
DMC-40x0 Installation Manual-ETL

DMC-40x0 Integrated Amplifier Installation Manual

Manual Rev. 1.0c

By Galil Motion Control, Inc.

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Using This Manual

This manual provides information for the wiring, installation, powering-up, and basic communication to the DMC-40x0 motion controller with the Galil internal amplifiers, AMP-43040 and SDM-44140. The following list of part numbers are examples of configurations of the DMC-40x0 motion controller that are covered in this manual.

DMC-4080 -D3040-D3040

DMC-4080 -D4140-D4140

This manual covers the basic installation of the controller and amplifier modules. For full operational information including specific I/O installation, detailed programming examples and additional internal driver information, see the DMC-40x0 User Manual.

WARNING: Machinery in motion can be dangerous! It is the responsibility of the user to design effective error handling and safety protection as part of the machinery. Galil shall not be liable or responsible for any incidental or consequential damages.

If the DMC-40x0 motion controller and included amplifiers or stepper drivers are not used in a manner specified by Galil Motion Control, the protection provided by the controller, amplifiers and drivers may be impaired.

Chapter 1 Overview

Introduction

DMC-40x0 Motion Controller

The DMC-40x0 Series are Galil's highest performance stand-alone controller. The controller series offers many enhanced features including high speed communications, non-volatile program memory, faster encoder speeds, and improved cabling for EMI reduction.

Each DMC-40x0 provides two communication channels: high speed RS-232 (2 channels up to 115K Baud) and 10BaseT Ethernet. The controllers allow for high-speed servo control up to 22 million encoder counts/sec and step motor control up to 6 million steps per second. Sample rates as low as 31.25 μ sec per axis are available.

A Flash EEPROM provides non-volatile memory for storing application programs, parameters, arrays and firmware. New firmware revisions are easily upgraded in the field.

The DMC-40x0 is available with up to eight axes in a single stand alone unit. The DMC-4010, 4020, 4030, 4040 are one thru four axes controllers and the DMC-4050, 4060, 4070, 4080 are five thru eight axes controllers. All eight axes have the ability to use Galil's integrated amplifiers or drivers and connections for integrating external devices.

Commands can be sent in either Binary or ASCII. Additional software is available for automatic-tuning, trajectory viewing on a PC screen, CAD translation, and program development using many environments such as Visual Basic, C, C++ etc. Drivers for Windows XP (32 & 64 bit), and Linux are available.

AMP-43040 Servo Amplifier (-D3040)

The AMP-43040 (four-axis) and AMP-43020 (two-axis) are multi-axis brush/brushless trans-conductance PWM amplifiers that are capable of handling 7Amps of continuous current and 10Amps of peak current with any one axis. The average continuous current per four-axis amplifier is 6A, with a maximum current output of 25A. The AMP-43040/43020 Brushless drive modules are connected to a DMC-40x0. The standard amplifier accepts DC supply voltages from 20-68 VDC.

NOTE: When the AMP-43040 is ordered with the ETL option, Chopper mode must be used. See the AU command in the DMC-40x0 Command Reference for more information on setting the AMP-43040 into Chopper Mode.

SDM-44140 Stepper Amplifier (-D4140)

The SDM-44140 microstepper module drives four bipolar two-phase stepper motors with 1/64 microstep resolution (the SDM-44140 drives two). The current is selectable with options of 0.5, 1.0, 2.0, & 3.0 Amps per axis. The standard SDM-44140 accepts DC supply voltages from 20-60 VDC.

Chapter 2 Installation

Pre-Installation

Operating Environment

The location for use of the DMC-40x0, AMP-43040 and SDM-44140 must meet the following requirements.

Description	Units	Specification
Ambient Temperature	C	0 to +70
Altitude	feet	10,000
Humidity	RH	20-95% (non-condensing)

Mounting Location

The DMC-40x0 motion controller must be mounted on a flat surface using the 4 mounting holes found on the metal base-plate. The grating found on the side of the metal must not be obstructed in order provide proper air flow for adequate heat dissipation. The dimensions for a 1-4 axis controller are smaller than that of a 4-8 axis controller, these dimensions and the mounting hole locations are found in Appendices A3 and A4.

Additional Mounting Consideration when using the AMP-43040

When operating a DMC-4080- D3040-D3040 or a DMC-4040-D3040, special mounting considerations must be made if the total continuous current output for the controller is greater than 15A for a 3-4 axis controller and greater than 30A for a 5-8 axis controller (standard mounting is adequate for a 1 or 2 axis controller). In this case, the controller base must be mounted to an addition heat sink.

Elements Needed for Installation

1. DC power supply
 - a. Ratings found in Appendix A1
2. Power Supply Cable
 - a. Cable from DC power supply to power input for AMP-43040 or SDM-44140.
 - b. DMC-4080 controller requires 2 cables.
3. PC or laptop with Ethernet and/or RS-232 ports
4. GalilTools, or GalilTools-Lite software package

5. Ethernet Cable
 - a. Recommended shielded Cat 5 STP cable. Straight-through or Cross-over.
6. RS-232 straight-through serial cable
 - a. 9 pin D-sub female
7. Molex pin Crimp Tool
8. Additional cables may be required for connection to motors, external amplifiers, digital or analog I/O, and other devices. See the full DMC-40x0 User Manual for further information.
9. Disconnect switch or circuit breaker for AC power to DC Power Supply

Unpacking the Controller

Caution: The DMC-40x0 motion controller and included internal amplifier include electrostatic sensitive components. Observe standard precautions for handling ESD sensitive devices when handling the controller.

1. Verify that the following components have been shipped along the motion controller.
 - Connectors and mating pins for motor power and amplifier power.
 - Qty 4 – 4 pin molex connectors for EACH internal amplifier
 - Qty 1 – 6 pin molex connector for EAH internal amplifier
 - Galil Software Installation CD

Note: Connectors and/or software installation CD may not be shipped to existing OEM customers.

2. Check that no visible damage has occurred to the controller, or internal amplifiers. If any damage has occurred to the controller, or the components shipped with the controller, contact Galil Motion Control immediately. Contact information can be found in the beginning of this manual.
3. Verify the controller that has been shipped to you is in fact the controller that you have ordered from Galil or your authorized Galil distributor. To do this, check the labeling on the controller and compare it to the part number that was ordered.

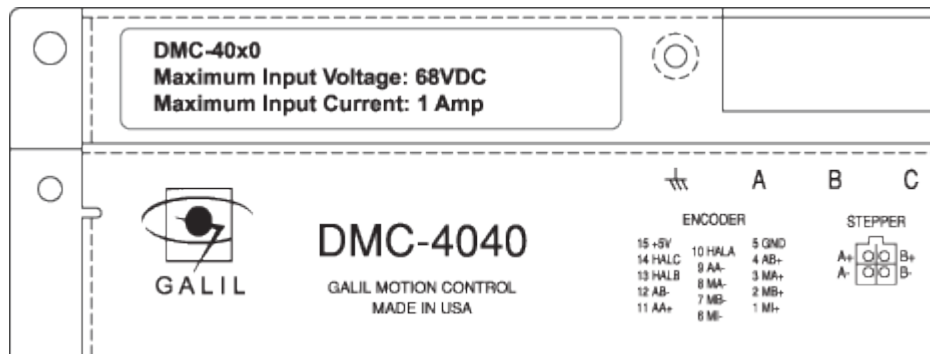


Figure 1: Label for DMC-40x0

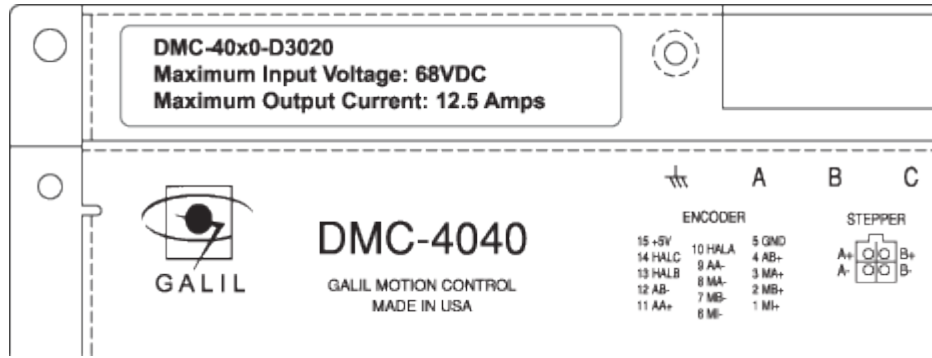


Figure 2: Label for DMC-40x0-D3020

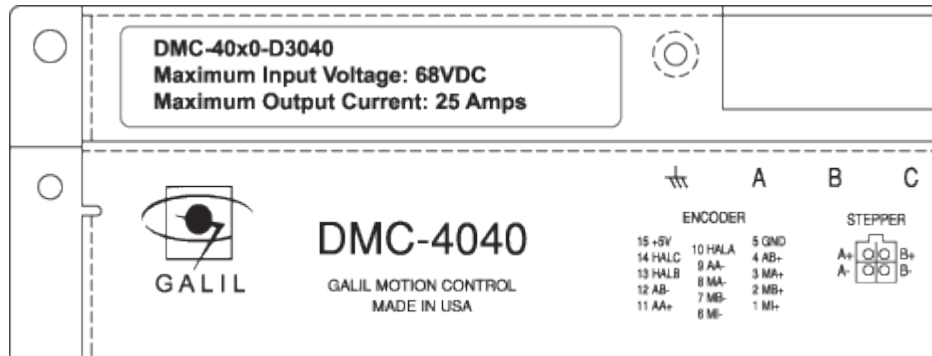


Figure 3: Label for DMC-40x0-D3040

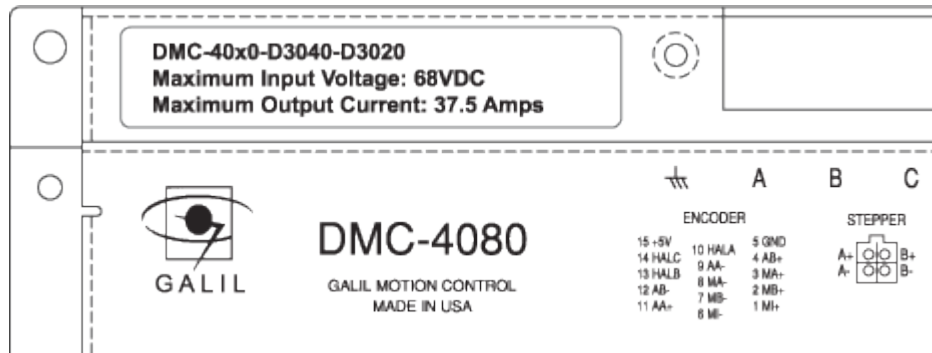


Figure 4: Label for DMC-40x0-D3040-D3020

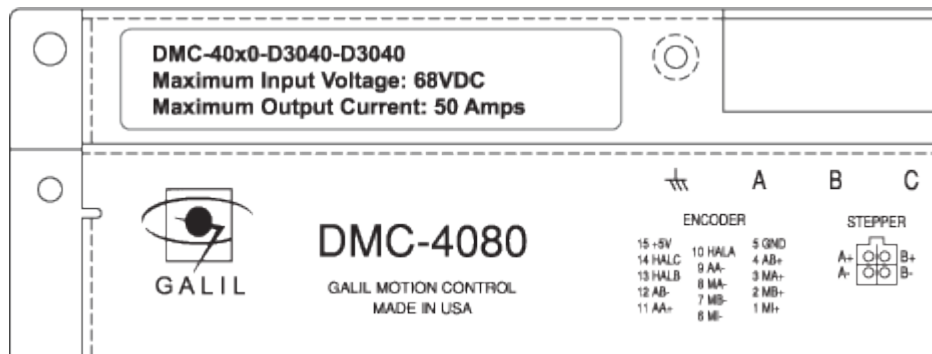


Figure 5: Label for DMC-40x0-D3040-D3040

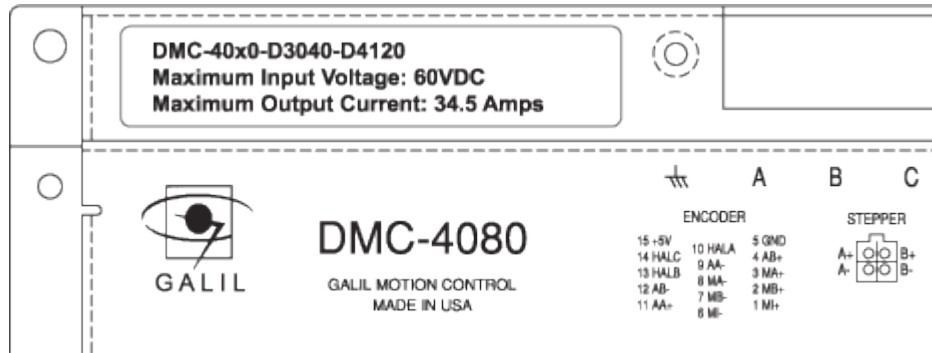


Figure 6: Label for DMC-40x0-D3040-D4120

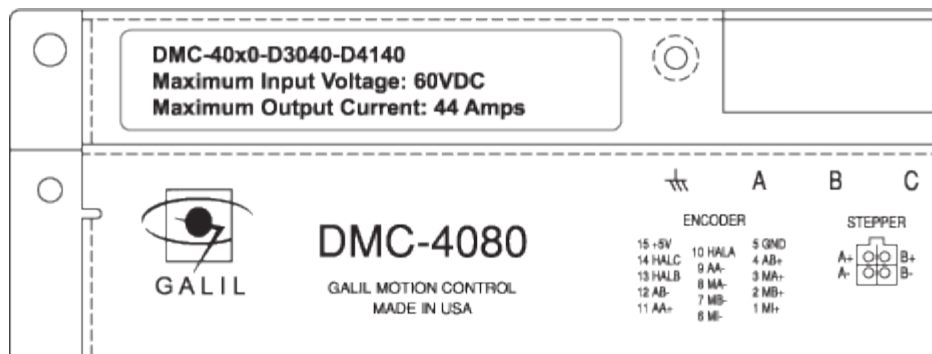


Figure 7: Label for DMC-40x0-D3040-D4140

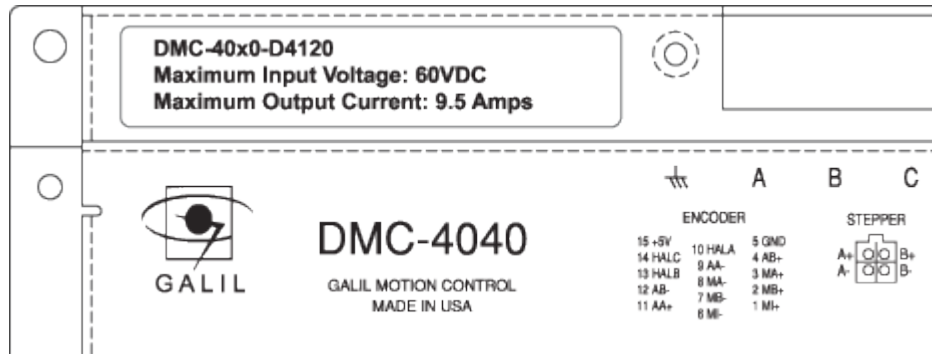


Figure 8: Label for DMC-40x0-D4120

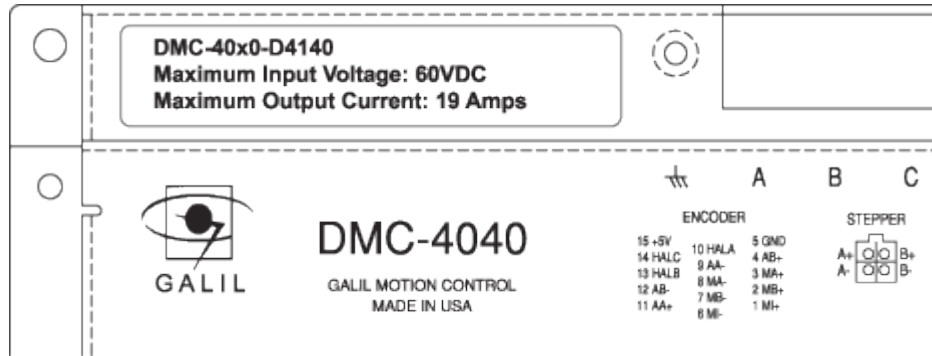


Figure 9: Label for DMC-40x0-D4140

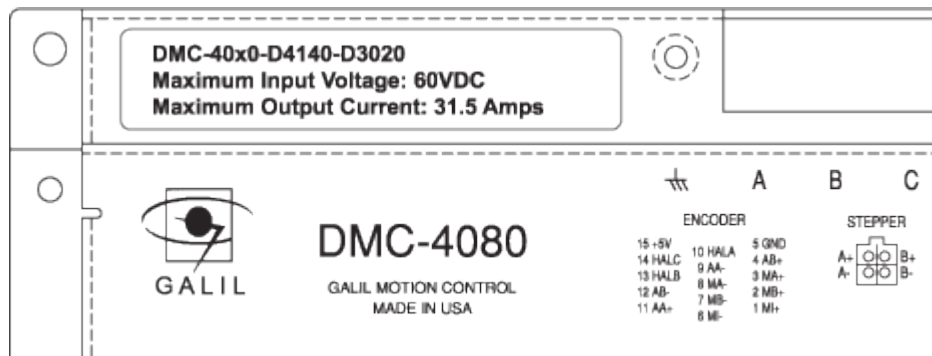


Figure 10: Label for DMC-40x0-D4140-D3020

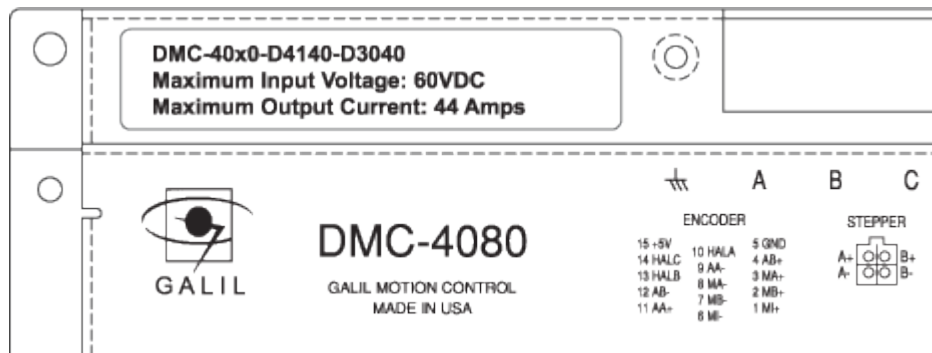


Figure 11: Label for DMC-40x0-D4140-D3040

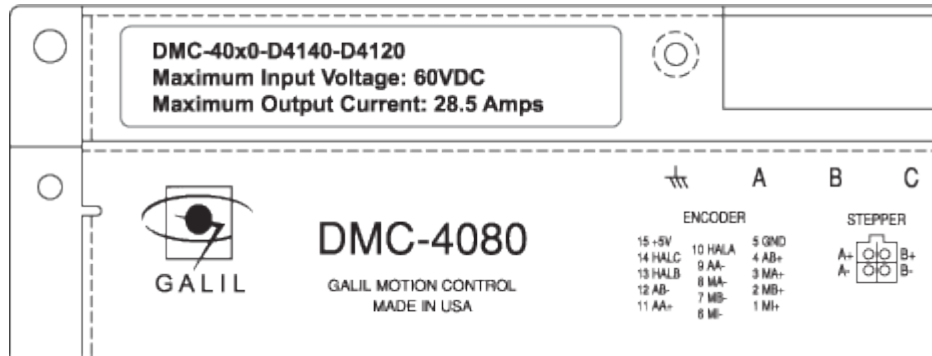


Figure 12: Label for DMC-40x0-D4140-D4120

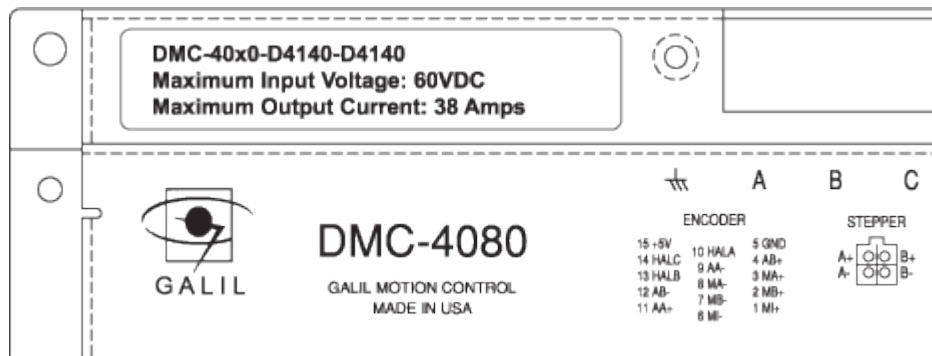


Figure 13: Label for DMC-40x0-D4140-D4140



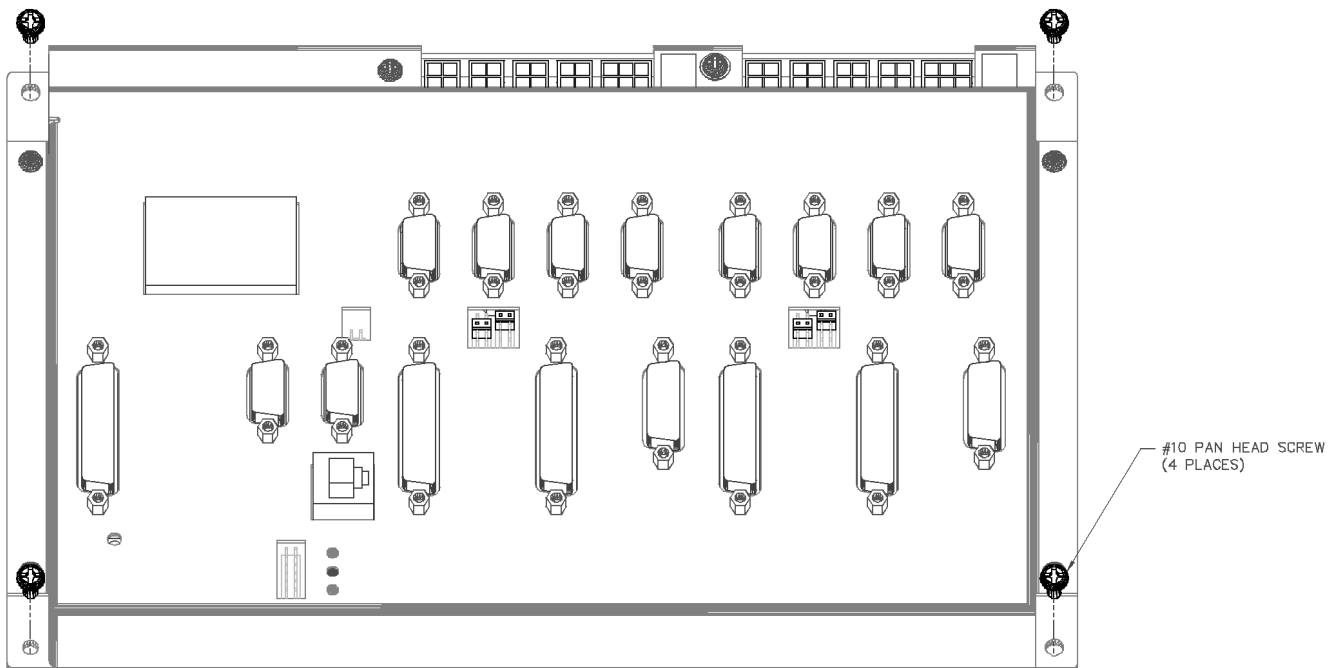
Figure 14: ETL Mark

Installation

Mounting the Controller

The DMC-40x0 motion controller must be mounted to a flat surface with 4 – #10 pan head screws through each mounting hole found on the controller base as shown in Figure 15. If the controller is mounted on a wall, the controller should be mounted so that the bottom of the controller is horizontal to the floor (as shown in Figure 15).

If the AMP-43040 internal amplifiers are being used, it should be determined at this time whether or not an additional heat sink will be required. This is determined based upon the continuous current requirements of the system as defined in the “Additional Mounting Consideration when using the AMP-43040” section above. The Motor Sizer tool found on our website can be used to determine this value <http://www.galilmc.com/learning/motorsizer.php>.



(Bottom of Controller)

Figure 15: Mounting the DMC-4000

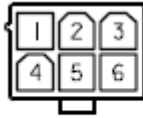
Wiring the Controller with internal AMP-43040

The basic wiring for a DMC-40x0 motion controller with included AMP-43040 servo amplifiers is shown in Figure 16. The disconnect switch or circuit breaker for AC power must be installed in a location that is in close proximity to the equipment and within easy reach of the operator. It must also be marked as the disconnect device for the equipment.

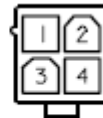
Connectors for AMP-43040

	On Board Connector	Terminal Pins
POWER	6-pin MATE-N-LOK MOLEX# 39-31-0060	MOLEX#44476-3112
A,B,C,D: 4-pin Motor Power Connectors	4-pin MATE-N-LOK MOLEX# 39-31-0040	MOLEX#44476-3112

For mating connectors see <http://www.molex.com/>



Power Connector



Motor Connector

Power Connector	
Pin Number	Connection
1,2,3	DC Power Supply Ground
4,5,6	+VS (DC Power)
Motor Connector	
1	Phase C (N/C for Bushed Motors)
2	Phase B
3	No Connect
4	Phase A

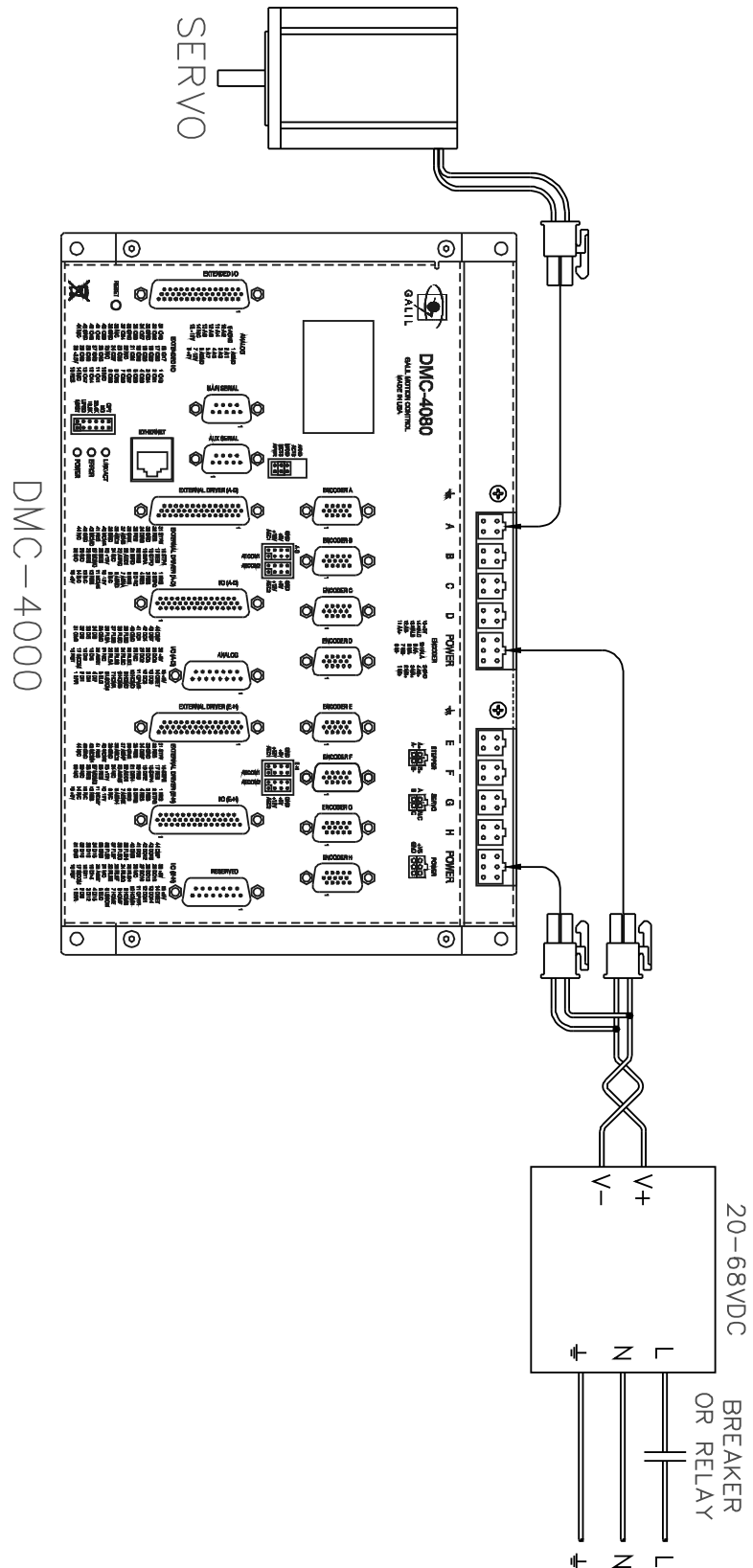


Figure 16: DMC-4000 wiring with AMP-43040

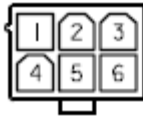
Wiring the Controller with internal SDM-44140

The basic wiring for a DMC-40x0 motion controller with included SDM-44140 stepper drivers is shown in Figure 17. The disconnect switch or circuit breaker for AC power must be installed in a location that is in close proximity to the equipment and within easy reach of the operator. It must also be marked as the disconnect device for the equipment.

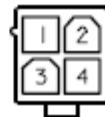
Connectors for SDM-44140

	On Board Connector	Terminal Pins
POWER	6-pin MATE-N-LOK MOLEX# 39-01-2065	MOLEX#44476-3112
A,B,C,D: 4-pin Motor Power Connectors	4-pin MATE-N-LOK MOLEX# 39-01-2045	MOLEX#44476-3112

For mating connectors see <http://www.molex.com/>



Power Connector



Motor Connector

Power Connector	
Pin Number	Connection
1,2,3	DC Power Supply Ground
4,5,6	+VS (DC Power)
Motor Connector	
1	B-
2	A-
3	B+
4	A+

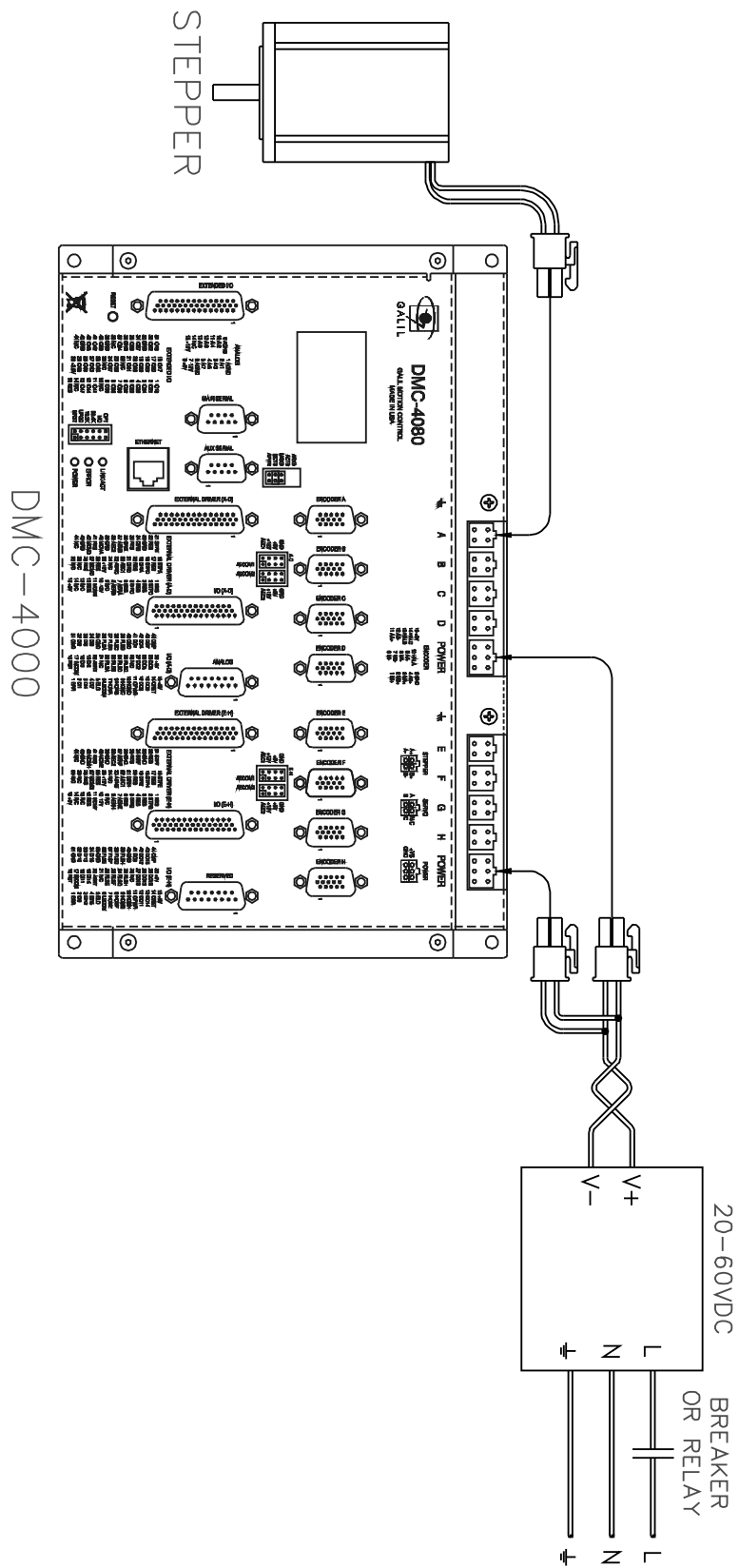


Figure 17: DMC-4000 wiring with SDM-44140

Communication Connection

Connect the serial cable or the Ethernet cable from your PC to the DMC-40x0 motion controller. The Ethernet cable may be connected through a hub or switch, or directly to the PC.

If the controller is connected to a DHCP enabled network, the IP address will automatically be assigned to the controller.

Additional Wiring

Additional wiring to the Analog and Digital I/O, encoders, limit switches and other connections found on the D-Subs on the DMC-40x0 motion controller will be required to complete your applications. For detailed information regarding these connections, see the DMC-40x0 User Manual.

Powering the Controller

Once the connections have been made from the DC power supply to the DMC-40x0 motion controller, the controller and internal amplifiers may be powered-up. At this time the Power LED should be illuminated, and the LCD should turn on and indicate the status of the axes available on the controller.

Communication with Galil Software

To communicate with the controller, the GalilTools communications software must first be installed. A free version of GalilTools (GalilTools-Lite) may also be used. These software applications can be found on the software installation CD shipped with the controller, or online at:

<http://www.galilmc.com/support/software-downloads.php>

Installation instructions for your operating system can be found in the GalilTools user manual.

<http://www.galilmc.com/support/manuals/galiltools/introduction.html>

Once the software has been installed, run GalilTools, or GalilTools-Lite and choose your controller.

RS-232 connection

If you are using over a serial connection, the standard baud rate of the DMC-40x0 motion controller is 115200. For a standard serial connection over COM1, choose COM1 115200 in the connections dialog window.

Ethernet connection

If you are connected to the controller via an Ethernet connection, and your network is DHCP enabled, then the controller will automatically have an IP address assigned to it. If your network is not DHCP enabled, or the connection is only between the PC and the controller, then the controller be found with the software as no IP address assigned. The GalilTools software will allow you to assign the controller with an IP address. See the GalilTools documentation for detailed information on using the software to assign the controller IP address.

Appendix – Specifications

A1 – Electrical Specifications

DMC-4080- D3040-D3040

Description	Units	Specification
Maximum Input Voltage	VDC	68
Minimum Input Voltage	VDC	20
Maximum Current Output	Amps	50

DMC-4080- D4140-D4140

Description	Units	Specification
Maximum Input Voltage	VDC	60
Minimum Input Voltage	VDC	20
Maximum Current Output	Amps	38

AMP-43040

Description	Units	Specification
Supply Voltage	VDC	20-68
Maximum Avg cont. current per 4 axes	Amps	6
Continuous Current per axis	Amps	7
Peak Current per axis	Amps	10
Nominal Amplifier Gain	A/V	0.7
Switching Frequency	Hz	60
Minimum Load Inductance:	mH	0.2 (Chopper Mode)
Brushless Motor Commutation angle	°	120
	°	60 (option available)
Supply Voltage Fuse	Amps	30

SDM-44140

Description	Units	Specification
DC Supply Voltage:	VDC	20-60
Max Current (per axis)	Amps	3.0
Max Step Frequency:	MHz	6
Motor Type:		Bipolar 2 Phase
Switching Frequency:	Hz	60
Minimum Load Inductance:	mH	0.5
Supply Voltage Fuse	Amps	20

Fault Information

The AMP-43040 and SDM-44140 are protected from the following fault conditions.

Fault Condition	AMP-43040	SDM-44140
Over-Current Protection	yes	yes
Under-Voltage Protection	yes	yes
Over-Temperature Protection	yes	yes
Over-Voltage Protection	yes	no
Hall Error Detection	yes	no

The Over-Current protection circuit is shown in Figure 18. For further specifics on fault conditions, see the DMC-40x0 User Manual.

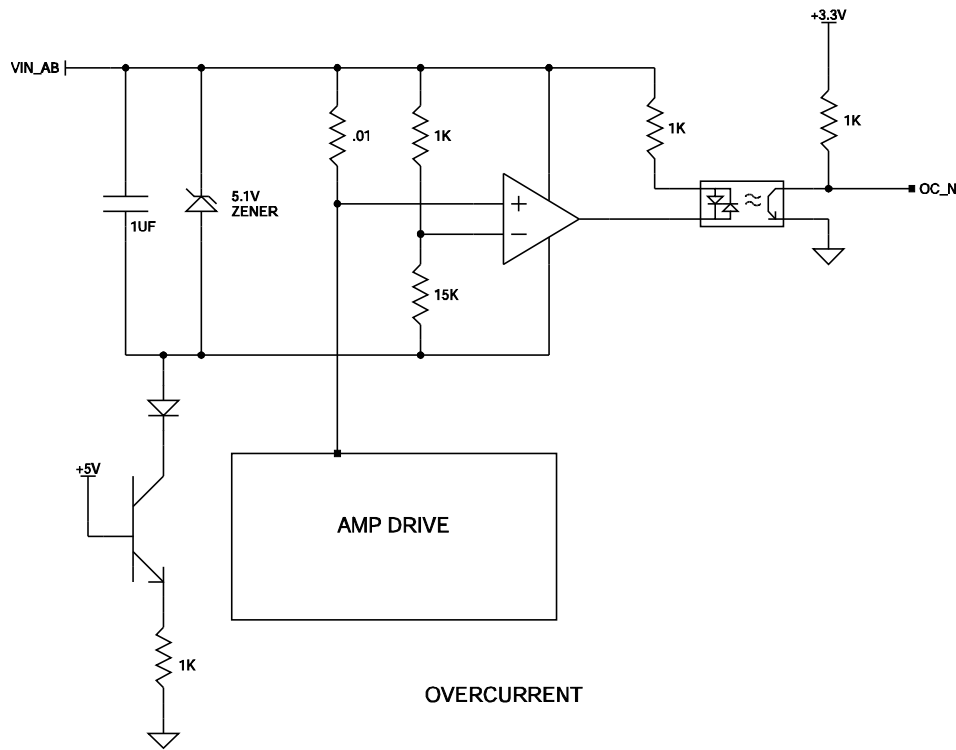


Figure 18: Overcurrent Circuit

A2 – Environmental Specifications

Description	Units	Specification
Storage Temperature	C	-40 to +125
Operating Temperature	C	0 to +70
Operating Altitude	feet	10,000
Humidity	RH	20-95% (non-condensing)

A3 – Mechanical Specifications DMC-4080

DMC-4080- D3040-D3040

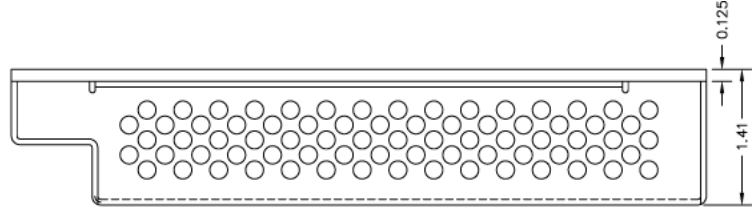
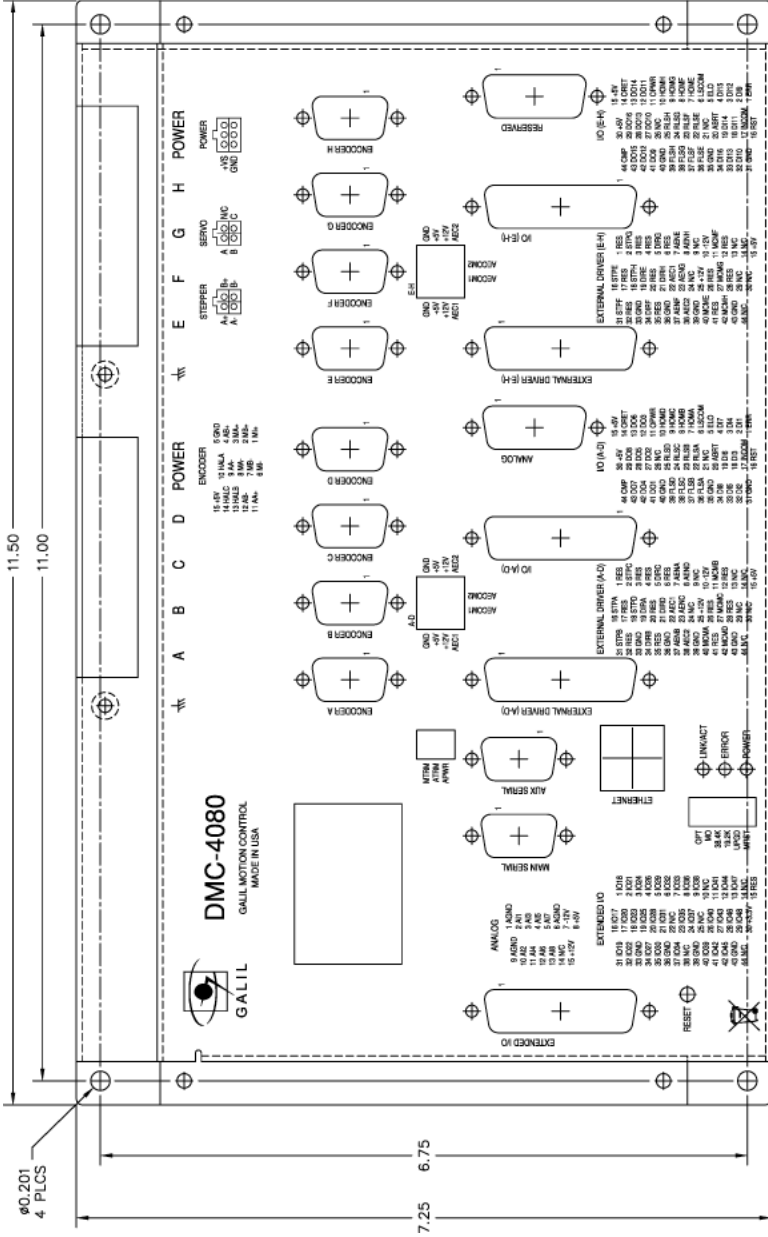
Included Components	Quantity	Description
DMC-4080	1	Main Controller Board
CMB-41012	1	Communications Board
ICM-42000	2	Interconnect Module
AMP-43040	2	Servo Amplifier Board

DMC-4080- D4140-D4140

Included Components	Quantity	Description
DMC-4080	1	Main Controller Board
CMB-41012	1	Communications Board
ICM-42000	2	Interconnect Module
AMP-43040	2	Servo Amplifier Board

DMC-4080

Description	Units	Specification
Weight	lb	4.35 (DMC-4080-D3040-D3040)
Length	in	11.50
Width	in	7.25
Height	in	1.41



A4 – Mechanical Specifications DMC-4040

Description	Units	Specification
Weight	lb	2.9 (DMC-4040-D3040)
Length	in	8.05
Width	in	7.25
Height	in	1.41

