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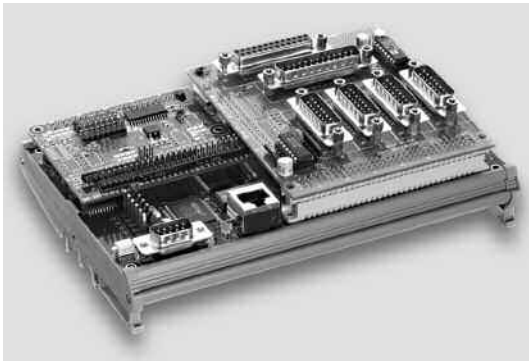
Ethernet /RS232 Econo Series, 1– 8 axes

DMC-21x3 Series

Product Description

Galil's DMC-21x3 Ethernet motion controllers are designed for extremely cost-sensitive and space-sensitive applications. The DMC-21x3 motor controllers are available with a variety of plug-in multi-axis amplifier boards that are designed to eliminate the wiring and any connectivity issues between the controller and drives.

The controllers incorporate a 32-bit microcomputer and provide such advanced features as PID compensation with velocity and acceleration feedforward, program memory with multitasking for simultaneously running up to eight programs, and uncommitted I/O 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.



DMC-2143 with mating ICM and DB-28040

Like all Galil controllers, these controllers use a simple, intuitive command language which makes 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. Communication drivers are available for Windows, .NET, Mac OSX, and Linux.

Features

- *Ethernet 10Base-T port; (1) RS232 port up to 19.2 kbaud*
- *Ethernet supports multiple masters and slaves. TCP/IP, UDP and Modbus TCP master protocol for communication with I/O devices*
- *Available in 1 through 8 axis versions*
- *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 12 MHz encoder frequencies for servos. Outputs up to 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 electronic cam. Features elliptical scaling, slow-down around corners, infinite segment feed and feedrate override*
- *Over 200 English-like commands executable by controller. Includes conditional statements and event triggers*
- *Non-volatile memory for programs, variables and arrays. Concurrent execution of up to eight programs*
- *Dual encoders, home and limits for each axis*
- *8 TTL uncommitted inputs and 8 outputs for 1- to 4-axis, 16 in/16 out for 5- to 8-axis models*
- *Optically isolated I/O and 500 mA highside outputs available with ICM-20105 (for DMC-21x3)*
- *Add 8 analog inputs and 40 digital I/O with DB-28040*
- *High speed position latch for each axis and output compare*
- *Small size: 1-4 axes card: 4.25" x 7.0"*
  5-8 axes card: 4.25" x 10.75"
- *DIN-Rail mount option*
- *Accepts +5 V, ±12 V DC inputs; DC-to-DC converter option for single 9 V to 72 V DC input*
- *DMC-21x3: 96-pin DIN connectors for each set of 4 axes. DMC-21x2: SCSI connector for each set of 4 axes*
- *Distributed control option with DMC-31x3 series*
- *Communication drivers for Windows, Mac OSX, and Linux*
- *Custom hardware and firmware options available*
- *CE certified for box-level version*

Ethernet/RS232 Econo Series, 1–8 axes

DMC-21x3 Series

Specifications

System Processor

- Motorola 32-bit microcomputer

Communications Interface

- Ethernet 10BASE-T. (1) RS232 port up to 19.2 kbaud 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
- Tangential Following
- Helical
- Electronic Gearing with multiple masters
- Gantry Mode
- Electronic Cam
- Contouring
- Teach and playback

Memory

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

Filter

- PID (proportional-integral-derivative) with velocity and acceleration feedforward
- Notch and low-pass filter
- 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/sec^2

Uncommitted Digital I/O

- 8 buffered inputs for 1–4 axes; 16 for 5–8 axes*
- 8 TTL outputs for 1–4 axes; 16 for 5–8 axes*
- 8 ±10 V range analog inputs and 40 digital I/O with DB-28040 (Default I/O is 3.3 V. For 5 V I/O, order DB-28040-5V)
- 8 analog inputs available with AMP-205x0 and SDM-206x0

High Speed Position Latch

- Uncommitted inputs 1–4 latch X,Y, Z,W; 9–12 latch E, F, G, H (latches within 0.1 microseconds)*

Dedicated Inputs (per axis)

- Main encoder inputs—Channel A, A-, B, B-, I, I- (±12 V or TTL)
- Auxiliary encoder inputs for each servo axis
- Forward and reverse limit inputs—buffered*
- Home input—buffered*
- High-speed position latch input—buffered*

Dedicated Outputs (per axis)

- Analog motor command output with 16-bit DAC resolution
- Pulse and direction output for step motors
- Amplifier enable output*
- Error output (one per controller)
- High-speed position compare output (1 output for each set of 4 axes)

Minimum Servo Loop Update Time

	STANDARD	*-FAST*†
1–2 axes:	250 µsec	125 µsec
3–4 axes:	375 µsec	250 µsec
5–6 axes:	500 µsec	375 µsec
7–8 axes:	625 µsec	500 µsec

Maximum Encoder Feedback Rate

- 12 MHz

Maximum Stepper Rate

- 3 MHz (Full, half or microstep)

Power Requirements

	1–4 axes	*5–8 axes*
+5 V	0.8 A	1.4 A
-12 V	20 mA	40 mA
+12 V	20 mA	40 mA

- DC-to-DC converter option: 9 V to 18 V for -DC12
18 V to 36 V input for -DC24
36 V to 72 V input for -DC48
- Approximate current draw for the DMC-2143 with no external load is about 200 mA for 24 V supply

Environmental

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

Mechanical

- 1–4 axes card: 4.25" × 7.0"
- 5–8 axes card: 4.25" × 10.75"

**Optically isolated I/O available with ICM-20105 option*

†Reduced feature set for -FAST.

Ethernet/RS232 Econo Series, 1–8 axes

DMC-21x3 Series

Instruction Set

Ethernet

HS	Handle switch
IA	Set IP address
IH	Open IP handle
IK	Ethernet port blocking
MB	Modbus
MW	Modbus wait
SA	Send command

Servo Motor

AF	Analog feedback
AG*	Set AMP-20540 gain
AU*	Set current loop gain
AW*	Report AMP-20540 bandwidth
DV	Dual velocity
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
PL	Pole
SH	Servo here
TK	Peak torque
TL	Continuous torque limit
TM	Sample time

Stepper Motor

AG†	Set SDM-20640 gain
KS	Stepper motor smoothing
LC	Low current
QS	Error magnitude
YA	Step drive resolution
YB	Step motor resolution
YC	Encoder resolution
YR	Error correction
YS	Stepper position maintenance

Internal Sine Commutation

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

AL	Arm latch
AQ	Analog configuration
CB	Clear bit
CO	Configure I/O points
II	Input interrupt
OB	Define output bit
OC	Output compare function
OP	Output port
SB	Set bit

† For use with SDM-20640
** For use with AMP-20540*

I/O (cont.)

@AN[x]	Value of analog input x
@IN[x]	State of digital input x
@OUT[x]	State of digital output x

System Configuration

AE	Amplifier error
BN	Burn parameters
BP	Burn program
BR*	Brush motor enable
BV	Burn variables and arrays
CC	Configure communications port
CE	Configure encoder type
CF	Configure unsolicited messages handles
CI	Configure communication interrupt
CN	Configure switches
CW	Data adjustment bit
DE	Define dual encoder position
DP	Define position
DR	Data record update rate
EO	Echo
IT	Independent smoothing
LO	Lockout handle
LZ	Leading zeros format
MO	Motor off
MT	Motor type
PF	Position format
QD	Download array
RS	Reset
^R^S	Master reset
VF	Variable format

Math Functions

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

Interrogation

LA	List arrays
LL	List labels
LS	List program
LV	List variables
MG	Message command
QH*	Query hall state
QR	Data record
QU	Upload array
QZ	Return data record info
RL	Report latch
RP	Report command position
^R^V	Firmware revision information
SC	Stop code
TA*	Tell AMP-20540 status

Interrogation (cont.)

TB	Tell status
TC	Tell error code
TD	Tell dual encoder
TE	Tell error
TH	Tell handle
TI	Tell input
TP	Tell position
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
RD	Record data
RE	Return from error routine
REM	Remark program
RI	Return from interrupt routine
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
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

Independent Motion Commands

MR	After motion—reverse
WC	Wait for contour data
WT	Wait for time
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
PT	Position tracking
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 modulus
EP	ECAM interval
EQ	Disengage ECAM
ET	ECAM table entry
EW	ECAM widen
GA	Master axis for gearing
GD	Engagement distance for gearing
GM	Gantry mode
_GP	Correction for gearing
GR	Gear ratio for gearing

Vector/Linear Interpolation

CA	Define vector plane
CR	Circular interpolation move
CS	Clear motion sequence
ES	Elliptical scaling
LE	Linear interpolation end
LI	Linear interpolation segment
LM	Linear interpolation mode
ST	Stop motion
TN	Tangent
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

ECONO

I/O Expansion Options

DB-28040 I/O Expansion Board

The DB-28040 mounts directly to the DMC-21x3 50-pin header and provides an additional 40 digital inputs and outputs, and eight 12-bit (16-bit optional) analog inputs (default I/O is 3.3 V. For 5 V I/O, order DB-28040-5V). Even with the DB-28040 attached there is still room to mount the ICM-20100, ICM-20105, SDM-20240, AMP-20341 or AMP-20440.

The 40 digital I/O signals are available on a 50-pin IDC header, and the analog inputs are available on a 16-pin header. With a controller firmware modification, the I/O board can also be modified to accept feedback from SSI encoders. 2.55" × 3.08".

DB-28104 Sinusoidal Encoder Interpolation Board

The DB-28104 mounts to the DMC-21x3 50-pin header and provides interpolation of up to four 1-volt differential sinusoidal encoders resulting in a higher position resolution. The AF n command selects sinusoidal interpolation where n specifies 2^n interpolation counts per encoder cycle (n= 5 to 12). For example, if the encoder cycle is 40 microns, AF10 results in 2^{10}=1024 counts per cycle, or a resolution of 39 nanometers per count. Each sinusoidal encoder connects to the DB-28104 through its own 9-pin D-sub connector. 3.510" × 3.075".

DMC-21x3 Interconnect and Drive Options

ICM-20100 Interconnect Module

The ICM-20100 breaks out the 96-pin connector into convenient D-sub connectors for easy interface to external amplifiers and I/O devices. The ICM-20100 provides 15-pin D-sub connectors for each of the four axes and 25-pin D-sub connectors for the auxiliary encoders and I/O. The ICM may be configured for High or Low amp enable. Default is high Amp Enable (-HAEN). For low Amp Enable, order -LAEN. The ICM-20100 mounts directly to the 96-pin connector on the DMC-21x3. 4.25" × 3.70".

ICM-20105 Interconnect with Optically Isolated I/O

The ICM-20105 provides optical isolation for DMC-21x3 inputs and outputs, and breaks out the 96-pin connector into convenient D-sub connectors for easy interface to external amplifiers and I/O devices. The ICM-20105 provides four 15-pin D-sub connectors for each of the four axes, a 37-pin D-sub for the digital I/O, home and limits, and a 25-pin D-sub for the auxiliary encoders. The maximum common voltage for the I/O is 28 VDC. Eight 500 mA highside drive outputs are available (total current not to exceed 3 A). The ICM-20105 is user-configurable for a broad range of amplifier enable options including: High amp enable, Low amp enable, 5 V logic, 12 V logic, external voltage supplies up to 24 V and sinking or sourcing. The ICM-20105 mounts directly to the 96-pin connector on the DMC-21x3. 4.25" × 3.70"

ICM-20501 Interconnect Module for AMP-205x0

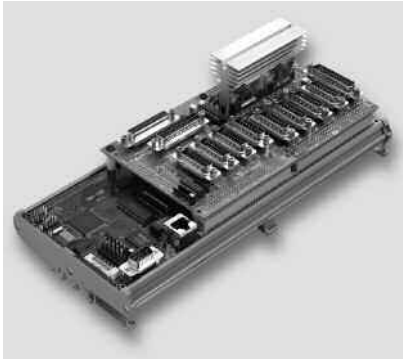
The ICM-20501 provides optical isolation on digital inputs and outputs to interface with up to 24V I/O. The first four outputs are high power outputs capable of providing up to 500 mA at up to 24 VDC. The ICM-20501 is available with D-type connectors. This provides optical isolation of the I/O when using an AMP-205x0. The D-type connectors include four 15-pin HD connectors and one 44-pin HD connector. The pinout of the 15-pin connectors are the same as the AMP-205x0. The 44-pin connections are the same except for the following four signals:

Pin 9 Output Supply
Pin 25 Input Common
Pin 39 Output Return
Pin 40 Limit Switch Common

AMP-20341 4-axis 20 W Servo Drives

The AMP-20341 contains four linear drives for operating small brush-type servo motors. The AMP-20341 requires a ± 12–30 VDC input.* Output power is 20 W per amplifier or 60 W total. 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. The AMP-20341 uses 15-pin D-sub connectors for encoder and limit connections on each axis and a 25-pin D-sub connector for I/O connections. An SSR option is available which guarantees absolutely no current during motor off. 4.25" × 3.70".

**The default configuration of the AMP-20341 is with J98 removed, which allows operation from a separate dual supply. Specify "install J98" for operation of the AMP-20341 and DMC-21x3 from the same dual supply.*



DMC-2183 8-axis controller with mounted ICM-20100 and AMP-20341

AMP-204x0 2- and 4-axis 200 W Servo Drives

The AMP-20440 contains four transconductance, PWM amplifiers for driving brush-type servo motors up to 200 Watts. Each amplifier drives up to 3.3 Amps at 20–60 VDC (available voltage at the motor is 10% less). No external heat sink is required. The AMP-20440 uses 2-pin Molex connectors for each motor and a 15-pin high density D-sub connector for encoder, limits and home for each axis. A single 44-pin high density D-sub connector is used for additional I/O signals. A 4-pin Molex is used for the DC voltage input from a single DC power supply ranging from 20–60 Volts. A two axis version, the AMP-20420 is also available. 4.95" × 3.75".

DMC-21x3 Interconnect and Drive Options — continued

AMP-205x0 2- and 4-axis 500 W Servo Drives

The AMP-20540 contains four transconductance, PWM amplifiers for driving brushless or brush-type servo motors. Each amplifier drives motors operating at up to 7 Amps continuous, 10 Amps peak, 18–60 VDC (available voltage at the motor is 10% less). The gain settings of the amplifier are user-programmable at 0.4 Amp/Volt, 0.7 Amp/Volt and 1 Amp/Volt. The switching frequency is 60 kHz. The amplifier offers protection for over-voltage, under-voltage, over-current, short-circuit and over-temperature. The amplifier status can be read through the DMC-21x3 controller, and the BS command allows easy hall sensor set-up. A 2-axis amplifier board, the AMP-20520 is also available. In a standard configuration the DB-28040 I/O board will not install next to an AMP-20540, however the AMP-20540 provides 8 uncommitted analog inputs with 12-bit ADC (16-bit optional).* The SR-19900 shunt regulator is available for the AMP-20540. 6.92" × 4.85". CE certified



AMP-20540 Interconnect with 4-axis 500 W servo drives

** Please consult factory for special options available when using a DB-28040 with an AMP-20540.*

SDM-20242 4-axis Full/Half Stepper Drives

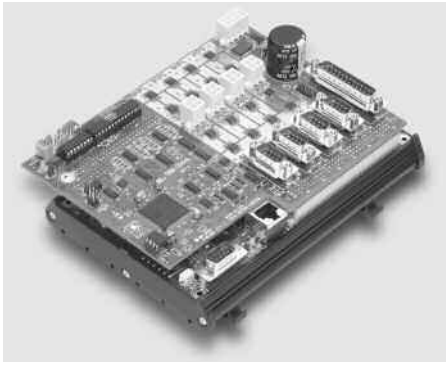
The SDM-20242 contains four drives for operating two-phase bipolar step motors. The SDM-20242 requires a single 12–30 VDC input. The SDM is user-configurable for 1.4 A, 1.0 A, 0.75 A, or 0.5 A per phase and full, half, 1/4 or 1/16 step. Adequate airflow across the board is recommended. The SDM uses 9-pin D-sub connectors for encoder and limit connections on each axis and a 25-pin D-sub connector for I/O connections. 4.25" × 3.70".

Note Regarding Power for AMP and SDM Amplifiers:

The default configuration of the AMP-205xx, AMP-204x0, SDM-20242 and SDM-206x0 amplifiers is to pass their operating voltages to the -DC24 or -DC48 controller supply. If you would like to operate these amplifiers from a separate supply, specify "no J98" on your DMC-21x3 controller and amplifier order. The default configuration of the AMP-20341 is with J98 removed which allows operation from a separate supply. Specify "install J98" for operation of the AMP-20341 and DMC-21x3 from the same dual supply.

SDM-206x0 2- and 4-axis Microstep Drives

The SDM-20640 contains four microstepping drives for operating two-phase bipolar stepper motors. The drives produce 64 microsteps per full step or 256 steps per full cycle which results in 12,800 steps/rev for a standard 200-step motor. The maximum step rate generated by the controller is 3,000,000 microsteps/second. *Correct motor sizing calculations are critical to achieve stepper performance at speed. Please contact Galil for assistance.* The SDM-20640 drives motors operating at up to 3 Amps at 12 VDC to 60 VDC (available voltage at the motor is 10% less). There are four software-selectable current settings: 0.5 A, 1 A, 2 A and 3 A. A selectable low-current mode reduces the current by 75% when the motor is not in motion. No external heatsink is required. A two-axis model, the SDM-20620 is also available. Includes 8 uncommited analog inputs.



DMC-2143 with SDM-20640 microstep drives

5- Through 8-axis Configurations

For the first four axes, any ICM, AMP or SDM may be used. Due to size constraints, for axes 5 through 8 only the ICM-20100, ICM-20105, AMP-20341, AMP-204x0 or SDM-20242 can be used.

PSR Series



Power Supplies — PSR Series

The PSR Series are regulated DC power supplies capable of operating from 100/240 VAC input, 50/60 Hz. The power supply includes power factor correction, a shunt regulator and blocking diode.

Model	*Power Rating*	*Dimensions*
PSR-12-24	24 VDC @ 12 A cont.	9" × 6.5" × 2" 3.5 lbs.
PSR-6-48	48 VDC @ 6 A cont.	9" × 6.5" × 2" 3.5 lbs.

ECONO

ECONO

Connectors—DMC-21x3

Axis 1–4 DMC-21x3 J4

96-pin DIN; Connector DIN 41612

1 Ground	33 Ground	65 Ground
2 PWM/step W	34 Sign/dir W	66 Motor command W
3 PWM/step Z	35 Sign/dir Z	67 Motor command Z
4 PWM/step Y	36 Sign/dir Y	68 Motor command Y
5 PWM/step X	37 Sign/dir X	69 Motor command X
6 Amp enable W	38 Ground	70 Output compare A-D
7 Amp enable X	39 Amp enable Y	71 Amp enable Z
8 Home W	40 Reverse limit W	72 Forward limit W
9 Home Z	41 Reverse limit Z	73 Forward limit Z
10 Home Y	42 Reverse limit Y	74 Forward limit Y
11 Home X	43 Reverse limit X	75 Forward limit X
12 Latch X/Input 1	44 Latch Y/Input 2	76 Latch Z/Input 3
13 Latch W/Input 4	45 Input 5	77 Input 6
14 Input 7	46 Input 8	78 Abort*
15 Output 3	47 Output 2	79 Output 1
16 Output 5	48 Ground	80 Output 4
17 Output 8	49 Output 7	81 Output 6
18 A+ X	50 A- X	82 B+ X
19 B- X	51 I+ X	83 I- X
20 A+ Y	52 A- Y	84 B+ Y
21 B- Y	53 I+ Y	85 I- Y
22 A+ Z	54 A- Z	86 B+ Z
23 B- Z	55 I+ Z	87 I- Z
24 A+ W	56 A- W	88 B+ W
25 B- W	57 I+ W	89 I- W
26 Ground	58 Ground	90 Ground
27 AA+ X	59 AA- X	91 AB+ X
28 AB- X	60 AA+ Y	92 AA- Y
29 AB+ Y	61 AB- Y	93 AA+ Z
30 AB+ Z	62 AA+ W	94 Error Output*
31 -12 V	63 Reset*	95 +12 V
32 5 V	64 5 V	96 5 V

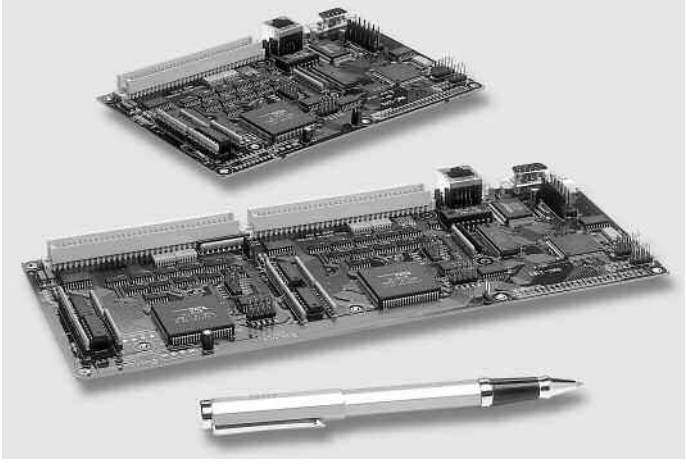
**Active low*

Axis 5 – 8 DMC-21x3 J5

96-pin DIN; Connector DIN 41612

1 Ground	33 Ground	65 Ground
2 PWM/step H	34 Sign/dir H	66 Motor command H
3 PWM/step G	35 Sign/dir G	67 Motor command G
4 PWM/step F	36 Sign/dir F	68 Motor command F
5 PWM/step E	37 Sign/dir E	69 Motor command E
6 Amp enable H	38 Ground	70 Output compare E-H
7 Amp enable E	39 Amp enable F	71 Amp enable G
8 Home H	40 Reverse limit H	72 Forward limit H
9 Home G	41 Reverse limit G	73 Forward limit G
10 Home F	42 Reverse limit F	74 Forward limit F
11 Home E	43 Reverse limit E	75 Forward limit E
12 Latch E/Input 9	44 Latch F/Input 10	76 Latch G/Input 11
13 Latch H/Input 12	45 Input 13	77 Input 14
14 Input 15	46 Input 16	78 Abort*
15 Output 11	47 Output 10	79 Output 9
16 Output 13	48 Ground	80 Output 12
17 Output 16	49 Output 15	81 Output 14
18 A+ E	50 A- E	82 B+ E
19 B- E	51 I+ E	83 I- E
20 A+ F	52 A- F	84 B+ F
21 B- F	53 I+ F	85 I- F
22 A+ G	54 A- G	86 B+ G
23 B- G	55 I+ G	87 I- G
24 A+ H	56 A- H	88 B+ H
25 B- H	57 I+ H	89 I- H
26 Ground	58 Ground	90 Ground
27 AA+ E	59 AA- E	91 AB+ E
28 AB- E	60 AA+ F	92 AA- F
29 AB+ F	61 AB- F	93 AA+ G
30 AB+ G	62 AA+ H	94 Error Output*
31 -12 V	63 Reset*	95 +12 V
32 5 V	64 5 V	96 5 V

Note: The DMC-21x3 comes standard with 96-pin DIN pins UP. It is also available with connector pins at a right angle and facing down.



DMC-2143/2183 cards (vertical connector mount; 96-pin in UP configuration)

Connectors—DB-28040

J3 8 Analog inputs (16 pin header)

1 Analog Ground	2 Analog Ground
3 Analog input 1	4 Analog input 2
5 Analog input 3	6 Analog input 4
7 Analog input 5	8 Analog input 6
9 Analog input 7	10 Analog input 8
11 Analog Ground	12 Analog Ground
13 -12V	14 +12V
15 5 V	16 Analog Ground

J1 40 Digital I/O (50-pin header)

1 Bank 4 - Bit40	2 Bank 5 - Bit41
3 Bank 4 - Bit39	4 Bank 5 - Bit42
5 Bank 4 - Bit38	6 Bank 5 - Bit43
7 Bank 4 - Bit37	8 Bank 5 - Bit44
9 Bank 4 - Bit36	10 Bank 5 - Bit45
11 Bank 4 - Bit35	12 Bank 5 - Bit46
13 Bank 4 - Bit34	14 Bank 5 - Bit47
15 Bank 4 - Bit33	16 Bank 5 - Bit48
17 Bank 3 - Bit32	18 Bank 6 - Bit49
19 Bank 3 - Bit31	20 Bank 6 - Bit50
21 Bank 3 - Bit30	22 Bank 6 - Bit51
23 Bank 3 - Bit29	24 Bank 6 - Bit52
25 Bank 3 - Bit28	26 Bank 6 - Bit53
27 Bank 3 - Bit27	28 Bank 6 - Bit54
29 Bank 3 - Bit26	30 Bank 6 - Bit55
31 Bank 3 - Bit25	32 Bank 6 - Bit56
33 Bank 2 - Bit24	34 Ground
35 Bank 2 - Bit23	36 Ground
37 Bank 2 - Bit22	38 Ground
39 Bank 2 - Bit21	40 Ground
41 Bank 2 - Bit20	42 Ground
43 Bank 2 - Bit19	44 Ground
45 Bank 2 - Bit18	46 Ground
47 Bank 2 - Bit17	48 Ground
49 5 V	50 Ground

Connectors—ICM-20100

J3 W-Axis 15-pin Male D-sub

1 Forward limit W
2 Home W
3 5 V
4 A- W
5 B- W
6 I- W
7 Amp enable W
8 Sign/dir W
9 Reverse limit W
10 Ground
11 A+ W
12 B+ W
13 I+ W
14 Motor command W
15 PWM/step W

J4 Z-Axis 15-pin Male D-sub

1 Forward limit Z
2 Home Z
3 5 V
4 A- Z
5 B- Z
6 I- Z
7 Amp enable Z
8 Sign/dir Z
9 Reverse limit Z
10 Ground
11 A+ Z
12 B+ Z
13 I+ Z
14 Motor command Z
15 PWM/step Z

J5 Y-Axis 15-pin Male D-sub

1 Forward limit Y
2 Home Y
3 5 V
4 A- Y
5 B- Y
6 I- Y
7 Amp enable Y
8 Sign/dir Y
9 Reverse limit Y
10 Ground
11 A+ Y
12 B+ Y
13 I+ Y
14 Motor command Y
15 PWM/step Y

J6 X-Axis 15-pin Male D-sub

1 Forward limit X
2 Home X
3 5 V
4 A- X
5 B- X
6 I- X
7 Amp enable X
8 Sign/dir X
9 Reverse limit X
10 Ground
11 A+ X
12 B+ X
13 I+ X
14 Motor command X
15 PWM/step X

J10 Auxiliary Encoders for X, Y, Z, W 25-pin Female D-Sub

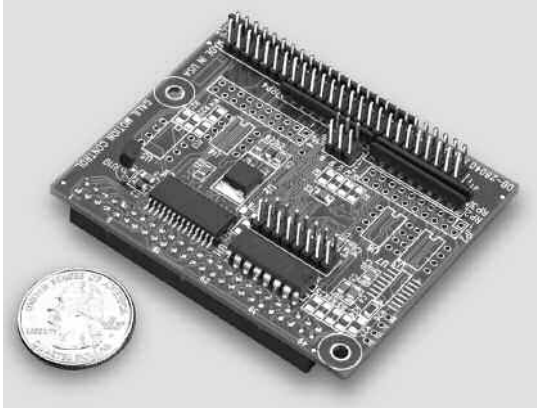
1 Reset*
2 AB- W
3 AA- W
4 AB- Z
5 AA- Z
6 AB- Y
7 AA- Y
8 AB- X
9 AA- X
10 5 V
11 5 V
12 +12 V
13 NC
14 Error Output*
15 AB+ W
16 AA+ W
17 AB+ Z
18 AA+ Z
19 AB+ Y
20 AA+ Y
21 AB+ X
22 AA+ X
23 Ground
24 Ground
25 -12 V

J11 I/O 25-pin Male D-Sub

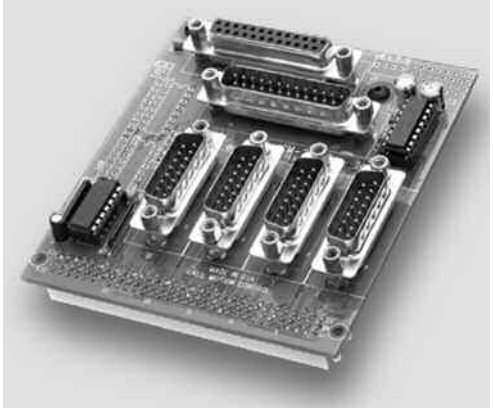
1 Ground
2 Latch X/Input 1
3 Latch Z/Input 3
4 Input 5
5 Input 7
6 Abort*
7 Output 1
8 Output 3
9 Output 5
10 Output 7
11 Ground
12 NC
13 NC
14 5 V
15 Latch Y/Input 2
16 Latch W/Input 4
17 Input 6
18 Input 8
19 Encoder-output compare
20 Output 2
21 Output 4
22 Output 6
23 Output 8
24 5 V
25 NC

**Active low*

DB-28040



ICM-20100



ECONO

Ethernet/RS232 Econo Series, 1–8 axes

DMC-21x3 Series

Connectors—ICM-20105

Interconnect with Optical Isolation

JX X-axis 15-Pin Male D-sub

1 Amp enable common-1
2 Amp enable X
3 5 V
4 A- X
5 B- X
6 I- X
7 NC
8 Sign/dir X
9 Amp enable common-2
10 Ground
11 A+ X
12 B+ X
13 I+ X
14 Motor command X
15 PWM/step X

JY Y-axis 15-Pin Male D-sub

1 Amp enable common-1
2 Amp enable Y
3 5 V
4 A- Y
5 B- Y
6 I- Y
7 NC
8 Sign/dir Y
9 Amp enable common-2
10 Ground
11 A+ Y
12 B+ Y
13 I+ Y
14 Motor command Y
15 PWM/step Y

JZ Z-axis 15-Pin Male D-sub

1 Amp enable common-1
2 Amp enable Z
3 5 V
4 A- Z
5 B- Z
6 I- Z
7 NC
8 Sign/dir Z
9 Amp enable common-2
10 Ground
11 A+ Z
12 B+ Z
13 I+ Z
14 Motor command Z
15 PWM/step Z

JW W-axis 15-Pin Male D-sub

1 Amp enable common-1
2 Amp enable W
3 5 V
4 A- W
5 B- W
6 I- W
7 NC
8 Sign/dir W
9 Amp enable common-2
10 Ground
11 A+ W
12 B+ W
13 I+ W
14 Motor command W
15 PWM/step W

JAUX Auxiliary Encoders 25-pin D-sub

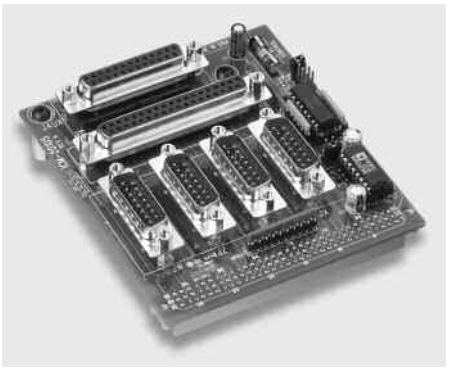
1 NC
2 AB- W
3 AA- W
4 AB- Z
5 AA- Z
6 AB- Y
7 AA- Y
8 AB- X
9 AA- X
10 5 V
11 5 V
12 +12V
13 NC
14 NC
15 AB+ W
16 AA+ W
17 AB+ Z
18 AA+ Z
19 AB+ Y
20 AA+ Y
21 AB+ X
22 AA+ X
23 Ground
24 Ground
25 -12V

J10 I/O 37-Pin Female D-sub

1 Input common
2 Input 2
3 Input 4
4 Input 6
5 Input 8
6 Output supply
7 Output 2
8 Output 4
9 Output 6
10 Output 8
11 Limit switch common
12 Reverse limit X
13 Forward limit Y
14 Home Y
15 Reverse limit Z
16 Forward limit W
17 Home W
18 5 V
19 Ground
20 Input 1
21 Input 3
22 Input 5
23 Input 7
24 Abort*
25 Output 1
26 Output 3
27 Output 5
28 Output 7
29 Output return
30 Forward limit X
31 Home X
32 Reverse limit Y
33 Forward limit Z
34 Home Z
35 Reverse limit W
36 5 V
37 Ground

**Active low*

ICM-20105



Connectors—AMP-20341

Interconnect with four 20 W servo drives

J9 Power 3-pin

1 +VM (+12 V to +30 V)
2 Ground
3 -VM (-12 V to -30 V)

J3 X-axis 15-pin Male D-sub

1 Forward limit X
2 Home X
3 5 V
4 A- X
5 B- X
6 I- X
7 AA- X
8 AB- X
9 Reverse limit X
10 Ground
11 A+ X
12 B+ X
13 I+ X
14 AA+ X
15 AB+ X

J4 Y-axis 15-pin Male D-sub

1 Forward limit Y
2 Home Y
3 5 V
4 A- Y
5 B- Y
6 I- Y
7 AA- Y
8 AB- Y
9 Reverse limit Y
10 Ground
11 A+ Y
12 B+ Y
13 I+ Y
14 AA+ Y
15 AB+ Y

J5 Z-axis 15-pin Male D-sub

1 Forward limit Z
2 Home Z
3 5 V
4 A- Z
5 B- Z
6 I- Z
7 AA- Z
8 AB- Z
9 Reverse limit Z
10 Ground
11 A+ Z
12 B+ Z
13 I+ Z
14 AA+ Z
15 AB+ Z

J6 W-axis 15-pin Male D-sub

1 Forward limit W
2 Home W
3 5 V
4 A- W
5 B- W
6 I- W
7 AA- W
8 AB- W
9 Reverse limit W
10 Ground
11 A+ W
12 B+ W
13 I+ W
14 AA+ W
15 AB+ W

J2 I/O 25-pin Male D-sub

1 Ground
2 Latch X/Input 1
3 Latch Z/Input 3
4 Input 5
5 Input 7
6 Abort*
7 Output 1
8 Output 3
9 Output 5
10 Output 7
11 Ground
12 Reset*
13 NC
14 5 V
15 Latch Y/Input 2
16 Latch W/Input 4
17 Input 6
18 Input 8
19 Encoder-compare output
20 Output 2
21 Output 4
22 Output 6
23 Output 8
24 5 V
25 Error Output*

JX, JY, JZ, JW Motor Outputs

JX1 XMO+
JX2 XMO-
JY1 YMO+
JY2 YMO-
JZ1 ZMO+
JZ2 ZMO-
JW1 WMO+
JW2 WMO-

J8 External Amplifier

1 Amp Enable X
2 Motor Command X
3 Amp Enable Y
4 Motor Command Y
5 Amp Enable Z
6 Motor Command Z
7 Amp Enable W
8 Motor Command W
9 Ground
10 Ground

Connectors—AMP-20440 Interconnect with four 200 W servo motor drives

J1 Power 4-pin
1 +VM (18 V–60 V)
2 Ground
3 +VM (18 V–60 V)
4 Ground

JX1 Motor Output 2-pin Molex
1 XMO-
2 XMO+

JY1 Motor Output 2-pin Molex
1 YMO-
2 YMO+

JZ1 Motor Output 2-pin Molex
1 ZMO-
2 ZMO+

JW1 Motor Output 2-pin Molex
1 WMO-
2 WMO+

J3 I/O 44-pin Hi-density Female D-sub
1 NC
2 Output 6
3 Output 8
4 Output 5
5 Output 2
6 Abort*
7 Input 6
8 Latch Z/Input 3
9 Amp enable Y
10 Encoder-output compare
11 Sign/dir X
12 Sign/dir Y
13 Sign/dir Z
14 Sign/dir W
15 PWM/step W
16 Amp enable W
17 Amp enable Z
18 Output 7
19 Output 4
20 Output 1
21 Output 3
22 Input 7
23 Latch W/Input 4
24 Latch X/Input 1
25 NC
26 Motor command X
27 Motor command Y
28 Motor command Z
29 Motor command W
30 Error Output*
31 NC
32 5 V
33 5 V
34 Ground

J3 I/O 44-pin Hi-density Female D-sub—*continued*
35 Ground
36 Input 8
37 Input 5
38 Latch Y/Input 2
39 NC
40 Amp enable X
41 PWM/step X
42 PWM/step Y
43 PWM/step Z
44 Reset*

J4 X-axis 15-pin Hi-density Female D-sub
1 I+ X
2 B+ X
3 A+ X
4 AB+ X
5 Ground
6 I- X
7 B- X
8 A- X
9 AA- X
10 Forward limit X
11 AA+ X
12 AB- X
13 Home X
14 Reverse limit X
15 5 V

J5 Y-axis 15-pin Hi-density Female D-sub
1 I+ Y
2 B+ Y
3 A+ Y
4 AB+ Y
5 Ground
6 I- Y
7 B- Y
8 A- Y
9 AA- Y
10 Forward limit Y
11 AA+ Y
12 AB- Y
13 Home Y
14 Reverse limit Y
15 5 V

J6 Z-axis 15-pin Hi-density Female D-sub
1 I+ Z
2 B+ Z
3 A+ Z
4 AB+ Z
5 Ground
6 I- Z
7 B- Z
8 A- Z
9 AA- Z
10 Forward limit Z
11 AA+ Z
12 AB- Z
13 Home Z
14 Reverse limit Z
15 5 V

J7 W-axis 15-pin Hi-density Female D-sub
1 I+ W
2 B+ W
3 A+ W
4 AB+ W
5 Ground
6 I- W
7 B- W
8 A- W
9 AA- W
10 Forward limit W
11 AA+ W
12 AB- W
13 Home W
14 Reverse limit W
15 5 V

**Active low*

Connectors—AMP-20540/20542 Interconnect with four servo drives (includes 8 analog inputs on AMP-20540)

J1 Power 8-pin AMP Mate-n-lock II

1 Earth
2 +VM (18 V–60 V)
3 +VM (18 V–60 V)
4 +VM (18 V–60 V)
5 Ground
6 Ground
7 Ground
8 Ground

JX1, JY1, JZ1, JW1 Motor Output 4-pin AMP Mate-n-lock II

1 NC
2 Motor phase A
3 Motor phase C
4 Motor phase B

J3 I/O 44-pin Hi-density Female D-sub

1 PWM/MCMD Z
2 Output 6
3 Output 8
4 Output 5
5 Output 2
6 Abort*
7 Input 6
8 Latch Z/Input 3
9 SIGN/AEN Y
10 Encoder-output compare
11 Reverse limit X
12 Reverse limit Y
13 Reverse limit Z
14 Reverse limit W
15 Forward limit W
16 SIGN/AEN W
17 SIGN/AEN Z
18 Output 7
19 Output 4
20 Output 1
21 Output 3
22 Input 7
23 Latch W/Input 4
24 Latch X/Input 1
25 PWM/MCMD X
26 Home X
27 Home Y
28 Home Z
29 Home W
30 Error Output*
31 PWM/MCMD W
32 5 V
33 5 V
34 Ground
35 Ground
36 Input 8
37 Input 5
38 Latch Y/Input 2
39 PWM/MCMD Y
40 SIGN/AEN X
41 Forward limit X
42 Forward limit Y
43 Forward limit Z
44 Reset*

J4 X-axis 15-pin Hi-density Female D-sub

1 I+ X
2 B+ X
3 A+ X
4 AB+ X
5 Ground
6 I- X
7 B- X
8 A- X
9 AA- X
10 Hall A X
11 AA+ X
12 AB- X
13 Hall B X
14 Hall C X
15 5 V

J5 Y-axis 15-pin Hi-density Female D-sub

1 I+ Y
2 B+ Y
3 A+ Y
4 AB+ Y
5 Ground
6 I- Y
7 B- Y
8 A- Y
9 AA- Y
10 Hall A Y
11 AA+ Y
12 AB- Y
13 Hall B Y
14 Hall C Y
15 5 V

J6 Z-axis 15-pin Hi-density Female D-sub

1 I+ Z
2 B+ Z
3 A+ Z
4 AB+ Z
5 Ground
6 I- Z
7 B- Z
8 A- Z
9 AA- Z
10 Hall A Z
11 AA+ Z
12 AB- Z
13 Hall B Z
14 Hall C Z
15 5 V

**Active low*

J7 W-axis 15-pin Hi-density Female D-sub

1 I+ W
2 B+ W
3 A+ W
4 AB+ W
5 Ground
6 I- W
7 B- W
8 A- W
9 AA- W
10 Hall A W
11 AA+ W
12 AB- W
13 Hall B W
14 Hall C W
15 5 V

J11 Analog 16-pin Header

1 Analog Ground
2 Analog Ground
3 Analog input 1
4 Analog input 2
5 Analog input 3
6 Analog input 4
7 Analog input 5
8 Analog input 6
9 Analog input 7
10 Analog input 8
11 Analog Ground
12 Analog Ground
13 -12 V
14 +12 V
15 5 V
16 Analog Ground

AMP-20540 attached to a DMC-2143 Controller



Note: The AMP-205x0 and DMC-21x3-DC24 or -DC48 are configured to accept their operating voltages from a single DC supply. If you want to operate the AMP and DMC from two separate supplies, you must remove J98 (10-pin header) on the DMC-21x3 controller. Galil will remove this header upon request if you specify "-no J98" on your DMC-21x3 order.

DMC-21x3 Series

Connectors—SDM-20242

Interconnect with four 1.4 A stepper drives

J1 Power
1 +VM (12 V–30 V)
2 Ground
3 +VM (12 V–30 V)
4 Ground

J2, J3, J4, J5
X, Y, Z, W Motor Output
1 Motor phase A+
2 Motor phase A-
3 Motor phase B+
4 Motor phase B-

J6 X-axis 9-pin Male D-sub
1 Forward limit X
2 Home X
3 5 V
4 A- X
5 B- X
6 Reverse limit X
7 Ground
8 A+ X
9 B+ X

J7 Y-axis 9-pin Male D-sub
1 Forward limit Y
2 Home Y
3 5 V
4 A- Y
5 B- Y
6 Reverse limit Y
7 Ground
8 A+ Y
9 B+ Y

J8 Z-axis 9-pin Male D-sub
1 Forward limit Z
2 Home Z
3 5 V
4 A- Z
5 B- Z
6 Reverse limit Z
7 Ground
8 A+ Z
9 B+ Z

J9 W-axis 9-pin Male D-sub
1 Forward limit W
2 Home W
3 5 V
4 A- W
5 B- W
6 Reverse limit W
7 Ground
8 A+ W
9 B+ W

J11 I/O 25-pin Male D-sub
1 Ground
2 Latch X/Input 1
3 Latch Z/Input 3
4 Input 5
5 Input 7
6 Abort*
7 Output 1
8 Output 3
9 Output 5
10 Output 7
11 Ground
12 Reset*
13 NC
14 5 V
15 Latch Y/Input 2
16 Latch W/Input 4
17 Input 6
18 Input 8
19 Encoder-output compare
20 Output 2
21 Output 4
22 Output 6
23 Output 8
24 5 V
25 Error output*

JP8 10-pin Header
1 Amp enable X
2 Motor command X
3 Amp enable Y
4 Motor command Y
5 Amp enable Z
6 Motor command Z
7 Amp enable W
8 Motor command W
9 Ground
10 Ground

**Active low*

Connectors—SDM-20640

Interconnect with four microstepping drives

J1 Power
8-pin AMP Mate-n-lock II
1 Earth
2 +VM (12V-60V)
3 +VM (12V-60V)
4 +VM (12V-60V)
5 Ground
6 Ground
7 Ground
8 Ground

JX1, JY1, JZ1, JW1
Motor Output AMP Mate-n-lock II
1 Motor phase B+
2 Motor phase A+
3 Motor phase B-
4 Motor phase A-

JX2 X-axis
9-pin Male D-sub
1 Forward limit X
2 Home X
3 5 V
4 A- X
5 B- X
6 Reverse limit X
7 Ground
8 A+ X
9 B+ X

JY2 Y-axis
9-pin Male D-sub
1 Forward limit Y
2 Home Y
3 5 V
4 A- Y
5 B- Y
6 Reverse limit Y
7 Ground
8 A+ Y
9 B+ Y

JZ2 Z-axis
9-pin Male D-sub
1 Forward limit Z
2 Home Z
3 5 V
4 A- Z
5 B- Z
6 Reverse limit Z
7 Ground
8 A+ Z
9 B+ Z

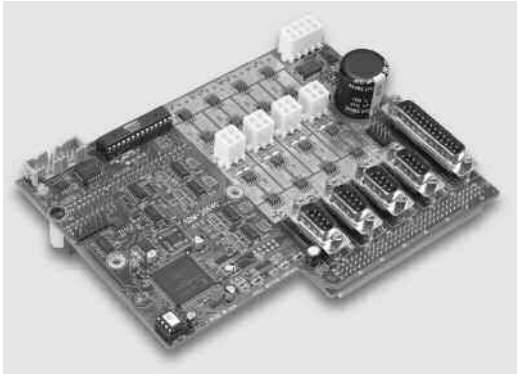
JW2 W-axis
9-pin Male D-sub
1 Forward limit W
2 Home W
3 5 V
4 A- W
5 B- W
6 Reverse limit W
7 Ground
8 A+ W
9 B+ W

J3 I/O
25-pin Male D-sub
1 Ground
2 Latch X/Input 1
3 Latch Z/Input 3
4 Input 5
5 Input 7
6 Abort*
7 Output 1
8 Output 3
9 Output 5
10 Output 7
11 Ground
12 Reset*
13 NC
14 5 V
15 Latch Y/Input 2
16 Latch W/Input 4
17 Input 6
18 Input 8
19 Encoder-output compare
20 Output 2
21 Output 4
22 Output 6
23 Output 8
24 5 V
25 Error output*

JP8 10-pin Header
1 Amp enable X
2 Motor command X
3 Amp enable Y
4 Motor command Y
5 Amp enable Z
6 Motor command Z
7 Amp enable W
8 Motor command W
9 Ground
10 Ground

J11 Analog
16-pin Header
1 Analog Ground
2 Analog Ground
3 Analog input 1
4 Analog input 2
5 Analog input 3
6 Analog input 4
7 Analog input 5
8 Analog input 6
9 Analog input 7
10 Analog input 8
11 Analog Ground
12 Analog Ground
13 -12 V
14 +12 V
15 5 V
16 Analog Ground

SDM-20640 Interconnect with four microstepping drives



Ethernet/RS232 Econo Series, 1–8 axes

DMC-21x3 Series

Ordering Information

PART NUMBER	DESCRIPTION	QUANTITY 1	QUANTITY 100
DMC-2113 (or -2112)	1-axis Ethernet 10BASE-T, RS232 card, 96-pin DIN (or 100-pin SCSI)	$ 795	$ 595
DMC-2123 (or -2122)	2-axis Ethernet 10BASE-T, RS232 card, 96-pin DIN (or 100-pin SCSI)	$ 895	$ 665
DMC-2133 (or -2132)	3-axis Ethernet 10BASE-T, RS232 card, 96-pin DIN (or 100-pin SCSI)	$1045	$ 725
DMC-2143 (or -2142)	4-axis Ethernet 10BASE-T, RS232 card, 96-pin DIN (or 100-pin SCSI)	$1195	$ 795
DMC-2153 (or -2152)	5-axis Ethernet 10BASE-T, RS232 card, 96-pin DIN (or 100-pin SCSI)	$1295	$ 845
DMC-2163 (or -2162)	6-axis Ethernet 10BASE-T, RS232 card, 96-pin DIN (or 100-pin SCSI)	$1395	$ 895
DMC-2173 (or -2172)	7-axis Ethernet 10BASE-T, RS232 card, 96-pin DIN (or 100-pin SCSI)	$1495	$ 945
DMC-2183 (or -2182)	8-axis Ethernet 10BASE-T, RS232 card, 96-pin DIN (or 100-pin SCSI)	$1595	$ 995
DMC-31x3	DMC-21x3 with distributed control functionality	Same price as DMC-21x3	
-DIN	DIN-rail mount option for DMC-21x2/x3	$ 100	$ 50
-BOX	Metal enclosure for DMC-2143 and ICM-20105	$ 100	$ 75
-DC12, -DC24, -DC48	DC-to-DC converter for 9 V to18 V, 18 V to 36 V, or 36 V to -72 V	$ 100	$ 70
DB-28040	I/O expansion board for 8 analog inputs and 40 digital I/O (outputs sink/source 3.3 V)	$ 295	$ 195
DB-28040-5V	I/O expansion board for 40 digital I/O and 8 analog inputs. Outputs sink/source 5 V	$ 295	$ 195
DB-28104	Sinusoidal Encoder Interpolation Board	$ 395	$ 245
ICM-20100	DMC-21x3 Interconnect with D-type connectors (use 1 for every 4 axes)	$ 95	$ 75
ICM-20105	DMC-21x3 Interconnect for optically isolated I/O (use 1 for every 4 axes)	$ 195	$ 145
ICM-20501	AMP-205x0 Interconnect with optical isolation and D-Type	$ 345	$ 245
SDM-20242	DMC-21x3 Interconnect with four 1.4 A stepper drivers	$ 195	$ 175
SDM-20620	DMC-21x3 Interconnect with two microstepping drives (includes 8 analog inputs)	$ 545	$ 345
SDM-20640	DMC-21x3 Interconnect with four microstepping drives (includes 8 analog inputs)	$ 695	$ 395
AMP-20341	DMC-21x3 Interconnect with four 20 W servo drives (default J98 removed)	$ 195	$ 175
AMP-20420	DMC-21x3 Interconnect with two 200 W servo drives	$ 395	$ 245
AMP-20440	DMC-21x3 Interconnect with four 200 W servo drives	$ 595	$ 295
AMP-20520	DMC-21x3 Interconnect with two 500 W servo drives (includes 8 analog inputs)	$ 595	$ 395
AMP-20540	DMC-21x3 Interconnect with four 500 W servo drives (includes 8 analog inputs)	$ 795	$ 495
AMP-20542	DMC-21x3 interconnect with four servo drives for low-inductance motors	$ 695	$ 395
AMP-205x0-80	Option for 80 V input (default J98 removed)	No extra charge	
-16BIT ADC	16-bit ADC for analog inputs	$ 100 adder	
SR-19900	Shunt regulator for AMP-205x0	$ 75	$ 40
PSR-12-24	Power supply, 12 A, 24 VDC. Includes shunt regulator	$ 250	$ 175
PSR-6-48	Power supply, 6 A, 48 VDC. Includes shunt regulator	$ 250	$ 175
ICS-48015-M	15-pin D HD male to screw terminals. For encoders	$ 50	$ 35
ICS-48015-F	15-pin D LD female to screw terminals. For analog	$ 50	$ 35
ICS-48044-M	44-pin D HD male to screw terminals. For I/O	$ 75	$ 50
ICS-48044-F	44-pin D HD female to screw terminals. For drives	$ 75	$ 50
CABLE-15-1M	15-pin HD D sub to discrete wires—1-meter (for AMP-205x0, -204x0)	$ 25	$ 17
CABLE-15-2M	15-pin HD D sub to discrete wires—2-meter (for AMP-205x0, -204x0)	$ 30	$ 20
CABLE-44-1M	44-pin HD D sub to discrete wires—1-meter (for AMP-205x0, -204x0)	$ 35	$ 24
CABLE-44-2M	44-pin HD D sub to discrete wires—2-meter (for AMP-205x0, -204x0)	$ 40	$ 27

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