors
- 12 MHz encoder frequencies for servos, 3 MHz for steppers
- 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, linear and circular interpolation, electronic gearing and ECAM. Features ellipse scaling, slow-down around corners, infinite segment feed and feedrate override
- Over 200 English-like commands including conditional statements and event triggers
- Non-volatile memory for programs, variables and arrays. Concurrent execution of up to eight application programs
- Isolated home and forward and reverse limits accepted for every axis. Isolation not available on the DMC-12x0
- 8 isolated uncommitted inputs and 8 outputs for 1- through 4-axes models, 24 in/16 out for 5- through 8-axis models. Optical isolation not available on the DMC-12x0
- High speed position latch for each axis and output compare
- 8 uncommitted analog inputs
- Dual encoder inputs for each axis
- DMC-16x0 includes 64 configurable I/O. Additional 64 I/O may be added on DMC-12x0 and DMC-17x0 using the DB-12064 or DB-14064 daughter board
- 100-pin SCSI connectors for each set of 4 axes. Galil's ICM-1900 interconnect module breaks-out the 100-pin cable into screw terminals
- Communication drivers for all current versions of Windows, DOS and Linux
- CE certified — DMC-17x0
- Custom hardware and firmware options available

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Specifications

System Processor

- Motorola 32-bit microcomputer

Communications Interface

- DMC-12x0: PC/104 with bi-directional, high speed FIFO
- DMC-16x0: CompactPCI with bi-directional FIFO plus auxiliary FIFO
- DMC-17xx: ISA with bi-directional FIFO plus auxiliary FIFO

Commands are sent in ASCII. A binary communication mode is also available as a standard feature

Modes of Motion:

- Point-to-point positioning
- Position Tracking
- Jogging
- 2D Linear and Circular Interpolation with feedrate override
- Linear Interpolation for up to 8 axes
- Tangential Following
- Helical
- Electronic Gearing with multiple masters
- Gantry Mode
- Electronic Cam
- Contouring
- Teach and playback

Memory

- Program memory size — 1000 lines × 80 characters
- 254 variables
- 8000 array elements in up to 30 arrays

Filter

- PID (proportional-integral-derivative) with velocity and acceleration feedforward
- Notch filter and low-pass filter
- Dual-loop control for backlash compensation
- Velocity smoothing to minimize jerk
- Integration limits
- Torque limits
- Offset adjustments
- Option for piezo-ceramic motors

Kinematic Ranges

- Position: 32 bit (± 2.15 billion counts per move; automatic rollover; no limit in jog or vector modes)
- Velocity: Up to 12 million counts/sec for servo motors
- Acceleration: Up to 67 million counts/sec²

Uncommitted Digital I/O

	DIGITAL INPUTS	DIGITAL OUTPUTS	CONFIGURABLE I/O
DMC-1210 thru -1240*	8	8	64 w/ DB-12064
DMC-1250 thru -1280*	16	16	64 w/ DB-12064
DMC-1610 thru -1640	8	8	64
DMC-1710 thru -1740	8	8	64 w/ DB-14064
DMC-1750 thru -1780	24	16	64 w/ DB-14064

Uncommitted Analog Inputs

- 8 individual ± 10 V analog inputs with 12-bit resolution (16-bit available as an option)

High Speed Position Latch

- Uncommitted inputs 1–4 latch X, Y, Z, W and 9–12 latch E, F, G, H axes (latches within 0.1 microseconds without optoisolation and within 40 microseconds with optoisolation)

Dedicated Inputs (per axis)

- Main encoder inputs — Channel A, A-, B, B-, I, I- (± 12 V or TTL)
- Dual encoder (for axes configured as servo) — Channel A, A-, B, B-
- Forward and reverse limit inputs — optoisolated*
- Home input — optoisolated*
- Selectable high-speed position latch input — optoisolated*
- Selectable abort input — optoisolated*

Dedicated Outputs (per axis)

- Analog motor command output with 16-bit DAC resolution
- Pulse and direction output for step motors
- PWM output for servo amplifiers
- Amplifier enable output
- Error output (per card)
- High-speed position compare output (per card)

Minimum Servo Loop Update Time

-FAST[†]

- 1–2 axes: 250 μ sec 125 μ sec
- 3–4 axes: 375 μ sec 250 μ sec
- 5–6 axes: 500 μ sec 375 μ sec
- 7–8 axes: 625 μ sec 500 μ sec

Maximum Encoder Feedback Rate

- 12 MHz

Maximum Stepper Rate

- 3 MHz (Full, half or microstep)

*DMC-1200 has TTL limits, home, and general inputs.

[†]Reduced feature set for -FAST.

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Specifications—continued

Power Requirements

- +5V 750 mA
- 12V 40 mA
- +12V 40 mA

Environmental

- Operating temperature: 0–70° C
- Humidity: 20–95% RH, non-condensing

Mechanical

- DMC-12x0
 - 1–4 axes: 4.4" × 4.15" (2 stacked cards)
 - 5–8 axes: 4.4" × 4.15" (3 stacked cards)
- DMC-16x0
 - 1–4 axes: 6U
- DMC-17x0
 - 1–4 axes: 10.25" × 4.8"
 - 5–8 axes: 13.25" × 4.8"

Hardware Accessories

ICM-1900 Interconnect Module

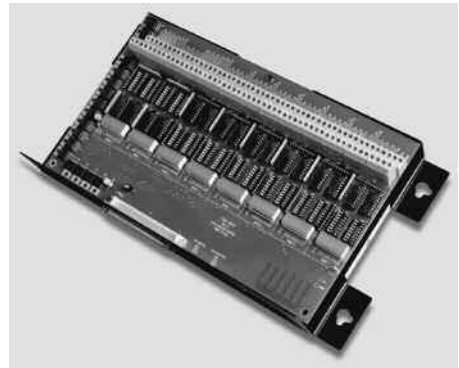
The ICM-1900 Interconnect Module breaks-out the 100-pin main cable and 25-pin auxiliary encoder cable into screw-type terminals for quick connection of system hardware. An ICM-1900 is required for each set of four axes. The ICM-1900 is contained in a metal enclosure with dimensions of 13.5" × 3.0" × 7.0" and 1/4" diameter keyholes for mounting. The ICM is default configured for high amp enable (-HAEN). For low amp enable, order ICM-1900-LAEN. Specify -OPTO for optoisolated outputs.

DB-14064 I/O Expansion

The DB-14064 is an optional board which provides 64 additional I/O for the DMC-17x0 controllers (for the DMC-12x0 use the DB-12064). This board mounts directly onto the back of the controller and provides 64 I/O points configurable by the user as inputs or outputs. The I/O is accessible through two 50-pin IDC headers. A CB-50-80 adaptor can be used to convert the IDC connectors to an 80-pin connector. Using the adaptor and the Cable-80 allows for direct connection to the Galil IOM-1964 opto-isolation module.

IOM-1964 I/O Module

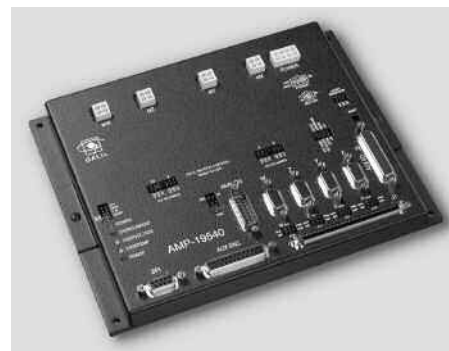
The IOM-1964 is an Input/Output module that provides optical isolation for the 64 extended I/O. Each of the 64 optically isolated inputs and outputs is rated for 25 mA at up to 28 VDC and is configurable as inputs or outputs in groups of eight bits. The IOM-1964 also provides 16 highside outputs capable of 500 mA of current per output. The dimensions are 13.5" × 3.0" × 7.0", with 1/4" diameter keyholes for mounting.



*IOM-1964
Optically
Isolated 64-bit
Input/Output
Module*

AMP-19540 Interconnect with Four 500 Watt Servo Drives

Galil's AMP-19540 is a 4-axis amplifier for driving brush or brushless motors up to 500 Watts. By interfacing directly to Galil's Optima controllers, it provides a cost-effective controller/drive solution for multi-axis applications. The AMP-19540 contains four transconductance, PWM amplifiers for driving brush or brushless motors. Each amplifier operates at 18 V to 80 V dc, up to 7 Amps continuous, 10 Amps peak. The AMP-19540 gain setting is easily configured with jumpers. The PWM switching frequency is 60 kHz. The AMP-19540 enclosure has dimensions of 6.8" × 8.75" × 1". It interfaces to the Optima 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. A shunt regulator option is also available.

AMP-19540

ICM-2900 Interconnect Module

The ICM-2900 breaks-out the 100-pin SCSI cable into removable screw-type terminals. One ICM-2900 is required for each set of four axes. The ICM-2900-FL has flanges which allow standard screw-type mounting. Specify -OPTO for optoisolated outputs. Specify -HAEN for high amp enable or -LAEN for low amp enable.

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Ordering Information

PART NUMBER	DESCRIPTION	QUANTITY 1	QUANTITY 100
DMC-1210	1-axis PC/104	\$1095	\$ 795
DMC-1220	2-axis PC/104	\$1495	\$ 875
DMC-1230	3-axis PC/104	\$1895	\$ 935
DMC-1240	4-axis PC/104	\$2195	\$ 995
DMC-1250	5-axis PC/104	\$2595	\$1345
DMC-1260	6-axis PC/104	\$2795	\$1425
DMC-1270	7-axis PC/104	\$2995	\$1525
DMC-1280	8-axis PC/104	\$3195	\$1595
CB-50-100-1200	50-pin to 100-pin converter board which includes two 50-pin cables	\$ 75	\$ 50
CABLE-20-25	20-pin IDC to 25-pin D type for dual encoders	\$ 15	\$ 15
CABLE-100-1M	100-pin high-density cable in 1-meter length	\$ 125	\$ 95
CABLE-100-2M	100-pin high-density cable in 2-meter length	\$ 135	\$ 100
CABLE-100-4M	100-pin high-density cable in 4-meter length	\$ 150	\$ 105
CABLESET-1200	(2) 50-pin ribbon, (1) 20-pin ribbon	\$ 35	\$ 30
ICM-1900	Interconnect module (use 1 for every 4 axes). Specify -HAEN for high amp enable or -LAEN for low amp enable	\$ 345	\$ 245
ICM-1900-OPTO	ICM with optoisolated outputs	\$ 395	\$ 295
DB-12064	Attachment board for 64 additional I/O	\$ 395	\$ 245
DMC-1610	1-axis CompactPCI	\$1395	\$ 945
DMC-1620	2-axis CompactPCI	\$1795	\$1025
DMC-1630	3-axis CompactPCI	\$2195	\$1085
DMC-1640	4-axis CompactPCI	\$2495	\$1145
CABLE-36-1M	36-pin high-density cable in 1 meter length	\$ 90	\$ 75
CABLE-36-3M	36-pin high-density cable in 3 meter length	\$ 110	\$ 90
CABLE-100-1M	100-pin high-density cable in 1 meter length	\$ 125	\$ 95
CABLE-100-2M	100-pin high-density cable in 2-meter length	\$ 135	\$ 100
CABLE-100-4M	100-pin high-density cable in 4 meter length	\$ 150	\$ 105

Ordering Information continued on the next page.

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Ordering Information—continued

PART NUMBER	DESCRIPTION	QUANTITY 1	QUANTITY 100
DMC-1710	1-axis ISA	\$1095	\$ 795
DMC-1720	2-axis ISA	\$1495	\$ 875
DMC-1730	3-axis ISA	\$1895	\$ 935
DMC-1740	4-axis ISA	\$2195	\$ 995
DMC-1750	5-axis ISA	\$2595	\$1345
DMC-1760	6-axis ISA	\$2795	\$1425
DMC-1770	7-axis ISA	\$2995	\$1525
DMC-1780	8-axis ISA	\$3195	\$1595
CB-50-80	50- to 80-pin converter board for 64 I/O to IOM-1964 (including cables)	\$ 75	\$ 50
CB-50-100-1780	50- to 100-pin converter board; incl. two ribbon cables for DMC-1750 to -1780	\$ 75	\$ 50
CABLE-26-25	26-pin IDC to 25-pin D type for dual encoders	\$ 15	\$ 15
ICM-1900	Interconnect module (use 1 for every 4 axes). Specify -HAEN for high amp enable or -LAEN for low amp enable	\$ 345	\$ 245
ICM-1900-OPTO	ICM with optoisolated outputs	\$ 395	\$ 295
AMP-19520	2-axis amplifier for 500 W servos	\$ 595	\$ 395
AMP-19540	4-axis amplifier for 500 W servos	\$ 795	\$ 495
-SR	Shunt regulator option for AMP-195x0	\$ 50	\$ 25
IOM-1964	Input/Output optoisolated module for 64 I/O	\$ 695	\$ 495
DB-14064	64 I/O expansion for DMC-17x0	\$ 295	\$ 195
Galil Utilities	Communication drivers, SmartTERM, DMCDOS	\$ 20 for CD; free download	
DMCWIN32	Windows API Tool Kit (VB, C, C++, etc.)	Included with Utilities	
WSDK	Set-up, tuning and analysis software	\$ 195	
ActiveX Tool Kit	Custom ActiveX controls for Visual Basic, Visual C++, etc.	\$ 595	

Galil offers additional quantity discounts for purchases between 1 and 100. Consult Galil for a quotation.