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.

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 OS, 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, slowdown 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 OS, and Linux
- Custom hardware and firmware options available
- CE certified for box-level version
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 x 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/sec2

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-
- 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: 0–70º C
- Humidity: 20 – 95% RH, non-condensing

Mechanical
- 1–4 axes card: 4.25" x 7.0"
- 5–8 axes card: 4.25" x 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
- AV*: Report AMP-20540 bandwidth
- DV: Dual velocity
- FA: Acceleration feedforward
- FV: Velocity feedforward
- IL: Integrator limit
- KD: Derivative constant
- KN: Integral constant
- KB: 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
- AGT: Set SDM-20640 gain
- KS: Stepper motor smoothing
- LC: Low current
- QS: Error magnitude
- SR: Step drive resolution
- SB: 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
- @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
- COS(x): Cosine of x
- COSH(x): Hyperbolic cosine
- COSH(x): Hyperbolic cosine
- SIN(x): Sine of x
- SQRT(x): Square root of x
- TAN(x): Tangent of x

### Interrogation
- LA: List arrays
- LS: List labels
- LV: List program
- MG: Message command
- GM*: 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
- 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
- VF: Variable format

### Error Control
- BL: Backward software limit
- BR: Break routine
- BO: Before operation
- 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
- AT: At speed
- AV: After vector distance
- MC: Motion complete
- MF: After motion—forward

### Independent Motion Commands
- MR: Motor—after motion
- 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: ECAM engage
- 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

@ACOS[x]: Arc cosine of x
@INT[x]: Integer portion of x
@FRAC[x]: Fraction portion of x
@COS[x]: Cosine of x
@ATAN[x]: Arc tangent of x
@TAN[x]: Tangent
@SQR[x]: Square root of x
@SIN[x]: Sine of x
ˆRˆS: Master reset
QD: Download array
PV: Position format
MT: Motor type
MO: Motor off
LZ: Leading zeros format
LO: Lockout handle
LS: List program
LV: List variables
MG: Message command
GM*: 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

* For use with AMP-20540
† For use with SDM-20640
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” x 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 $A F^n$ 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, $A F 10$ 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” x 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” x 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” x 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 $\pm 12-30$ 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” x 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.

**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” x 3.75”.
**DMC-21x3 Series**

**Ethernet/RS232 Econo Series, 1–8 axes**

**SDM-20242 4-axis Full/Half Stepper Drives**
The SDM-20242 contains four 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 uncommitted analog inputs.

**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**
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.
**DMC-21x3 Series**

**Connectors—DMC-21x3**

### Axis 1–4 DMC-21x3 J4

<table>
<thead>
<tr>
<th>Axis 1–4 DMC-21x3 J4</th>
<th>96-pin DIN; Connector DIN 41612</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Ground</td>
<td>33 Ground</td>
</tr>
<tr>
<td>2 PWM/step W</td>
<td>34 Sign/dir W</td>
</tr>
<tr>
<td>3 PWM/step Z</td>
<td>35 Sign/dir Z</td>
</tr>
<tr>
<td>4 PWM/step Y</td>
<td>36 Sign/dir Y</td>
</tr>
<tr>
<td>5 PWM/step X</td>
<td>37 Sign/dir X</td>
</tr>
<tr>
<td>6 Amp enable W</td>
<td>38 Ground</td>
</tr>
<tr>
<td>7 Amp enable X</td>
<td>39 Amp enable Y</td>
</tr>
<tr>
<td>8 Home W</td>
<td>40 Reverse limit W</td>
</tr>
<tr>
<td>9 Home Z</td>
<td>41 Reverse limit Z</td>
</tr>
<tr>
<td>10 Home Y</td>
<td>42 Reverse limit Y</td>
</tr>
<tr>
<td>11 Home X</td>
<td>43 Reverse limit X</td>
</tr>
<tr>
<td>12 Latch X/Inpu t 1</td>
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<tr>
<td>13 Latch W/Inpu t 4</td>
<td>45 Inpu t 5</td>
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<tr>
<td>14 Inpu t 7</td>
<td>46 Inpu t 8</td>
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<tr>
<td>15 Output 3</td>
<td>47 Output 2</td>
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<tr>
<td>16 Output 5</td>
<td>48 Ground</td>
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<tr>
<td>17 Output 8</td>
<td>49 Output 7</td>
</tr>
<tr>
<td>18 A+ X</td>
<td>50 A- X</td>
</tr>
<tr>
<td>19 B- X</td>
<td>51 I- X</td>
</tr>
<tr>
<td>20 A+ Y</td>
<td>52 A- Y</td>
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<tr>
<td>21 B- Y</td>
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<td>22 A+ Z</td>
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<td>24 A+ W</td>
<td>56 A- W</td>
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<td>25 B- W</td>
<td>57 I- W</td>
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<tr>
<td>26 Ground</td>
<td>58 Ground</td>
</tr>
<tr>
<td>27 AA+ X</td>
<td>59 AA- X</td>
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<tr>
<td>28 AB- X</td>
<td>60 AA+ Y</td>
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<tr>
<td>29 AB+ Y</td>
<td>61 AB- Y</td>
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<tr>
<td>30 AB+ Z</td>
<td>62 AA+ W</td>
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<tr>
<td>31 -12 V</td>
<td>63 Reset*</td>
</tr>
<tr>
<td>32 5 V</td>
<td>64 5 V</td>
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</tbody>
</table>

*Active low

**Axis 5–8 DMC-21x3 J5**

<table>
<thead>
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<th>Axis 5–8 DMC-21x3 J5</th>
<th>96-pin DIN; Connector DIN 41612</th>
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<tbody>
<tr>
<td>1 Ground</td>
<td>33 Ground</td>
</tr>
<tr>
<td>2 PWM/step H</td>
<td>34 Sign/dir H</td>
</tr>
<tr>
<td>3 PWM/step G</td>
<td>35 Sign/dir G</td>
</tr>
<tr>
<td>4 PWM/step F</td>
<td>36 Sign/dir F</td>
</tr>
<tr>
<td>5 PWM/step E</td>
<td>37 Sign/dir E</td>
</tr>
<tr>
<td>6 Amp enable H</td>
<td>38 Ground</td>
</tr>
<tr>
<td>7 Amp enable E</td>
<td>39 Amp enable F</td>
</tr>
<tr>
<td>8 Home H</td>
<td>40 Reverse limit H</td>
</tr>
<tr>
<td>9 Home G</td>
<td>41 Reverse limit G</td>
</tr>
<tr>
<td>10 Home F</td>
<td>42 Reverse limit F</td>
</tr>
<tr>
<td>11 Home E</td>
<td>43 Reverse limit E</td>
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<tr>
<td>12 Latch E/Inpu t 9</td>
<td>44 Latch F/Inpu t 10</td>
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<tr>
<td>13 Latch H/Inpu t 12</td>
<td>45 Inpu t 13</td>
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<tr>
<td>14 Inpu t 15</td>
<td>46 Inpu t 16</td>
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<tr>
<td>15 Output 11</td>
<td>47 Output 10</td>
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<tr>
<td>16 Output 13</td>
<td>48 Ground</td>
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<tr>
<td>17 Output 16</td>
<td>49 Output 15</td>
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<td>18 A+ E</td>
<td>50 A- E</td>
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<td>19 B- E</td>
<td>51 I- E</td>
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<td>20 A+ F</td>
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<td>22 A+ G</td>
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<td>23 B- G</td>
<td>55 I- G</td>
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<td>24 A+ H</td>
<td>56 A- H</td>
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<td>29 AB+ F</td>
<td>61 AB- F</td>
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<tr>
<td>30 AB+ G</td>
<td>62 AA+ H</td>
</tr>
<tr>
<td>31 -12 V</td>
<td>63 Reset*</td>
</tr>
<tr>
<td>32 5 V</td>
<td>64 5 V</td>
</tr>
</tbody>
</table>

*Active low

**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.
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. 5V

**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. 5V

Connectors—ICM-20100

**J3** W-Axis 15-pin Male D-sub

1. Forward limit W  
2. Home W  
3. 5V  
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. 5V  
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. 5V  
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. 5V  
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. 5V  
11. 5V  
12. +12V  
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. -12V

**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. 5V  
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. 5V  
25. NC

*Active low
Connectors—ICM-20105
Interconnect with Optical Isolation

**JX** X-axis
15-Pin Male D-sub
1 Amp enable common-1
2 Amp enable Y
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

**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

**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

**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

**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 -12 V
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 -12 V

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 7A- 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 5 V
16 15 Latch Y/Input 2
17 16 Latch W/Input 4
18 17 Input 6
19 18 Input 8
20 Encoder-compare output
21 20 Output 2
22 21 Output 4
23 22 Output 6
24 23 Output 8
25 24 5 V
25 Error Output*

**JX** X-axis
1 XMO+
2 XMO-

**JY** Y-axis
1 YMO+
2 YMO-

**JZ** Z-axis
1 ZMO+
2 ZMO-

**JW** W-axis
1 WMO+
2 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** 1/0 44-pin Hi-density Female D-sub — continued

<table>
<thead>
<tr>
<th>Pin</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>35</td>
<td>Ground</td>
</tr>
<tr>
<td>36</td>
<td>Input B</td>
</tr>
<tr>
<td>37</td>
<td>Input S</td>
</tr>
<tr>
<td>38</td>
<td>Latch Y/Input 2</td>
</tr>
<tr>
<td>39</td>
<td>NC</td>
</tr>
<tr>
<td>40</td>
<td>Amp enable X</td>
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<tr>
<td>41</td>
<td>PWM/step X</td>
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<tr>
<td>42</td>
<td>PWM/step Y</td>
</tr>
<tr>
<td>43</td>
<td>PWM/step Z</td>
</tr>
<tr>
<td>44</td>
<td>Reset*</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Pin</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>I+ X</td>
</tr>
<tr>
<td>2</td>
<td>B+ X</td>
</tr>
<tr>
<td>3</td>
<td>A+ X</td>
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<tr>
<td>4</td>
<td>AB+ X</td>
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<tr>
<td>5</td>
<td>Ground</td>
</tr>
<tr>
<td>6</td>
<td>I- X</td>
</tr>
<tr>
<td>7</td>
<td>B- X</td>
</tr>
<tr>
<td>8</td>
<td>A- X</td>
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<tr>
<td>9</td>
<td>AA- X</td>
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<tr>
<td>10</td>
<td>Forward limit X</td>
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<td>11</td>
<td>AA+ X</td>
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<td>AB- X</td>
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<td>Home X</td>
</tr>
<tr>
<td>14</td>
<td>Reverse limit X</td>
</tr>
<tr>
<td>15</td>
<td>5 V</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Pin</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>I+ Y</td>
</tr>
<tr>
<td>2</td>
<td>B+ Y</td>
</tr>
<tr>
<td>3</td>
<td>A+ Y</td>
</tr>
<tr>
<td>4</td>
<td>AB+ Y</td>
</tr>
<tr>
<td>5</td>
<td>Ground</td>
</tr>
<tr>
<td>6</td>
<td>I- Y</td>
</tr>
<tr>
<td>7</td>
<td>B- Y</td>
</tr>
<tr>
<td>8</td>
<td>A- Y</td>
</tr>
<tr>
<td>9</td>
<td>AA- Y</td>
</tr>
<tr>
<td>10</td>
<td>Forward limit Y</td>
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<tr>
<td>11</td>
<td>AA+ Y</td>
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<tr>
<td>12</td>
<td>AB- Y</td>
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<tr>
<td>13</td>
<td>Home Y</td>
</tr>
<tr>
<td>14</td>
<td>Reverse limit Y</td>
</tr>
<tr>
<td>15</td>
<td>5 V</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Pin</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>I+ Z</td>
</tr>
<tr>
<td>2</td>
<td>B+ Z</td>
</tr>
<tr>
<td>3</td>
<td>A+ Z</td>
</tr>
<tr>
<td>4</td>
<td>AB+ Z</td>
</tr>
<tr>
<td>5</td>
<td>Ground</td>
</tr>
<tr>
<td>6</td>
<td>I- Z</td>
</tr>
<tr>
<td>7</td>
<td>B- Z</td>
</tr>
<tr>
<td>8</td>
<td>A- Z</td>
</tr>
<tr>
<td>9</td>
<td>AA- Z</td>
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<td>10</td>
<td>Forward limit Z</td>
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<tr>
<td>11</td>
<td>AA+ Z</td>
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<tr>
<td>12</td>
<td>AB- Z</td>
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<tr>
<td>13</td>
<td>Home Z</td>
</tr>
<tr>
<td>14</td>
<td>Reverse limit Z</td>
</tr>
<tr>
<td>15</td>
<td>5 V</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Pin</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>I+ W</td>
</tr>
<tr>
<td>2</td>
<td>B+ W</td>
</tr>
<tr>
<td>3</td>
<td>A+ W</td>
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<tr>
<td>4</td>
<td>AB+ W</td>
</tr>
<tr>
<td>5</td>
<td>Ground</td>
</tr>
<tr>
<td>6</td>
<td>I- W</td>
</tr>
<tr>
<td>7</td>
<td>B- W</td>
</tr>
<tr>
<td>8</td>
<td>A- W</td>
</tr>
<tr>
<td>9</td>
<td>AA- W</td>
</tr>
<tr>
<td>10</td>
<td>Forward limit W</td>
</tr>
<tr>
<td>11</td>
<td>AA+ W</td>
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<tr>
<td>12</td>
<td>AB- W</td>
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<tr>
<td>13</td>
<td>Home W</td>
</tr>
<tr>
<td>14</td>
<td>Reverse limit W</td>
</tr>
<tr>
<td>15</td>
<td>5 V</td>
</tr>
</tbody>
</table>

*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 (18V–60V)
3. +VM (18V–60V)
4. +VM (18V–60V)
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 1/0 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/Output 4
24. Latch X/Output 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. 5V
33. 5V
34. Ground
35. Ground
36. Input 8
37. Input 5
38. Latch Y/Output 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. 5V

### 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. 5V

### 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. 5V

### 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. 5V

### 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. -12V
14. +12V
15. 5V
16. Analog Ground

*Active low

---

**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.
**Connectors—SDM-20242**
Interconnect with four 1.4 A stepper drives

<table>
<thead>
<tr>
<th>J1</th>
<th>Power</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>+VM (12 V–30 V)</td>
</tr>
<tr>
<td>2</td>
<td>Ground</td>
</tr>
<tr>
<td>3</td>
<td>+VM (12 V–30 V)</td>
</tr>
<tr>
<td>4</td>
<td>Ground</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>J2, J3, J4, J5</th>
<th>X, Y, Z, W Motor Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Motor phase A+</td>
</tr>
<tr>
<td>2</td>
<td>Motor phase A-</td>
</tr>
<tr>
<td>3</td>
<td>Motor phase B+</td>
</tr>
<tr>
<td>4</td>
<td>Motor phase B-</td>
</tr>
</tbody>
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<table>
<thead>
<tr>
<th>J6</th>
<th>X-axis 9-pin Male D-sub</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Forward limit X</td>
</tr>
<tr>
<td>2</td>
<td>Home X</td>
</tr>
<tr>
<td>3</td>
<td>S V</td>
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<tr>
<td>4</td>
<td>A- X</td>
</tr>
<tr>
<td>5</td>
<td>B- X</td>
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<tr>
<td>6</td>
<td>Reverse limit X</td>
</tr>
<tr>
<td>7</td>
<td>Ground</td>
</tr>
<tr>
<td>8</td>
<td>A+ X</td>
</tr>
<tr>
<td>9</td>
<td>B+ X</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>J7</th>
<th>Y-axis 9-pin Male D-sub</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Forward limit Y</td>
</tr>
<tr>
<td>2</td>
<td>Home Y</td>
</tr>
<tr>
<td>3</td>
<td>S V</td>
</tr>
<tr>
<td>4</td>
<td>A- Y</td>
</tr>
<tr>
<td>5</td>
<td>B- Y</td>
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<tr>
<td>6</td>
<td>Reverse limit Y</td>
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<tr>
<td>7</td>
<td>Ground</td>
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<tr>
<td>8</td>
<td>A+ Y</td>
</tr>
<tr>
<td>9</td>
<td>B+ Y</td>
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<table>
<thead>
<tr>
<th>J8</th>
<th>Z-axis 9-pin Male D-sub</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Forward limit Z</td>
</tr>
<tr>
<td>2</td>
<td>Home Z</td>
</tr>
<tr>
<td>3</td>
<td>S V</td>
</tr>
<tr>
<td>4</td>
<td>A- Z</td>
</tr>
<tr>
<td>5</td>
<td>B- Z</td>
</tr>
<tr>
<td>6</td>
<td>Reverse limit Z</td>
</tr>
<tr>
<td>7</td>
<td>Ground</td>
</tr>
<tr>
<td>8</td>
<td>A+ Z</td>
</tr>
<tr>
<td>9</td>
<td>B+ Z</td>
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</tbody>
</table>

**Connectors—SDM-20640**
Interconnect with four microstepping drives

<table>
<thead>
<tr>
<th>J1</th>
<th>Power</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Forward limit W</td>
</tr>
<tr>
<td>2</td>
<td>Home W</td>
</tr>
<tr>
<td>3</td>
<td>S V</td>
</tr>
<tr>
<td>4</td>
<td>A- W</td>
</tr>
<tr>
<td>5</td>
<td>B- W</td>
</tr>
<tr>
<td>6</td>
<td>Reverse limit W</td>
</tr>
<tr>
<td>7</td>
<td>Ground</td>
</tr>
<tr>
<td>8</td>
<td>A+ W</td>
</tr>
<tr>
<td>9</td>
<td>B+ W</td>
</tr>
</tbody>
</table>

**J2, J3, J4, J5**
X, Y, Z, W Motor Output

<table>
<thead>
<tr>
<th>J6</th>
<th>Power</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Forward limit X</td>
</tr>
<tr>
<td>2</td>
<td>Home X</td>
</tr>
<tr>
<td>3</td>
<td>S V</td>
</tr>
<tr>
<td>4</td>
<td>A- X</td>
</tr>
<tr>
<td>5</td>
<td>B- X</td>
</tr>
<tr>
<td>6</td>
<td>Reverse limit X</td>
</tr>
<tr>
<td>7</td>
<td>Ground</td>
</tr>
<tr>
<td>8</td>
<td>A+ X</td>
</tr>
<tr>
<td>9</td>
<td>B+ X</td>
</tr>
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<table>
<thead>
<tr>
<th>J7</th>
<th>Power</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Forward limit Y</td>
</tr>
<tr>
<td>2</td>
<td>Home Y</td>
</tr>
<tr>
<td>3</td>
<td>S V</td>
</tr>
<tr>
<td>4</td>
<td>A- Y</td>
</tr>
<tr>
<td>5</td>
<td>B- Y</td>
</tr>
<tr>
<td>6</td>
<td>Reverse limit Y</td>
</tr>
<tr>
<td>7</td>
<td>Ground</td>
</tr>
<tr>
<td>8</td>
<td>A+ Y</td>
</tr>
<tr>
<td>9</td>
<td>B+ Y</td>
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</table>

**J8**
Z-axis 9-pin Male D-sub

<table>
<thead>
<tr>
<th>J9</th>
<th>W-axis 9-pin Male D-sub</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>Forward limit W</td>
</tr>
<tr>
<td>2</td>
<td>Home W</td>
</tr>
<tr>
<td>3</td>
<td>S V</td>
</tr>
<tr>
<td>4</td>
<td>A- W</td>
</tr>
<tr>
<td>5</td>
<td>B- W</td>
</tr>
<tr>
<td>6</td>
<td>Reverse limit W</td>
</tr>
<tr>
<td>7</td>
<td>Ground</td>
</tr>
<tr>
<td>8</td>
<td>A+ W</td>
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<tr>
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<td>B+ W</td>
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**J11 I/O 25-pin Male D-sub**

<table>
<thead>
<tr>
<th>J11</th>
<th>I/O 25-pin Male D-sub</th>
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<tbody>
<tr>
<td>1</td>
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<tr>
<td>2</td>
<td>Latch X/Input 1</td>
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<tr>
<td>3</td>
<td>Latch Z/Input 3</td>
</tr>
<tr>
<td>4</td>
<td>Input 5</td>
</tr>
<tr>
<td>5</td>
<td>Input 7</td>
</tr>
<tr>
<td>6</td>
<td>Abort*</td>
</tr>
<tr>
<td>7</td>
<td>Output 1</td>
</tr>
<tr>
<td>8</td>
<td>Output 3</td>
</tr>
<tr>
<td>9</td>
<td>Output 5</td>
</tr>
<tr>
<td>10</td>
<td>Output 7</td>
</tr>
<tr>
<td>11</td>
<td>Ground</td>
</tr>
<tr>
<td>12</td>
<td>Reset*</td>
</tr>
<tr>
<td>13</td>
<td>NC</td>
</tr>
<tr>
<td>14</td>
<td>S V</td>
</tr>
<tr>
<td>15</td>
<td>Latch Y/Input 2</td>
</tr>
<tr>
<td>16</td>
<td>Latch W/Input 4</td>
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<tr>
<td>17</td>
<td>Input 6</td>
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<tr>
<td>18</td>
<td>Input 8</td>
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<tr>
<td>19</td>
<td>Encoder-output compare</td>
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<tr>
<td>20</td>
<td>Output 2</td>
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<tr>
<td>21</td>
<td>Output 4</td>
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<td>22</td>
<td>Output 6</td>
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<tr>
<td>23</td>
<td>Output 8</td>
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<tr>
<td>24</td>
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<tr>
<td>25</td>
<td>Error output*</td>
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**JP8 10-pin Header**

<table>
<thead>
<tr>
<th>JP8</th>
<th>Header</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Amp enable X</td>
</tr>
<tr>
<td>2</td>
<td>Motor command X</td>
</tr>
<tr>
<td>3</td>
<td>Amp enable Y</td>
</tr>
<tr>
<td>4</td>
<td>Motor command Y</td>
</tr>
<tr>
<td>5</td>
<td>Amp enable Z</td>
</tr>
<tr>
<td>6</td>
<td>Motor command Z</td>
</tr>
<tr>
<td>7</td>
<td>Amp enable W</td>
</tr>
<tr>
<td>8</td>
<td>Motor command W</td>
</tr>
<tr>
<td>9</td>
<td>Ground</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>JX1, JY1, JZ1, JW1</th>
<th>Motor Output AMP Mate-n-lock II</th>
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<tbody>
<tr>
<td>1</td>
<td>Motor phase B+</td>
</tr>
<tr>
<td>2</td>
<td>Motor phase A+</td>
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<tr>
<td>3</td>
<td>Motor phase B-</td>
</tr>
<tr>
<td>4</td>
<td>Motor phase A-</td>
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</table>

**JX2 X-axis 9-pin Male D-sub**

<table>
<thead>
<tr>
<th>JX2</th>
<th>X-axis 9-pin Male D-sub</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Forward limit X</td>
</tr>
<tr>
<td>2</td>
<td>Home X</td>
</tr>
<tr>
<td>3</td>
<td>S V</td>
</tr>
<tr>
<td>4</td>
<td>A- X</td>
</tr>
<tr>
<td>5</td>
<td>B- X</td>
</tr>
<tr>
<td>6</td>
<td>Reverse limit X</td>
</tr>
<tr>
<td>7</td>
<td>Ground</td>
</tr>
<tr>
<td>8</td>
<td>A+ X</td>
</tr>
<tr>
<td>9</td>
<td>B+ X</td>
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</tbody>
</table>

**JY2 Y-axis 9-pin Male D-sub**

<table>
<thead>
<tr>
<th>JY2</th>
<th>Y-axis 9-pin Male D-sub</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Forward limit Y</td>
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<tr>
<td>2</td>
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<td>3</td>
<td>S V</td>
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<td>A- Y</td>
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<tr>
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<td>B- Y</td>
</tr>
<tr>
<td>6</td>
<td>Reverse limit Y</td>
</tr>
<tr>
<td>7</td>
<td>Ground</td>
</tr>
<tr>
<td>8</td>
<td>A+ Y</td>
</tr>
<tr>
<td>9</td>
<td>B+ Y</td>
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**JP8 10-pin Header**

<table>
<thead>
<tr>
<th>JP8</th>
<th>Header</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Amp enable X</td>
</tr>
<tr>
<td>2</td>
<td>Motor command X</td>
</tr>
<tr>
<td>3</td>
<td>Amp enable Y</td>
</tr>
<tr>
<td>4</td>
<td>Motor command Y</td>
</tr>
<tr>
<td>5</td>
<td>Amp enable Z</td>
</tr>
<tr>
<td>6</td>
<td>Motor command Z</td>
</tr>
<tr>
<td>7</td>
<td>Amp enable W</td>
</tr>
<tr>
<td>8</td>
<td>Motor command W</td>
</tr>
<tr>
<td>9</td>
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</table>

**JZ2 Z-axis 9-pin Male D-sub**

<table>
<thead>
<tr>
<th>JZ2</th>
<th>Z-axis 9-pin Male D-sub</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Forward limit Z</td>
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<tr>
<td>2</td>
<td>Home Z</td>
</tr>
<tr>
<td>3</td>
<td>S V</td>
</tr>
<tr>
<td>4</td>
<td>A- Z</td>
</tr>
<tr>
<td>5</td>
<td>B- Z</td>
</tr>
<tr>
<td>6</td>
<td>Reverse limit Z</td>
</tr>
<tr>
<td>7</td>
<td>Ground</td>
</tr>
<tr>
<td>8</td>
<td>A+ Z</td>
</tr>
<tr>
<td>9</td>
<td>B+ Z</td>
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*Active low*
## Ordering Information

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

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