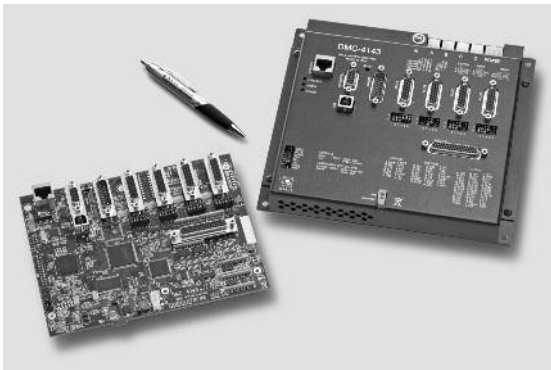**ECONO**

## Product Description

The DMC-41x3 motion controller is Galil's latest generation Econo motor controller. Compared with the DMC-21x3 Econo controller, the DMC-41x3 offers the following enhancements: 100BASE-T Ethernet, aux RS232 port, USB port, uncommitted analog inputs, accepts 15 MHz encoder frequencies, more program memory, and faster sample frequencies. The DMC-41x3 also accommodates the same stepper and servo motor drives used in the DMC-40x0 Accelera series and allows two 4-axis 500 W drives to be installed in the 8-axis controller package.

The DMC-41x3 is available as a box-level or card-level motion controller. The unit operates stand-alone or interfaces to a PC with Ethernet 10/100BASE-T, or USB. It includes optically isolated I/O in addition to analog inputs and outputs. The DMC-41x3 controller and drive unit accepts power from a single 20 –80 VDC source.

*DMC-41x3 motion controller. Available as card-level or box-level in 1- through 8-axis versions.*



The DMC-41x3 is available in one through eight axis formats, and each axis is user-configurable for stepper or servo motor operation. Standard programming features include PID compensation with velocity and acceleration feedforward, multitasking for simultaneously running up to eight programs, and I/O processing for synchronizing motion with external events. Modes of motion include point-to-point positioning, position tracking, jogging, linear and circular interpolation, contouring, electronic gearing and ECAM. Like all Galil controllers, the DMC-41x3 controllers use Galil's popular, intuitive command language, making 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.

## Features

■ Packaged or card-level controller in 1 through 8 axis versions: DMC-41x3 where x=1,2,3,4,5,6,7,8 axes

■ (1) 10/100BASE-T Ethernet port with Auto MDIX
(1) USB port–main
(1) RS232 port up –aux

■ 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 15 MHz encoder frequencies for servos. Outputs pulses 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, PVT, 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 including conditional statements and event triggers

■ Non-volatile memory for programs, variables and arrays. Multitasking for concurrent execution of up to eight programs

■ Optically isolated home input and forward and reverse end-of-travel limits for every axis

■ Uncommitted, isolated inputs and isolated outputs
1- through 4-axis models: 8 inputs and 8 outputs
5- through 8-axis models: 16 inputs and 16 outputs

■ High speed position latch for each axis and output compare

■ 8 uncommitted analog inputs

■ Dual encoder inputs for each servo axis

■ Accepts single 20 – 80 VDC input

■ Available with internal stepper and servo drives. Or, connect to external drives of any power range

■ Available as card-level or with metal enclosure

■ Communication drivers for Windows, Mac OSX, and Linux

■ Custom hardware and firmware options available

Sold & Serviced By:

**ELECTROMATE**

Toll Free Phone (877) SERVO98
Toll Free Fax (877) SERVO99
www.electromate.com
sales@electromate.com

# Ethernet/RS232/USB Econo Series, 1–8 axes

## DMC-41x3 Series

## Specifications

### System Processor

■ RISC-based, clock multiplying processor with DSP functions

### Communications Interface

■ (1) 10/100BASE-T Ethernet port with Auto MDIX

■ (1) USB port – main

■ (1) RS232 port – aux

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

### Modes of Motion:

■ Point-to-point positioning

■ Position Tracking

■ Jogging

■ 2D Linear and Circular Interpolation with feedrate override

■ Linear Interpolation for up to 8 axes

■ Tangential Following

■ Helical

■ Electronic Gearing with multiple masters and ramp-to-gearing

■ Gantry Mode

■ Electronic Cam

■ Contouring

■ PVT (Position-Velocity-Time)

■ Teach and playback

### Memory

■ Program memory size — 2000 lines × 80 characters

■ 510 variables

■ 16,000 total array elements in up to 30 arrays

### Filter

■ PID with velocity and acceleration feedforward

■ Notch filter and low-pass filter

■ Dual-loop control for backlash compensation

■ Velocity smoothing to minimize jerk

■ Integration limit

■ Torque limit

■ Offset adjustment

### Kinematic Ranges

■ Position: 32 bit (±2.15 billion counts per move; automatic rollover; no limit in jog or vector modes)

■ Velocity: Up to 15 million counts/sec for servo motors

■ Acceleration: Up to 1 billion counts/sec$^2$

### Uncommitted I/O

| | ISOLATED INPUTS | ISOLATED OUTPUTS | ANALOG INPUTS |
|---|---|---|---|
| DMC-4113 thru -4143 | 8 | 8 | 8 |
| DMC-4153 thru -4183 | 16 | 16 | 8 |

### High Speed Position Latch

■ Uncommitted inputs 1-4 latch A,B,C,D and 9-12 latch E, F, G, H axes (latches within 40 microseconds with optoisolation)

### Dedicated Inputs (per axis)

■ Main encoder inputs — Channel A, A-, B,B-,I, I- (±12 V or TTL)

■ Dual encoder (for axes configured as servo) — Channel A, A-, B, B-

■ Forward and reverse limit inputs — optoisolated

■ Home input — optoisolated

■ Selectable high-speed position latch input — optoisolated

■ Selectable abort input for each axis — optoisolated

### Dedicated Outputs (per axis)

■ Analog motor command output with 16-bit DAC resolution

■ Pulse and direction output for step motors

■ PWM output also available for servo amplifiers

■ Amplifier enable output

■ Error output (one per controller)

■ High-speed position compare output (per set of 4 axes)

### Minimum Servo Loop Update Time

| | STANDARD | -FAST* |
|---|---|---|
| ■ 1–2 axes: | 125 μsec | 62 μsec |
| ■ 3–4 axes: | 250 μsec | 125 μsec |
| ■ 5–6 axes: | 375 μsec | 188 μsec |
| ■ 7–8 axes: | 500 μsec | 250 μsec |

### Maximum Encoder Feedback Rate

■ 15 MHz

### Maximum Stepper Rate

■ 3 MHz (Full, half or microstep)

### Power Requirements

■ 20 – 80 VDC

### Environmental

■ Operating temperature: 0–70º C

■ Humidity: 20 – 95% RH, non-condensing

### Mechanical

■ 1- thru 4-axis: 8.1" × 7.25" × 1.5"
5- thru 8-axis: 11.5" × 7.25" × 1.5"

### Connectors

■ General I/O: 44-pin HD Female D-sub

■ Axes: 26-pin HD Female D-sub

■ Analog: 15-pin LD Male D-sub

*Reduced feature set for -FAST.

ECONO

Sold & Serviced By:

**ELECTROMATE**

Toll Free Phone  (877) SERVO98
Toll Free Fax  (877) SERV099
www.electromate.com
sales@electromate.com

# Ethernet/RS232/USB Econo Series, 1–8 axes

## DMC-41x3 Series

## Instruction Set

**ECONO**

### Ethernet

| | |
|---|---|
| DH | DHCP Configuration |
| HS | Handle switch |
| IA | Set IP address |
| IH | Open IP handle |
| IK | Ethernet port blocking |
| MB | Modbus |
| MW | Modbus wait |
| SA | Send command |
| SM | Subnet mask |

### Servo Motor

| | |
|---|---|
| AF | Analog feedback |
| AG | Set amplifier gain |
| AU | Set current loop gain |
| AW | Report AMP-43040 bandwidth |
| DV | Dual loop operation |
| 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 | Torque limit |
| TM | Sample time |

### Stepper Motor

| | |
|---|---|
| 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 |
| BX | Sine Amp Initialization |
| 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 |
| @AN[x] | Value of analog input x |
| @IN[x] | State of digital input x |
| @OUT[x] | State of digital output x |

### System Configuration

| | |
|---|---|
| BN | Burn parameters |
| BP | Burn program |
| BR | Brush motor enable |
| BV | Burn variables and arrays |
| BW | Brake wait |
| CC | Configure communications port |
| CE | Configure encoder type |
| CF | Configuration unsolicited messages handle |
| CI | Configure communication interrupt |
| CN | Configure switches |
| CW | Data adjustment bit |
| DE | Define dual encoder position |
| DP | Define position |
| DR | Data record update rate |
| EI | Event interrupts |
| EO | Echo |
| IT | Independent smoothing |
| ^L^K | Program protect (Lock) |
| LZ | Leading zeros format |
| MO | Motor off |
| MT | Motor type |
| PF | Position format |
| PW | Password |
| QD | Download array |
| QU | Upload array |
| RS | Reset |
| ^R^S | Master reset |
| UI | User interrupt |
| 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 |
| % | Modulus operator |

### Interrogation

| | |
|---|---|
| ID | AMP ID |
| 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 information |
| RL | Report latch |
| RP | Report command position |
| ^R^V | Firmware revision information |
| SC | Stop code |
| TA | Tell amplifier status |
| TB | Tell status |
| TC | Tell error code |
| TD | Tell dual encoder |

### Interrogation (cont.)

| | |
|---|---|
| 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 |
| ZA | Data record variables |
| ZS | Zero stack |
| ' | Comment |

### Error Control

| | |
|---|---|
| BL | Backward software limit |
| ER | Error limit |
| FL | Forward software limit |
| LD | Limit disable |
| OA | Encoder failure |
| OE | Off-on-error function |
| OT | Encoder failure period |
| OV | Encoder failure voltage |
| TW | Timeout for in-position |

### Trippoint

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

### Independent Motion

| | |
|---|---|
| AB | Abort motion |
| AC | Acceleration |
| BG | Begin motion |
| DC | Deceleration |
| FE | Find edge |
| FI | Find index |
| HM | Home |
| HV | Home speed |
| IP | Increment position |
| IT | Smoothing time constant |
| JG | Jog mode |
| PA | Position absolute |
| PR | Position relative |
| PT | Position tracking |
| SD | Switch deceleration |
| SP | Speed |
| ST | Stop |

### Contour Mode

| | |
|---|---|
| CD | Contour data |
| CM | Contour mode |
| DT | Contour time interval |

### PVT Mode

| | |
|---|---|
| PV | Position, velocity, time |
| BT | Coordinate start |

### 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 |
| EY | ECAM cycle counter |
| 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 |
| IT | Smoothing time constant |
| 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 |
| VV | Vector Velocity |

# Ethernet/RS232/USB Econo Series, 1–8 axes

## DMC-41x3 Series

**ECONO**

## Connectors — Communications

### RS232 Auxiliary Port
**9-pin; Female connector and cable**
1 NC
2 Receive data-input
3 Transmit data-output
4 NC
5 Ground
6 NC
7 Request to send-output
8 Clear to send-input
9 5 V

### Ethernet 10/100Base-T
**RJ-45 connector**

### USB Connector

## Connectors— Amplifier Board AMP-43040

### J2 Power**
**6-pin**
1 Ground
2 Ground
3 Ground
4 +VM (20 V – 80 V)
5 +VM (20 V – 80 V)
6 +VM (20 V – 80 V)

### JA1, JB1, JC1, JD1 Motor Output
**4-pin**
1 Motor Phase C
2 Motor Phase B
3 NC
4 Motor Phase A

## Connectors — I/O

### J2 General I/O Axes A thru D
**44-pin Hi-density Female D-sub**
1 Error output*
2 Input 1-isolated
3 Input 4-isolated
4 Input 7-isolated
5 Electronic Lockout-isolated input*
6 Limit switch common
7 Home A-isolated
8 Home B-isolated
9 Home C-isolated
10 Home D-isolated
11 Output power$^†$
12 Output 3-isolated
13 Output 6-isolated
14 Output return-
15 +5 V
16 Reset-isolated*
17 Input common
18 Input 3-isolated
19 Input 6-isolated
20 Abort-isolated*
21 NC
22 Reverse limit A-isolated$^†$
23 Reverse limit B-isolated$^†$
24 Reverse limit C-isolated$^†$
25 Reverse limit D-isolated$^†$
26 NC
27 Output 2-isolated
28 Output 5-isolated
29 Output 8-isolated
30 +5 V
31 Ground
32 Input 2-isolated
33 Input 5-isolated
34 Input 8-isolated
35 Ground
36 Forward limit A-isolated$^†$
37 Forward limit B-isolated$^†$
38 Forward limit C-isolated$^†$
39 Forward limit D-isolated$^†$
40 Ground
41 Output 1-isolated
42 Output 4-isolated
43 Output 7-isolated
44 Output Compare A–D

### J2 General I/O Axes E thru H
**44-pin Hi-density Female D-sub**
1 Error output*
2 Input 9-isolated
3 Input 12-isolated
4 Input 15-isolated
5 Electronic lockout-isolated input*
6 Limit switch common
7 Home E-isolated
8 Home F-isolated
9 Home G-isolated
10 Home H-isolated
11 Output power$^†$
12 Output 11-isolated
13 Output 14-isolated
14 Output return-
15 +5 V
16 Reset-isolated*
17 Input common
18 Input 11-isolated
19 Input 14-isolated
20 Abort-isolated*
21 NC
22 Reverse limit E-isolated$^†$
23 Reverse limit F-isolated$^†$
24 Reverse limit G-isolated$^†$
25 Reverse limit H-isolated$^†$
26 NC
27 Output 10-isolated
28 Output 13-isolated
29 Output 16-isolated
30 +5 V
31 Ground
32 Input 10-isolated
33 Input 13-isolated
34 Input 16-isolated
35 Ground
36 Forward limit E-isolated$^†$
37 Forward limit F-isolated$^†$
38 Forward limit G-isolated$^†$
39 Forward limit H-isolated$^†$
40 Ground
41 Output 9-isolated
42 Output 12-isolated
43 Output 15-isolated
44 Output Compare E–H

### J3 Analog Inputs
**15-pin Low-density Male D-sub**
1 Analog Ground
2 Analog input 1
3 Analog input 3
4 Analog input 5
5 Analog input 7
6 Analog Ground
7 -12 V
8 +5 V
9 Analog Ground
10 Analog input 2
11 Analog input 4
12 Analog input 6
13 Analog input 8
14 NC
15 +12 V

### Axis Connectors Axes A thru H
**26-pin Hi-density Female D-sub**
1 Hall 2
2 Amp Enable
3 Direction
4 Home–isolated
5 Limit switch common
6 Aux A-
7 Index+
8 A-
9 +5 V
10 Ground
11 Amp Enable Return
12 Hall 1
13 Step
14 Forward limit–isolated$^†$
15 Aux B+
16 Index-
17 B+
18 Ground
19 Motor command
20 Amp Enable Power
21 Hall 0
22 Reverse limit–isolated$^†$
23 Aux B-
24 Aux A+
25 B-
26 A+

**Note: Power can be input through either of the amplifier connectors to power the entire unit due to power pass-thru connectors that connect input power to all modules. For 5- through 8-axis units with two different types of amplifiers, the lower of the maximum voltages is the maximum rating for the unit. However, if you need different voltages, you can specify the ISAMP and/or ISCNTL option to separate the various power inputs.*

*When using the AMP-43140 with a power supply lower than +20 Volts, a separate supply of 20 – 80 VDC must be input to the 2-pin connector on the side of the DMC-41x3.*

*Active low
$^†$Programmable for Active high or Active low

Sold & Serviced By:

**ELECTROMATE**

Toll Free Phone (877) SERVO98
Toll Free Fax (877) SERV099
www.electromate.com
sales@electromate.com

# Ethernet/RS232/USB Econo Series, 1–8 axes

## DMC-41x3 Series

### DMC-41x3 Servo Drive Options

**AMP-430x0 2- and 4-axis 500 W Servo Drives (-D3020, -D3040)**

The AMP-43040 contains four transconductance, PWM amplifiers for driving brushless/brush servo motors. Operating at up to 7 Amps cont., 10 Amps peak, 20–80 VDC. The gain settings of the amplifier are user-programmable at 0.4, 0.7 and 1 Amp/Volt. The switching frequency is 60 kHz. The drive for each axis is software configurable to operate in either a chopper or inverter mode. The chopper mode is intended for operating low inductance motors. The amplifier offers protection for over-voltage, under-voltage, over-current, short-circuit and over-temperature. Hall sensors are required for brushless motors. A shunt regulator option is available. A two-axis version, the AMP-43020 is also available.

**AMP-43140 4-axis 20 W Servo Drives (-D3140)**

The AMP-43140 contains four linear drives for operating small, brush-type servo motors. The AMP-43140 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. An SSR option is available which guarantees absolutely no current during motor off.

**AMP-43240 4-axis 750 W Servo Drives (-D3240)**

The AMP-4324 contains four transconductance, PWM amplifiers for driving brushless/brush servo motors servo motors. Operating at up to 10 Amps cont., 20 Amps peak, 20–80 VDC. The gain settings of the amplifier are user-programmable at 0.5, 1 and 2 Amp/Volt. The switching frequency is 24 KHz. The drive operates in chopper mode. The amplifier offers protection for over-voltage, under-voltage, over-current, short-circuit and over-temperature. Hall sensors are required for brushless motors. A shunt regulator option is available.

**AMP-435x0 2- and 4-axis 600 W Servo Drives with Sinusoidal Commutation (-D3520, -D3540)**

The AMP-43540 contains four transconductance, PWM amplifiers for driving brushless servo motors with sinusoidal commutation. Each amplifier drives motors operating at up to 8 Amps cont., 15 Amps peak, 20–80 VDC. The gain settings of the amplifier are user-programmable at 0.4, 0.8 and 1.6 Amp/Volt. The switching frequency is 33 KHz. The amplifier offers protection for over-voltage, under-voltage, over-current, short-circuit and over-temperature. Hall sensors are not required for brushless motor commutation. A shunt regulator option is available. A two-axis version, the AMP-43520, is also available.

**AMP-43640 4-axis 20 W Servo Drives with Sinusoidal Commutation (-D3640)**

The AMP-43640 contains four linear, transconductance amplifiers for driving brushless servo motors with sinusoidal commutation. The AMP-43640 requires 15–30 VDC, and the gain setting of each amplifier is 0.1 A/V at 1 A maximum current. Hall sensors are not required for brushless motor commutation.

The DMC-41x3 can be optionally equipped with a multi-axis internal servo or stepper motor drive that resides inside the DMC-41x3 enclosure. 5–8 axis versions can mix and match two of the following drives.

| Drive Name (Part Number) | AMP-430x0 (-D30x0) | AMP-43140 (-D3140) | AMP-43240 (-D3240) | AMP-435x0 (-D35x0) | AMP-43640 (-D3640) |
|---|---|---|---|---|---|
| **Motor Type** | Brushed/Brushless servo | Brushed servo | Brushed/Brushless servo | Brushless servo-sinusoidal | Brushless servo-sinusoidal |
| **Axes** | 4 x=4, 2 x=2 | 4 | 4 | 4 x=4, 2 x=2 | 4 |
| **Current Drive** | PWM | Linear | PWM | PWM | Linear |
| **Axis power (Watts)** | 500 | 20 (60 max for 4 axes) | 750 | 600 | 20 |
| **Cont. Current (Amps)** | 7 | 1 | 10 | 8 | 1 |
| **Peak Current (Amps)** | 10 | 1 | 20 | 15 | 2 |
| **Voltage Bus (VDC)** | 20-80 (160 available) | +/- 12-30 bipolar | 20-80 | 20-80 | 15-30 |
| **Gains** | 0.4, 0.7, 1.0 A/V | 0.1 (0.01 available) A/V | 0.5, 1, 2 A/V | 0.4, 0.8, 1.6 A | 0.2 A/V |
| **Switching Freq (Khz)** | 60 (140 available) | N/A | 24 | 33 | N/A |
| **Typical Current Loop BW (kHz)*** | 2-8 | 4 | 4 | - | 4 |
| **Drive Modes** | Inverter, Chopper | Linear | Chopper | - | Linear |
| **Commutation** | Trap w/ 120° Halls | Brushed only | Trap w/ 120° Halls | Sinusoidal | Sinusoidal |
| **Min. Inductance (mH)** | 0.2-0.5 | 0.2 | 0.2 | 0.5 | 0.5 |
| **Over Voltage** | Yes | No | Yes | Yes | No |
| **Under Voltage** | Yes | No | Yes | Yes | No |
| **Over Current** | Yes | Fused | Yes | Yes | Fused |
| **Short circuit** | Yes | Fused | Yes | Yes | Fused |
| **Over temp** | Yes | Thermal Shutdown | Yes | Yes | Thermal Shutdown |
| **ELO input** | Yes | Yes | Yes | Yes | Yes |
| **Other Notes** | Shunt option Adjustable current loop | SSR option, disconnects power at startup | Shunt option Adjustable current loop | Shunt option | SSR option |

*Current Loop bandwidth is system dependent. **Contact Galil for unlisted upgrade options for all above drives.**

ECONO

Sold & Serviced By:

**ELECTROMATE**

Toll Free Phone (877) SERVO98
Toll Free Fax (877) SERV099
www.electromate.com
sales@electromate.com

# Ethernet/RS232/USB Econo Series, 1–8 axes

## DMC-41x3 Series

### DMC-41x3 Stepper Drive Options

#### SDM-440x0 2- and 4-axis Stepper Drives (-D4020, -D4040)
The SDM-44040 contains four drives for operating two-phase bipolar step motors. The SDM-44040 requires a single 12–30 VDC input. The unit is user-configurable for 1.4 A, 1.0 A, 0.75 A, or 0.5 A per phase and for full-step, half-step, 1/4 step or 1/16 step. A two-axis version, the SDM-44020, is also available.

#### SDM-44140 4-axis Microstep Drives (-D4140)
The SDM-44140 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. The SDM-44140 drives motors operating at up to 3 Amps at 12 to 60 VDC (available voltage at motor is 10% less). There are four software-selectable current settings: 0.5 A, 1 A, 2 A and 3 A. Plus, a selectable low-current mode reduces the current by 75% when the motor is not in motion. No external heatsink is required.
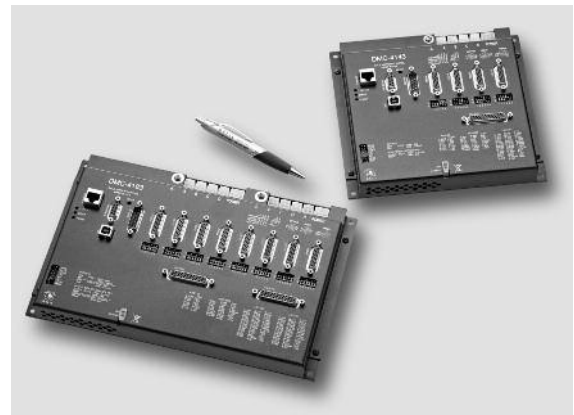
#### Power Supplies — PSR Series
The PSR Series are regulated DC power supplies capable of operating from a 100/240 VAC input, at 50/60 Hz. The power supply includes a shunt regulator and blocking diode.

| 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. |

#### ICS D-type to Screw-Terminal Boards
Galil offers various ICS boards which break-out the DMC-41x3 D-type connectors into screw terminals for quick prototyping:

**ICS-48115-F** 15-pin LD female to terminals—analog.

**ICS-48026-M** 26-pin HD male to terminals — for axes.

**ICS-48044-M** 44-pin HD male to terminals — I/O.

The DMC-41x3 can be optionally equipped with a multi-axis internal servo or stepper motor drive that resides inside the DMC-41x3 enclosure. 5–8 axis versions can mix and match two of the following drives.



*-BOX version of the DMC-41x3 controller*

| Drive Name (Part Number) | SDM-440x0 (-D40x0) | SDM-44140 (-D4140) |
|---|---|---|
| Motor Type | Stepper | Stepper |
| Axes | 4 x=4, 2 x=2 | 4 |
| Current Drive | PWM | PWM |
| Axis power (Watts) | 42 | 180 |
| Cont. Current (Amps) | - | - |
| Peak Current (Amps) | 1.4 | 3.0 |
| Voltage Bus (VDC) | 12-30 | 12-60 |
| Gains | 0.5,0.75,1.0,1.4 A | 0.5,1.0,2.0,3.0 A |
| Switching Freq (Khz) | 27 (nominal) | 60 |
| Typical Current Loop BW (kHz)* | - | - |
| Drive Modes | 1,2,4,16 microstep | 64 microstep |
| Commutation | - | - |
| Min. Inductance (mH) | 0.5 | 0.5 |
| Over Voltage | No | No |
| Under Voltage | No | Yes |
| Over Current | Yes | Yes |
| Short circuit | Yes | Yes |
| Over temp | No | Yes |
| ELO input | Yes | Yes |
| Other Notes | Low current feature | Low current feature |

*Current Loop bandwidth is system dependent. **Contact Galil for unlisted upgrade options for all above drives.**

ECONO

Sold & Serviced By:

**ELECTROMATE**

Toll Free Phone  (877) SERVO98
Toll Free Fax  (877) SERV099
www.electromate.com
sales@electromate.com

# Ethernet/RS232/USB Econo Series, 1–8 axes

## DMC-41x3 Series

## Ordering Information

*1- through 8-axis Models:*

**D M C - 4 1 x 3 - D x x x x - D x x x x - S R 9 0 - B O X**

**Number
of Axes**
1: 1-axis
2: 2-axes
3: 3-axes
4: 4-axes
5: 5-axes
6: 6-axes
7: 7-axes
8: 8-axes

**Shunt Regulator
(optional)**

**Metal enclosure
(optional if not using Galil drives.
Required for AMPs and SDMs)**

**Drive—Axes 5–8 (optional)**
3020: two 500 Watt servo motor drives
3040: four 500 Watt servo motor drives
3140: four 20 Watt servo motor drives
3240: four 750 Watt servo motor drives
3520: two 600 Watt servo motor drives—sinusoidal commutation
3540: four 600 Watt servo motor drives—sinusoidal commutation
3640: four 20 Watt servo motor drives—sinusoidal commutation
4020: two 1.4 A stepper motor drives—Full, Half, 1/4, 1/16
4040: four 1.4 A stepper motor drives—Full, Half, 1/4, 1/16
4140: four microstep drives

**Drive—Axes 1–4 (optional)**
3020: two 500 Watt servo motor drives
3040: four 500 Watt servo motor drives
3140: four 20 Watt servo motor drives
3240: four 750 Watt servo motor drives
3520: two 600 Watt servo motor drives—sinusoidal commutation
3540: four 600 Watt servo motor drives—sinusoidal commutation
3640: four 20 Watt servo motor drives—sinusoidal commutation
4020: two 1.4 A stepper motor drives—Full, Half, 1/4, 1/16
4040: four 1.4 A stepper motor drives—Full, Half, 1/4, 1/16
4140: four microstep drives

ECONO

## Options

### DMC Controller

| OPT CODE | DESCRIPTION |
|---|---|
| DIN | DIN Rail mounting option |
| 12 V | 12 VDC controller power |
| 16BIT | 16-Bit ADC for analog inputs. 12-bits is standard |
| NRExxxx | Customized upgrade |
| 422 | RS422 on auxiliary |
| SSI | SSI encoders. Quadrature encoders are standard |
| BiSS | BiSS encoders. Quadrature encoders are standard |
| TRES | Termination resistors |
| 4-20mA | 4-20mA analog inputs |
| HSRC | HIgh power sourcing outputs (default low power sinking) |

### SDM and AMP Drives

| OPT CODE | DESCRIPTION |
|---|---|
| 100mA | 100 mA output capacity for AMP-43140. Default is 1 Amp |
| ISAMP | Isolation of power between each AMP amplifier |
| ISCNTL | Isolation of controller power from amplifier power |
| SSR | No current during motor off |

*Note:* If a special option is required, place the appropriate OPT CODE inside a parenthesis directly following the respective DMC, CMB, ICM, SDM or AMP part numbers.  Use commas for multiple options within a parenthesis.

Sold & Serviced By:

**ELECTROMATE**

Toll Free Phone (877) SERVO98
Toll Free Fax (877) SERVO99
www.electromate.com
sales@electromate.com

# Ethernet/RS232/USB Econo Series, 1–8 axes

## DMC-41x3 Series

**ECONO**

## Ordering Information — continued

| PART NUMBER | DESCRIPTION | QUANTITY 1 | QUANTITY 100 |
|---|---|---|---|
| DMC-4113 | 1-axis Ethernet/RS232/USB controller (card-level) | $1095 | $ 795 |
| DMC-4123 | 2-axis Ethernet/RS232/USB controller (card-level) | $1195 | $ 865 |
| DMC-4133 | 3-axis Ethernet/RS232/USB controller (card-level) | $1345 | $ 925 |
| DMC-4143 | 4-axis Ethernet/RS232/USB controller (card-level) | $1495 | $ 995 |
| DMC-4153 | 5-axis Ethernet/RS232/USB controller (card-level) | $1695 | $1145 |
| DMC-4163 | 6-axis Ethernet/RS232/USB controller (card-level) | $1795 | $1215 |
| DMC-4173 | 7-axis Ethernet/RS232/USB controller (card-level) | $1895 | $1280 |
| DMC-4183 | 8-axis Ethernet/RS232/USB controller (card-level) | $1995 | $1345 |
| -BOX | Metal enclosure for 1–4 axis models (required if using AMPs and SDMs) | add $ 100 | add $ 75 |
| -BOX | Metal enclosure for 5–8 axis models (required if using AMPs and SDMs) | add $ 125 | add $ 100 |
| AMP-43040 (-D3040) | Four 500 W servo motor drives (use one for 1–4 axis models; Two for 5–8 axes models). Add to above. -BOX version is required for AMPs and SDMs | $ 700 | $ 400 |
| AMP-43020 (-D3020) | Two 500 W servo motor drives. -BOX version is required for AMPs and SDMs | $ 450 | $ 275 |
| AMP-43140 (-D3140) | Four 20 W servo motor drives. -BOX version is required for AMPs and SDMs | $ 175 | $ 155 |
| AMP-43240 (-D3240) | Four 750 W servo motor drives. -BOX version is required for AMPs and SDMs | $ 900 | $ 500 |
| AMP-43520 (-D3520) | Two 600 W servo motor drives with sinusoidal commutation | $ 650 | $ 375 |
| AMP-43540 (-D3540) | Four 600 W servo motor drives with sinusoidal commutation | $1000 | $ 600 |
| AMP-43640 (-D3640) | Four 20 W servo motor drives with sinusoidal commutation | $ 600 | $ 350 |
| SR-49000 (-SR90) | Shunt regulator (90 V). Add to above | $ 50 | $ 35 |
| SDM-44020 (-D4020) | Two 1.4 A stepper motor drives- Full, Half, 1/4, 1/16. -BOX required | $ 125 | $ 105 |
| SDM-44040 (-D4040) | Four 1.4 A stepper motor drives- Full, Half, 1/4, 1/16. -BOX required | $ 175 | $ 155 |
| SDM-44140 (-D4140) | Four microstep drives. -BOX version is required for AMPs and SDMs | $ 600 | $ 400 |
| PS-2.50-24 | 24 V, 60-watt power supply | $ 85 | $ 60 |
| 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-48115-F | 15-pin D LD female to screw terminals — for analog inputs | $ 50 | $ 35 |
| ICS-48044-M | 44-pin D HD male to screw terminals — for general I/O | $ 75 | $ 50 |
| ICS-48026-M | 26-pin D HD male to screw terminals — for axis connectors | $ 75 | $ 50 |
| GalilTools-Lite | Editor, Terminal, Watch Tools. Includes communication library | Free download | |
| GalilTools | Above with Scope and Tuner | $ 195 | |

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