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Find the *Galil Motion Control DMC-1415* at our website: *Click HERE*

Ethernet/RS232, 1- and 2-axis

DMC-14x5 Series

Product Description

The DMC-1415 and DMC-1425 are economical, one and two axis motion controllers with an Ethernet 10Base-T and RS232 port. The DMC-34x5 is designed for Ethernet-based distributed systems where one DMC-34x5 controller is designated as the master over other DMC-34x5 controllers. Controllers are available as a card-level product or in a metal enclosure with power supply.

With a 32-bit microcomputer, the single and dual axis controllers provide such advanced features as PID compensation with velocity and acceleration feedforward, program memory with multitasking for simultaneously running two applications programs, and uncommitted I/O for synchronizing motion with external events. It handles various modes of motion including point-to-point positioning, jogging, contouring, electronic gearing and ECAM. The DMC-1415 or -3415 single-axis controller accepts inputs from two encoders, which is useful for electronic gearing applications. The DMC-1425 or -3425 dual-axis controller includes linear and circular interpolation for precise, coordinated motion.

DMC-14x5 Controller



Like all Galil controllers, the DMC-14x5 and -34x5 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 Windows, .NET, QNX, and Linux.

Features

- *Card-level and box-level , stand-alone motion controllers*
- *DMC-1415 or DMC-3415: 1-axis card or box*
  DMC-1425 or DMC-3425: 2-axis card or box
- *Ethernet 10BASE-T and one RS232 port up to 19.2 kb.*
- *Ethernet supports multiple masters and slaves*
- *The DMC-1425, -3425 controls two servos or two steppers*
- *Accepts up to 12 MHz encoder frequencies for servos. Outputs up to 3 MHz for steppers*
- *Advanced PID compensation with velocity and acceleration feedforward, offsets, notch filter and integration limits*
- *Modes of motion include jogging, point-to-point positioning, contouring, electronic gearing and ECAM. Accepts input from auxiliary encoder for DMC-1415, -3415 only. Linear and circular interpolation for DMC-1425, -3425 only.*
- *Over 200 English-like commands directly executable by controller. Includes conditional statements and event triggers*
- *Non-volatile memory for programs, variables and arrays. Concurrent execution of two application programs*
- *Home input and forward and reverse limits*
- *2 uncommitted analog inputs with 12-bit ADC*
- *DMC-1415, -3415: 7 Uncommitted digital inputs, 3 digital outputs*
  DMC-1425, -3425: 3 Uncommitted digital inputs, 3 digital outputs
- *High-speed position latch*
- *Use Galil's IOC-7007 or DB-14064 for additional I/O*
- *Uses 37-pin D connector. ICM-1460 interconnect module breaks-out 37-pin cable into screw terminals*
- *DMC- 14x5, -34x5-Card accepts +5 V, ± 12 V;*
  DMC-14x5, -34x5-BOX accepts 90 – 260 VAC
- *Compact size:*
  DMC-14x5, -34x5-CARD: 3.75" x 5.0"
  DMC-14x5, -34x5-BOX: 5.1" x 3.0" x 6.8"
- *Communication drivers for Windows, QNX, and Linux*
- *CE certified*
- *Custom hardware and firmware options available*

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DMC-14x5 Series

Specifications

System Processor

- Motorola 32-bit microcomputer

Communications Interface

- Ethernet BASE-T and RS232 port up to 19.2k baud

Modes of Motion:

- Point-to-point positioning
- Jogging
- Electronic Gearing
- Electronic Cam
- Contouring
- Linear and circular interpolation for DMC-1425, -3425

Memory

- Program memory size—500 lines × 80 characters
- 126 variables
- 2000 array elements in up to 14 arrays

Filter

- PID (proportional-integral-derivative) with velocity and acceleration feedforward
- Notch filter
- Dual-loop control for backlash compensation (DMC-1415, -3415 only)
- Velocity smoothing to minimize jerk
- Integration limits
- Torque limits
- Offset adjustment
- 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/sec^2

Uncommitted Digital I/O

- DMC-1415/3415: 7 buffered inputs; 3 TTL outputs*
- DMC-1425, -3425: 3 buffered inputs; 3 TTL outputs*
- DB-14064: Configurable 64 TTL I/O

Uncommitted Analog Inputs

- 2 individual ±10 V analog inputs with 12-bit resolution (16-bit optional)

High Speed Position Latch

- Latches within 0.1 microseconds

Dedicated I/O

- Main encoder inputs—Channel A, A-, B,B-,I, I- (±12 V or TTL)
- Auxiliary encoder—Channel A, A-, B, B- (not available on DMC-1425, -3425)
- Forward and reverse limit inputs—buffered*
- Home input—buffered*
- High-speed position latch input—buffered*
- Analog motor command output with 16-bit DAC resolution
- Pulse and direction output for step motors
- Amplifier enable output
- Error output
- Encoder output compare

Minimum Servo Loop Update Time

- 250 microseconds
- 125 microseconds with fast firmware (DMC-14x5)

Maximum Encoder Feedback Rate

- 12 MHz

Maximum Stepper Rate

- 3 MHz (Full, half or microstep)

Power Requirements

- DMC-1415 and DMC-1425 cards:
  +5 V 400 mA
  -12 V 40 mA
  +12 V 40 mA
- DMC-1415/1425/34x5 Box: accepts 90–260 V AC 50/60 Hz supply

Environmental

- Operating temperature: 0–70° C for card; 0–60° C for box
- Humidity: 20–95% RH, non-condensing

Mechanical

- DMC-14x5, -34x5 cards: 3.75" × 5.0"
- DMC-14x5, -34x5 boxes: 5.1" × 6.8" × 3.0"

Connectors

- 37-pin D-type

**Optically isolated I/O available with ICM-1460-OPTO option.*

SINGLE AXIS

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Instruction Set

Servo Motor
AF Analog feedback
DV Dual loop operation (1415)
FA Acceleration feedforward
FV Velocity feedforward
IL Integrator limit
KD Derivative constant
KI Integrator constant
KP Proportional constant
NB Notch bandwidth
NF Notch frequency
NZ Notch zero
OF Offset
SH Servo here
TL Torque limit
TM Sample time

Stepper Motor
DE Define encoder position
DP Define reference position
KS Stepper motor smoothing
MT Motor type
RP Report commanded position
TD Step counts output
TP Tell position of encoder

Brushless Motor (-1415, -3415 only)
BA Brushless axis
BB Brushless phase
BC Brushless calibration
BD Brushless degrees
BI Brushless inputs
BM Brushless modulo
BO Brushless offset
BS Brushless setup
BZ Brushless zero

I/O Commands
AL Arm latch
AO Set analog voltage
CB Clear bit
CI Communication interrupt
II Input interrupt
OB Define output bit
OC Output compare function
OP Output port
SB Set bit
@IN[x] State of digital input x
@OUT[x] State of digital output x
@AN[x] Value of analog input x

System Configuration
BN Burn parameters
BP Burn program
BV Burn variables and arrays
CE Configure encoder type

System Configuration (cont.)
CF Configure unsolicited messages
CN Configure switches
CO Configure I/O points
CW Data adjustment bit
DE Define dual encoder position
DP Define position
EO Echo off
IA Set IP address
IH Internet handle
IK Ethernet port blocking
IT Independent smoothing
LZ Leading zeros format
MB ModBus
MO Motor off
MT Motor type
PF Position format
QD Download array
QU Upload array
^R^S Master reset
VF Variable format

Math Functions
@SIN[x] Sine of x
@COS[x] Cosine of x
@COM[x] 1's complement of x
@ASIN[x] Arc sine of x
@ACOS[x] Arc cosine of x
@ATAN[x] Arc tangent of x
@ABS[x] Absolute value of x
@FRAC[x] Fraction portion of x
@INT[x] Integer portion of x
@RND[x] Round of x
@SQR[x] Square root of x

Interrogation
LA List arrays
LL List labels
LS List program
LV List variables
MG Message command
QR Data record
QZ Return data record
RP Report command position
RL Report latch
^R^V Firmware revision information
SC Stop code
TB Tell status
TC Tell error code
TD Tell dual encoder
TE Tell error
TH Tell Ethernet handle
TI Tell input
TIME Time operand
TP Tell position

Interrogation (cont.)
TR Trace program
TS Tell switches
TT Tell torque
TV Tell velocity
TZ Tell I/O configuration
WH Which handle

Programming
BK Breakpoint
DA Deallocate variables/arrays
DL Download program
DM Dimension arrays
ED Edit program
ELSE Conditional statement
ENDIF End of cond. statement
EN End program
HX Halt execution
IF If statement
IN Input variable
JP Jump
JS Jump to subroutine
NO No-operation—for comments
RA Record array
RC Record interval for RA
RD Record data for RA
RE Return from Error
REM Remark program
RI Return from interrupt
SA Send command
SL Single step
UL Upload program
XQ Execute program
ZS Zero stack
' Comment

Error Control
BL Backward software limit
ER Error limit
FL Forward software limit
OE Off-on-error function
TL Torque limit
TW Timeout for in-position

Trippoint
AD After distance
AI After input
AM After motion profiler
AP After absolute position
AR After relative distance
AS At speed
AT After time
AV After vector distance
MC Motion complete
MF After motion—forward
MR After motion—reverse

Trippoint (cont.)
WC Wait for contour data
WT Wait for time

Independent Motion
AB Abort motion
AC Acceleration
BG Begin motion
DC Deceleration
FE Find edge
FI Find index
HM Home
IP Increment position
IT Smoothing time constant
JG Jog mode
PA Position absolute
PR Position relative
SP Speed
ST Stop

Contour Mode
CD Contour data
CM Contour mode
DT Contour time interval
WC Wait for contour data

ECAM/Gearing
EA ECAM master
EB Enable ECAM
EC ECAM table index
EG ECAM go
EM ECAM cycle
EP ECAM interval
EQ Disengage ECAM
ET ECAM table entry
GA Master axis for gearing
GM Gantry mode
GR Gear ratio for gearing

Vector/Linear Interpolation (DMC-1425, -3425 only)
CR Circular interpolation move
CS Clear motion sequence
ES Ellipse scaling
LE Linear interpolation end
LI Linear interpolation segment
LM Linear interpolation mode
ST Stop motion
VA Vector acceleration
VD Vector deceleration
VE Vector sequence end
VM Coordinated motion mode
VP Vector position
VR Vector speed ratio
VS Vector speed
VT Smoothing time constant—vector

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Hardware Accessories

ICM-1460

The ICM-1460 Interconnect Module provides a breakout to screw terminals for the 37-pin D-type cable from the DMC-14x5 or 34x5 for quick connection of system hardware. The ICM-1460 is contained in a metal enclosure with dimensions of 6.9" × 4.9" × 2.6" and 0.2" diameter keyholes for mounting. The ICM is normally shipped configured for high amp enable, +5 V (-HAEN). For low amp enable, order ICM-1460-LAEN.

ICM-1460 OPTO

For applications requiring optoisolation, the ICM-1460 "OPTO" option provides 5–24 V optoisolation on all general inputs and outputs, home inputs, limits, and abort input.



ICM-1460 Interconnect Module (shown with and without cover)

DB-14064 I/O Expansion

The DB-14064 is an optional board which provides 64 additional I/O for the DMC-14x5 or 34x5 controller cards. This board mounts directly onto the back of the controller and provides 64 I/O points configurable by the user for inputs or outputs. The I/O is accessible through two 50-pin headers.

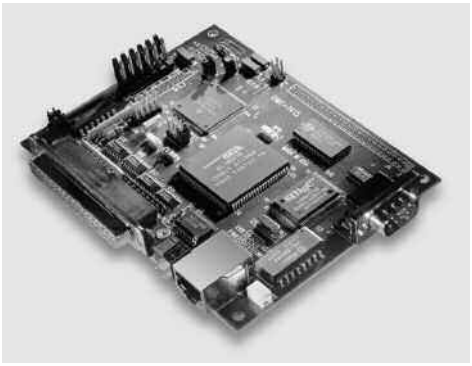
DMC-34x5 Distributed Control Option

The DMC-34x5 Series distributed control system can operate with a single communication channel between the host and the master controller. This master controller is programmed to maintain communication with each slave. Commands sent by the host computer to the master controller are based on the multi-axis convention designating the axes as A, B, C, D, E, F, G, H.

The individual slave controllers can contain their own local application program. A slave program would be written to act as if the slave was operating independent of the distributed control network.

In most cases, the programming is done on a multi-axis level to simplify the programming. An application program written at the multi-axis level can command all axes of motion and apply trippoints to all axes. On the other hand, a slave controller program can drive only the local motors and include trippoints which refer to the local axes.

The multi-axis network may be configured automatically with the HC command. This single command is used to configure the number of axes, data update rate and number of IOC devices in the system. DMC-3415 and DMC-3425 controllers may be used in any combination for a total of up to 8 axes in the network.



DMC-3425

AMP-14110 1-axis and AMP-14120 2-axis 20W Servo Drives

The AMP-14110 and AMP-14120 are one-axis and two-axis linear drives for operating small brush-type servo motors. The AMP-14110 mounts directly to the DMC-1415 1-axis controller and the AMP-14120 mounts to the DMC-1425 2-axis controller. The amplifiers require a ±12–30 VDC input. Output power is 20W per amplifier. The gain of each transconductance linear amplifier is 0.1 A/V at 1 A maximum current. The typical current loop bandwidth is 4 kHz. 100 mA maximum current is available as an option.

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Ethernet/RS232, 1- and 2-axis

DMC-14x5 Series

Connectors

DMC-1415, 3415 J3

Main 37-pin D-type

1	Reset* (TTL)	20	Error*
2	Amp enable	21	ACMD (STEP for Stepper Motor)
3	Output 3	22	Output 2
4	Output 1	23	Output compare
5	Analog Input 1	24	Analog Input 2
6	Input 7	25	Input 6
7	Input 5	26	Input 4
8	Input 3	27	Input 2
9	Input 1 (and latch)	28	Forward limit
10	+5V	29	Reverse limit
11	Ground	30	Home
12	+12V	31	-12V
13	Ground	32	Main Encoder A+
14	Main Encoder A-	33	Main Encoder B+
15	Main Encoder B-	34	Main Encoder I+
16	Main Encoder I-	35	Auxiliary A+
17	Auxiliary A-	36	Auxiliary B+
18	Auxiliary B-	37	Abort*
19	ACMD Phase B (DIR for Stepper Motor) (For Sinusoidal Commutation)		

DMC-1425, -3425 J3

Main 37-pin D-type

1	Reset*	20	Error*
2	Amp Enable (both motors)	21	ACMDX/STEPX
3	Output 3	22	Output 2
4	Output 1	23	Output compare
5	Analog 1	24	Analog 2
6	Index Y	25	Home Y
7	Reverse limit Y	26	Forward limit Y
8	Input 3	27	Input 2 (Y latch input)
9	Input 1 (X latch input)	28	Forward limit X
10	+ 5V	29	Reverse limit X
11	Ground	30	Home X
12	+12V	31	-12 V
13	Ground	32	X Encoder A+
14	X Encoder A -	33	X Encoder B+
15	X Encoder B -	34	X Encoder I+
16	X Encoder I -	35	Y Encoder A+
17	Y Encoder A -	36	Y Encoder B +
18	Y Encoder B -	37	Abort*
19	ACMDY/DIRX		

**Active low*

Ordering Information

PART NUMBER	DESCRIPTION	QUANTITY 1	QUANTITY 100
DMC-1415-card (or -3415)	1-axis stand-alone with Ethernet & RS232	$ 595	$ 395
DMC-1415-box (or -3415)	DMC-1415 in enclosure with power supply	$ 795	$ 545
DMC-1425-card (or -3425)	2-axis controller for 2 servo motors	$ 695	$ 445
DMC-1425-box (or -3425)	DMC-1425 in enclosure with power supply	$ 895	$ 595
-STEPPER option	Controls 2 step motors instead of 2 servo motors	No extra charge	
CABLE 37-pin D	37-pin D-type cable	$ 25	
ICM-1460	Interconnect Module. Specify -HAEN for high amp enable or -LAEN for low amp enable	$ 145	$ 95
ICM-1460-STEPPER	Interconnect for DMC-1425-STEPPER	$ 145	$ 95
ICM-1460-OPTO	ICM with optoisolated inputs and outputs	$ 195	$ 145
AMP-14110	1-axis 20W servo amplifier board for DMC-1415-card	$ 75	$ 55
AMP-14120	2-axis 20W servo amplifier board for DMC-1425-card	$ 125	$ 105
DB-14064	Expansion board for 64 I/O (for card-level only)	$ 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 Microsoft platforms	$ 595	

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

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