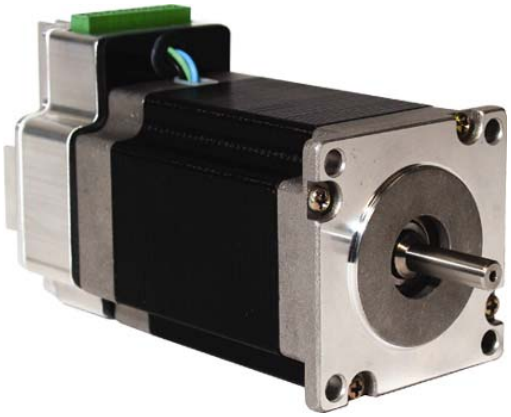
SMD Series

Integrated Stepper Driver and Motor
Revision 1.3

The AMCI Integrated Stepper Motor and Microstepping Drive Combination represents the future of Stepper Motor Control applications.



The SMD is a self-contained stepper motor and driver package, capable of optimizing a wide variety of industrial stepper motor control applications. It is no longer necessary to run a cable from the indexer to the driver and then a cable from the driver to the motor. Now you simply have to connect the step and direction signals, along with supply voltage, directly to the SMD and your installation is complete.

Features

- Optimized motor and drive combination
- Industry standard Step/Direction control signals
- More torque than competitive designs
- Eliminates the need for a separate stepper drive
- Wide range of operating voltages, 24-75Vdc
- Speeds to 2000 RPM
- Anti-resonance circuitry
- Easy to use configuration software
- Uses standard RS232 interface for programming
- Programmable motor current
- Programmable Idle Current Reduction
- 400, 1000, 2000, or 5000 selectable step resolution
- AMCI quality and reliability
- Single power supply

The SMD uses step and direction control signals generated from an external source. (i.e. AMCI's 3202 or 3601 stepper control modules) It is powered by an external DC supply with an operating range of 24 to 75Vdc. There are additional control pins that can be used to disable the motor.

SMD Motor and Drive Specifications

Technical Specifications

Supply Voltage

24Vdc to 75Vdc max, 4 Amps max per axis, user supplied.

CAUTION The maximum supply input voltage includes power supply ripple and motor back EMF.

Operating Temperature

See Notes Below

Motor Specifications

SMD23-130

Holding Torque – 130 oz-in (0.91 Nm)
Maximum Starting Torque – 120 oz-in (0.85 Nm)
Rotor Inertia – 1.42 oz-in^2 (0.26 kg-cm^2)
Weight – 1.56 lbs (0.71 kg)

SMD23-240

Holding Torque – 240 oz-in (1.69 Nm)
Maximum Starting Torque – 220 oz-in (1.55 Nm)
Rotor Inertia – 2.51 oz-in^2 (0.46 kg-cm^2)
Weight – 2.48 lbs (1.13 kg)

SMD34-300

Holding Torque – 300 oz-in (2.12 Nm)
Maximum Starting Torque – 270 oz-in (1.91 Nm)
Rotor Inertia – 7.93 oz-in^2 (1.45 kg-cm^2)
Weight – 3.63 lbs (1.65 kg)

SMD34-600

Holding Torque – 600 oz-in (4.24 Nm)
Maximum Starting Torque – 500 oz-in (3.53 Nm)
Rotor Inertia – 15.86 oz-in^2 (2.90 kg-cm^2)
Weight – 5.96 lbs (2.70 kg)

SMD34-900

Holding Torque – 900 oz-in (6.36 Nm)
Maximum Starting Torque – 725 oz-in (5.12 Nm)
Rotor Inertia – 24.06 oz-in^2 (4.4 kg-cm^2)
Weight – 7.72lbs (3.50 kg)

Electrical Specifications

Motor Current
User Selectable – 3.4 Arms max 0.3 –3.4Arms in 0.3 increments (10%-100%)
Default value – 2.70 Arms (80%)

Steps per Revolution - 400, 1000, 2000, and 5000 – user selectable
Default value – 2000 steps/rev
Frequency on the Step input (max) - 100KHz

Idle current reduction time - 1 sec
Idle current selection - 0% to 70% of the maximum operating current
Default Value – 20%

Digital Inputs
Number of inputs – 3 opto-isolated differential
Step – Velocity/position command
Direction – Direction Control
Disable – Disables motion and disables current to motor
Type of input – 5V TTL logic
Input Current – 15mA max
Input Connector – AMCI Part # MS-8P, provided (Phoenix part # MC 1.5/8-ST3.81)
8 screw terminal type – 16 AWG max.

Programming Communications
Interface – RS232
Programming Interface – AMCI SPI Interface software, Windows 2000/XP supported
Interface Cable – AMCI CSMD-5 5 ft serial cable (optional)

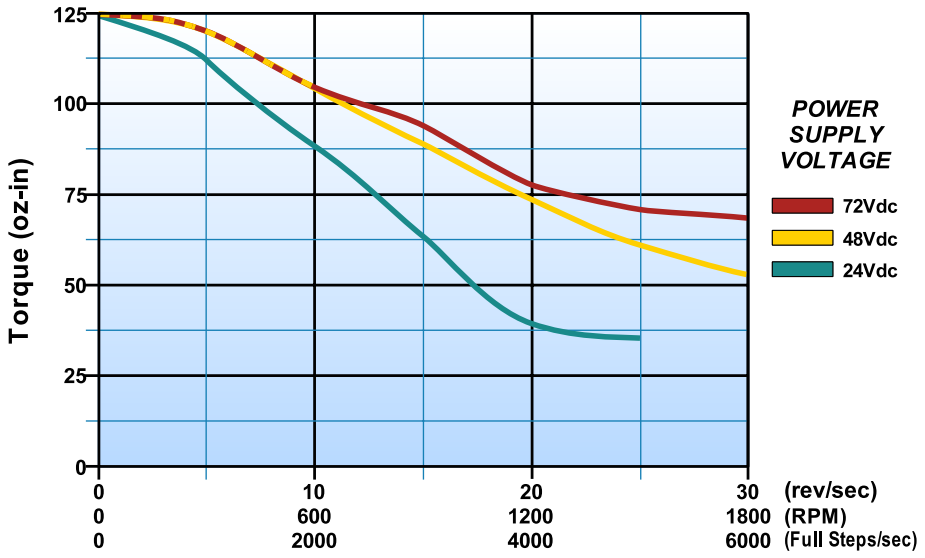
Notes

Maximum temperature of the SMD motor must not exceed 100°C(212 °F) and maximum temperature of the SMD drive heat sink must not exceed 85°C(185 °F). If these temperatures are exceeded the SMD thermal protection circuit will shut down the drive. To prevent overheating a few factors must be considered:

- Operating motor current - configure just as much current as needed to provide the torque for the specific application.
- Idle current: This is the amount of current that the driver provides to the motor when motion is not occurring. To maximize motor efficiency and motor cooling, set the idle current to the minimum value necessary to provide the required holding torque.
- Supply voltage: In general the higher supply voltage leads to higher switching losses and higher heat generation in the motor-drive system.
- Motor mounting: If possible, mount the motor in such a manner that the mounting hardware acts as a heat sink.
- Heat Sink position: Mount the motor so that the heat sink fins are vertical. This will allow for free air flow between the fins. Maintain spacing around the SMD of one inch.

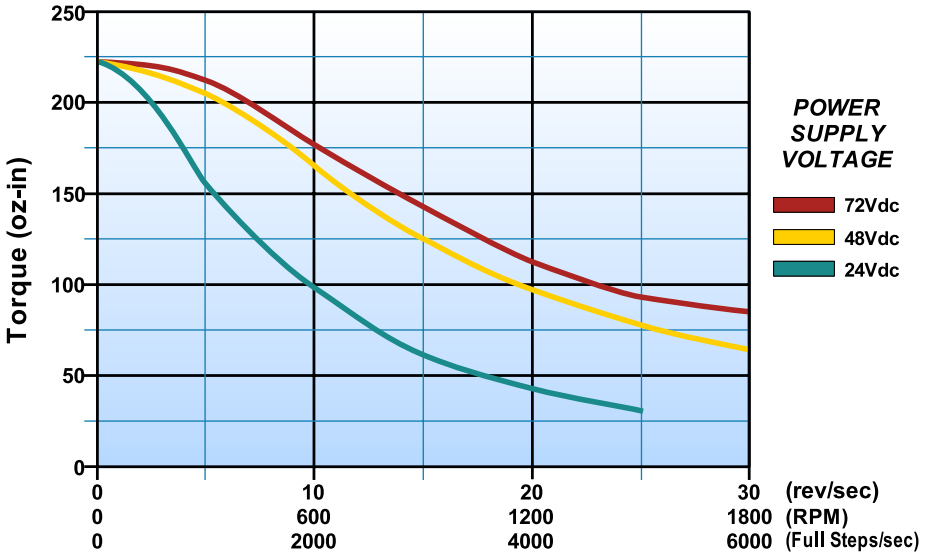
SMD23 Torque Curves

SMD23-130



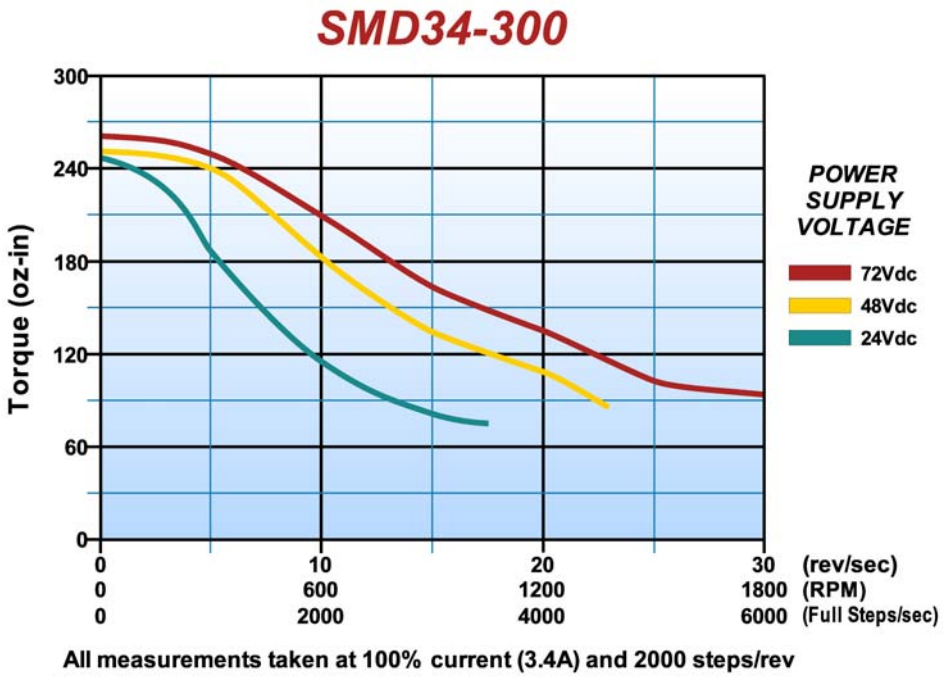
All measurements taken at 100% current (3.4A) and 2000 steps/rev

SMD23-240

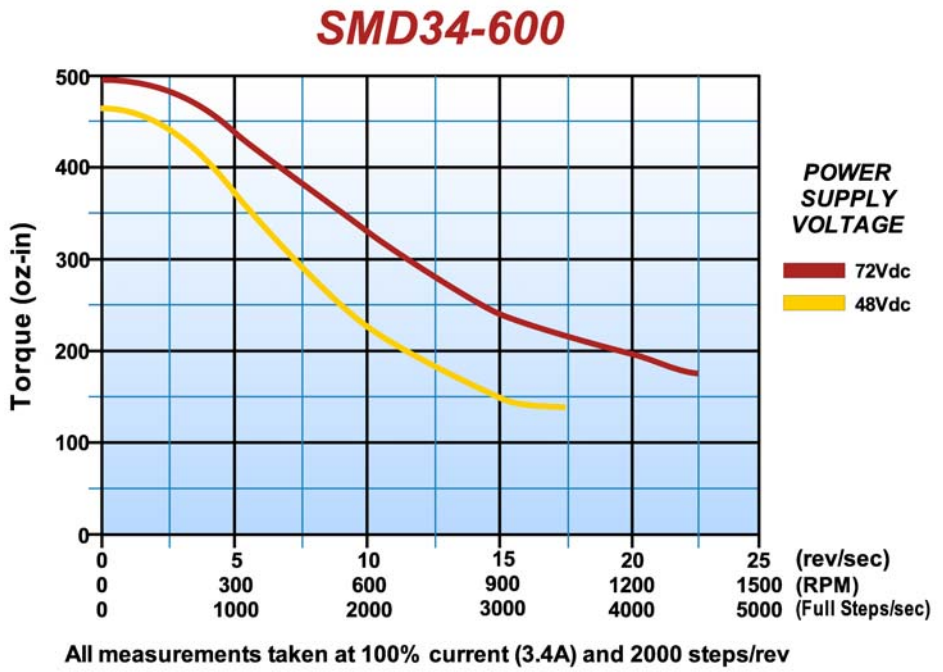


All measurements taken at 100% current (3.4A) and 2000 steps/rev

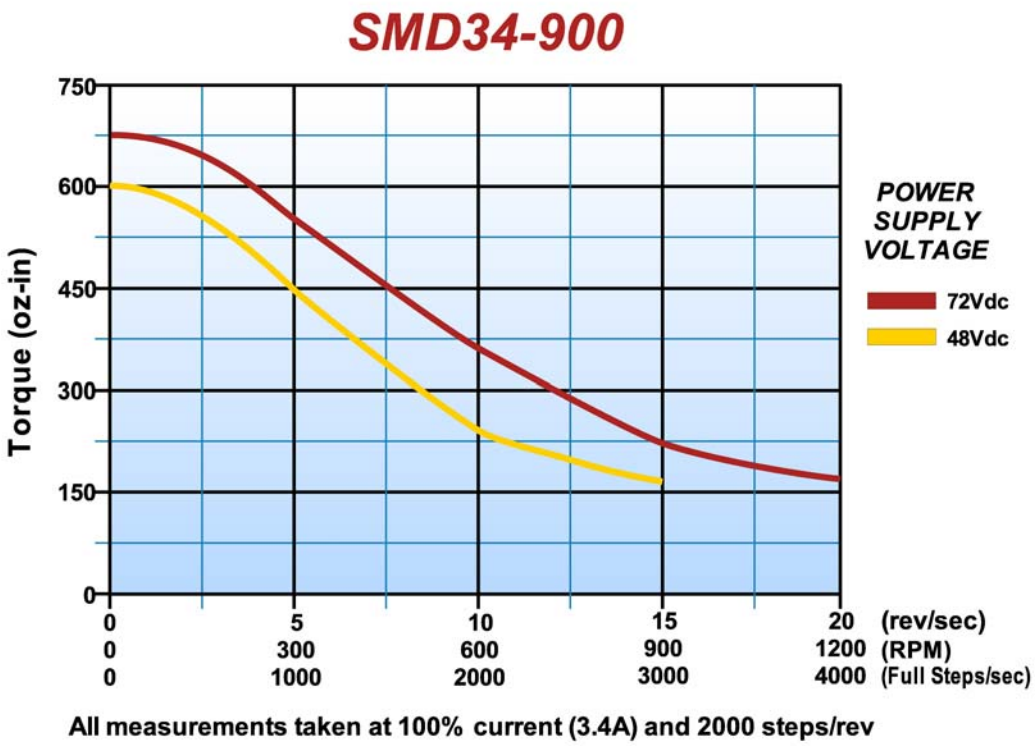
SMD34 Torque Curves



All measurements taken at 100% current (3.4A) and 2000 steps/rev



All measurements taken at 100% current (3.4A) and 2000 steps/rev

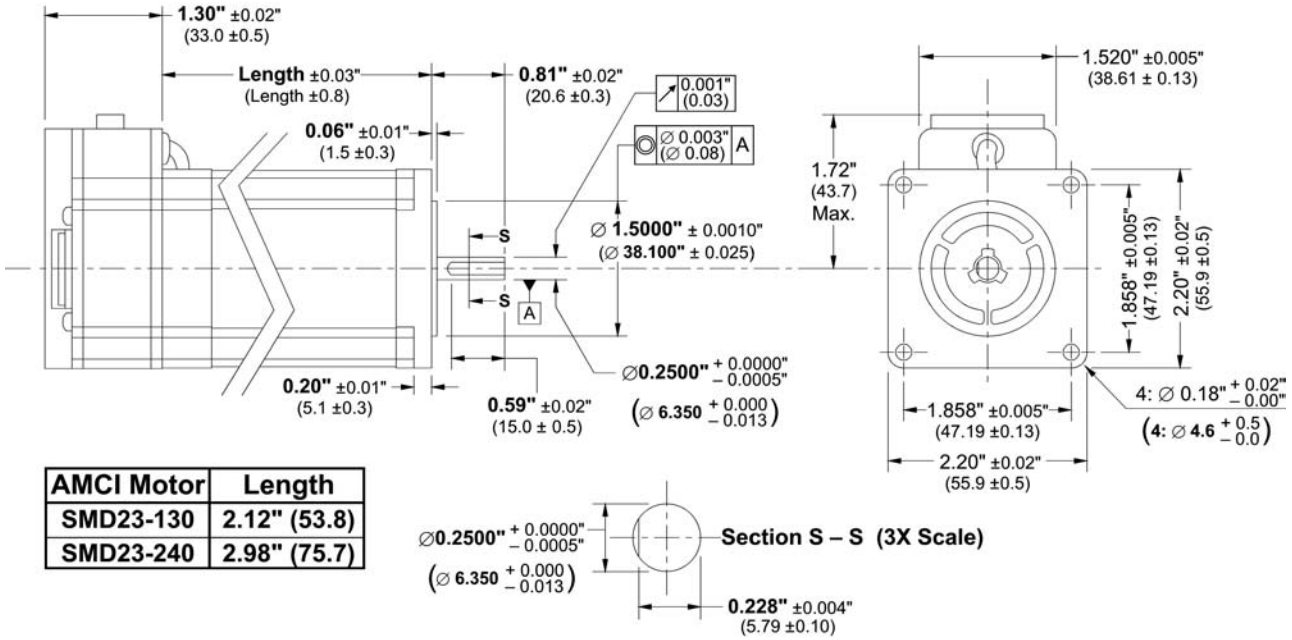


NOTE: Current setting for each torque curve was measured at 3.4Arms.

INSTALLATION

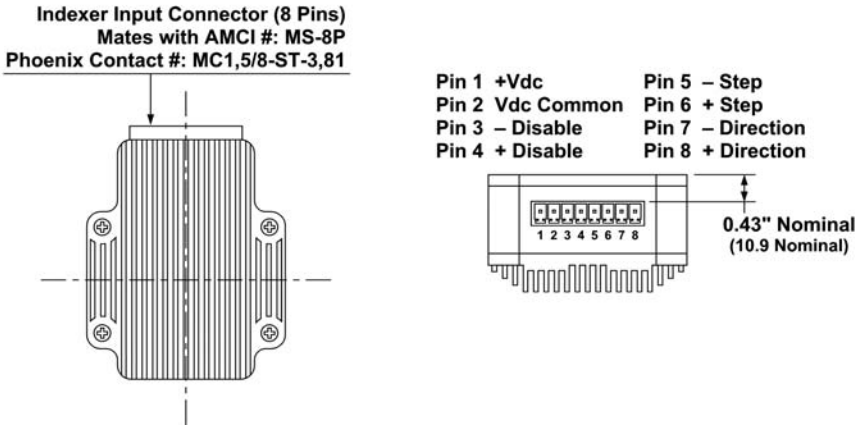
The mounting flange functions as both a mounting mechanism and also a heatsink. Mount the SMD to a large as possible thermally conductive surface. Heat is conducted from the SMD to the mounting fixture resulting in motor/drive cooling. For proper cooling the SMD must be mounted with the heatsink fins vertical. In extreme cases a cooling fan may be required.

SMD23 Outline Drawings

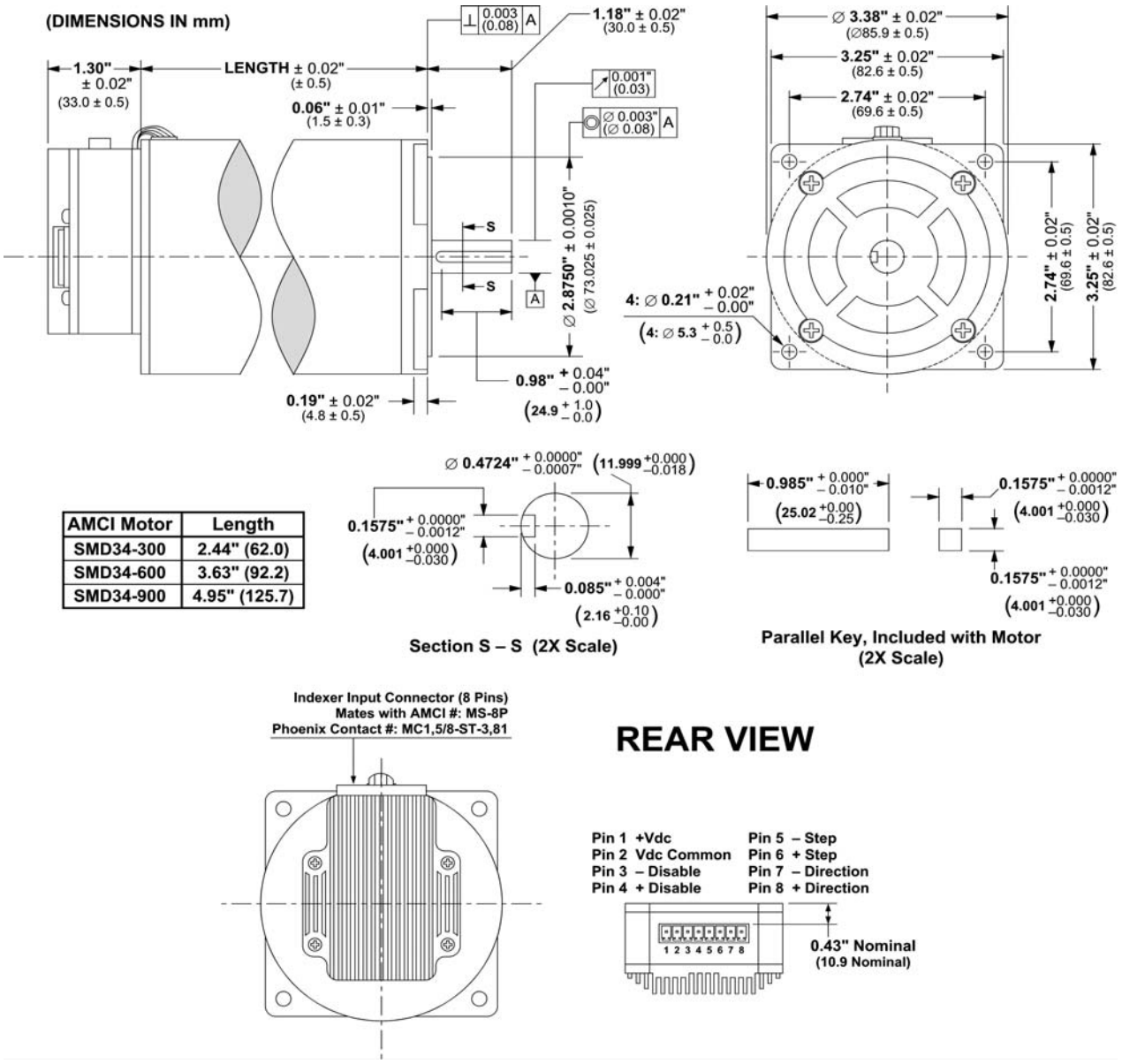


AMCI Motor	Length
SMD23-130	2.12" (53.8)
SMD23-240	2.98" (75.7)

REAR VIEW



SMD34 Outline Drawing



AMCI Motor	Length
SMD34-300	2.44" (62.0)
SMD34-600	3.63" (92.2)
SMD34-900	4.95" (125.7)

SMD Electrical Installation

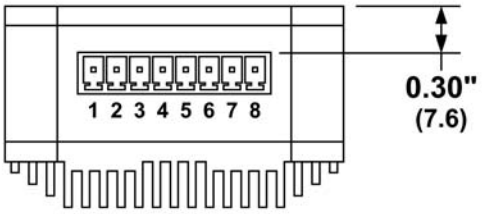
WARNING

Power supply inputs are NOT reverse connection protected. Applying reverse voltage will damage unit.

Logic inputs are rated for 5Vdc max. Exceeding 5vdc will damage the unit unless the recommended limiting resistors are used.

Control Signal Wiring

Pin 1 +Vdc	Pin 5 – Step
Pin 2 Vdc Common	Pin 6 + Step
Pin 3 – Disable	Pin 7 – Direction
Pin 4 + Disable	Pin 8 + Direction



Programmer Wiring – CSMD-5 cable

SMD Connector – AMCI part # MS-8P

To SMD

1. DC Supply	24-75Vdc
2. DC Common	Vdc com
3. DTR	
4. RXD	
5. RTS	
6. N/C	
7. TXD	
8. GND	

Serial Port Connector – DB-9

To PC Serial Port

1. N/C
2. RXD
3. TXD
4. DTR
5. GND
6. N/C
7. RTS
8. N/C
9. N/C

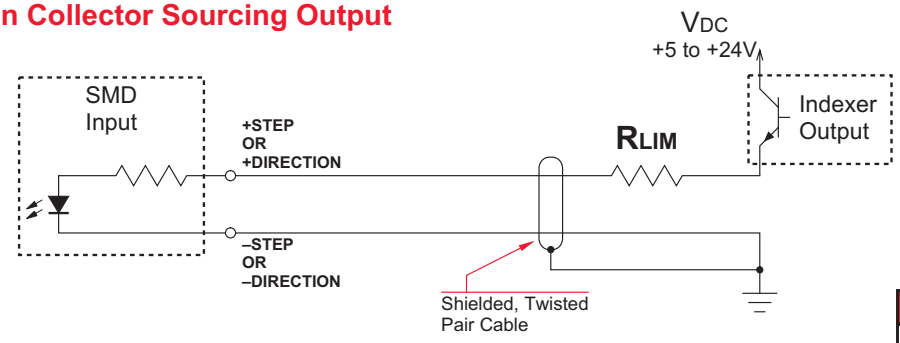
Use a general purpose diode with a breakdown voltage greater than 30Vdc such as 1N4005 or 1N4148 to protect the SMD RTS input.

The eight pin connector of the SMD is used for programming and control. The SMD drive monitors the TXD signal coming from the computer's serial port for a specific sequence of data. When the SMD receives this data, it enters programming mode. To exit programming mode you must cycle power on the SMD and reconnect the motion control signals. The SMD automatically enters motion mode when power is re-applied.

Wiring the SMD Control Signals to a Single-Ended Input

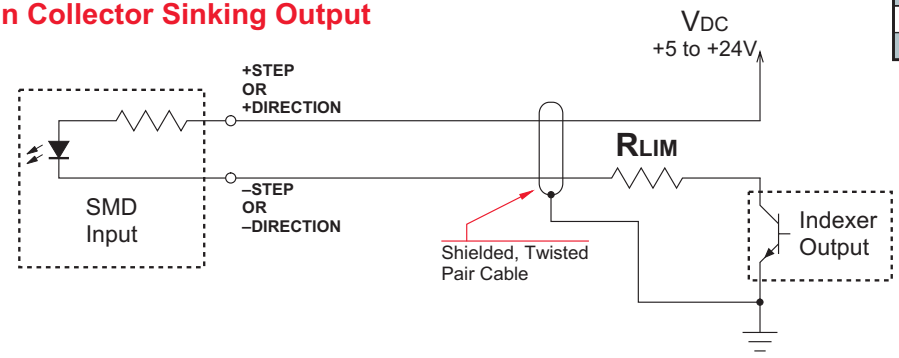
The SMD is built with differential inputs for optimal noise immunity. However many stepper control circuits use single-ended (sinking or sourcing) control signals. The following schematics show the correct wiring when using the SMD with single-ended control signals.

Open Collector Sourcing Output



VDC	RLIMIT
5 Volts	None
12 Volts	2.0 K□
15 Volts	2.0 K□
24 Volts	3.9 K□

Open Collector Sinking Output



Note: SMD input resistor value – 1Kohm

Disable Input Wiring

The Disable input circuit is the same as step and direction inputs. Electrical connections, instructions, and comments are the same.

The Disable Input on the SMD will shut off motor current when active. The circuitry of the Disable Input is identical to the Step and Direction Inputs.

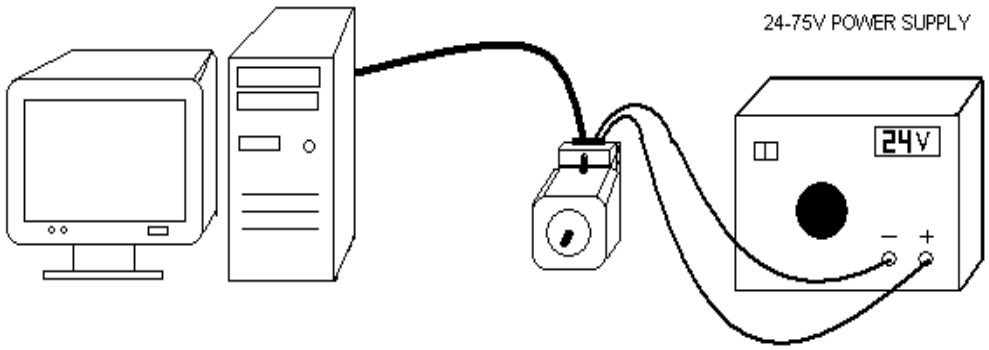
The SMD does not accept directional pulses while the Disable Input is active.

CHANGING THE SMD CONFIGURATION SETTINGS

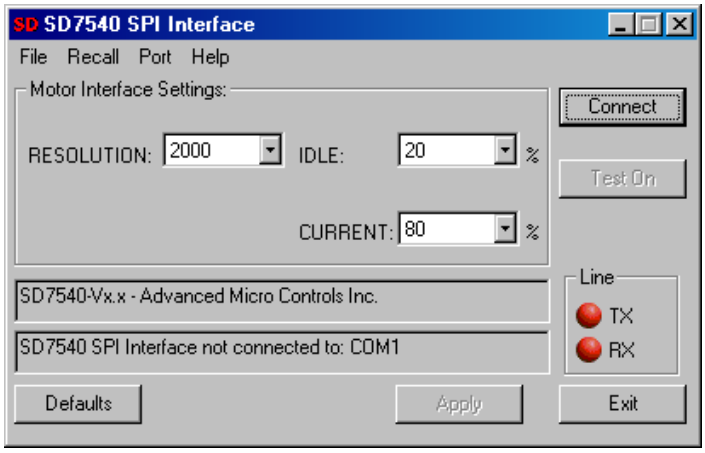
Equipment required for changing the driver settings:

- Power supply – 24 to 75VDC, 4Amps;
- Programming cable - AMCI CSMD-5, 5 ft serial cable(optional). It connects the driver to a PC. The connections are described in the document. The driver circuit provides optical isolation from the PC;
- PC running Windows 98/2000/XP;
- AMCI SPI Programming software, downloadable from the AMCI website (www.amci.com);

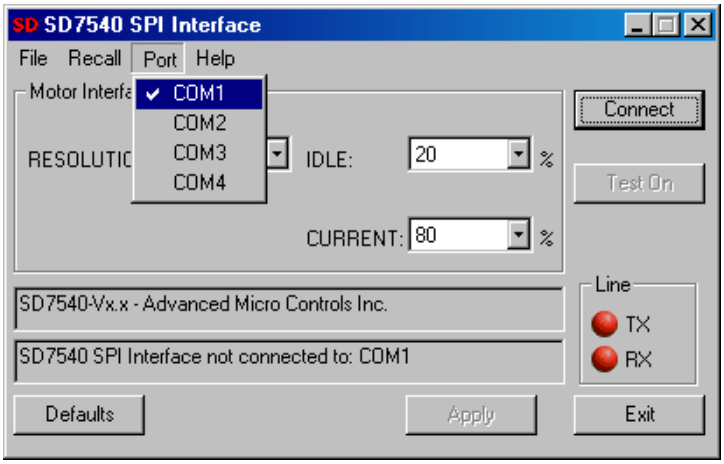
Procedure:



1. Install the AMCI SPI Programming software on the PC.
2. Connect the programming cable(AMCI part# CSMD-5, optional) to the SMD.
3. Connect the power supply to the same connector (follow the specified polarity).
4. Connect the D-Sub connector of the programming cable to the serial port of the PC.
5. Run the AMCI SPI programming software. The following window will appear on the screen:

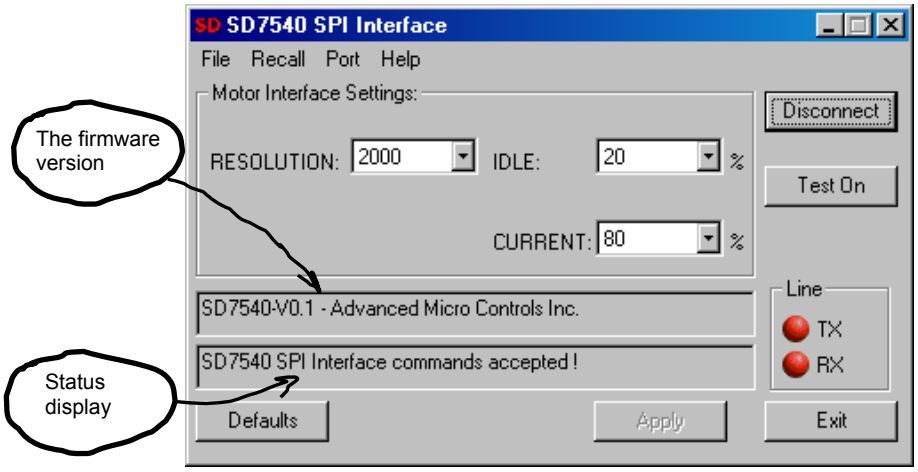


6. Select the ***Port*** menu and choose the COM port that the cable is connected to:



7. Turn on the power supply to the driver.
8. Press the ***Connect*** button. For a few seconds the TX and the RX lights can change their color to green to inform that the program is establishing the communication. Once they settle to red, the communication is established. The current settings of the driver will be displayed (RESOLUTION, IDLE and CURRENT), together with the identification of the Driver. The motor will be disabled until the next power up.

   For example:

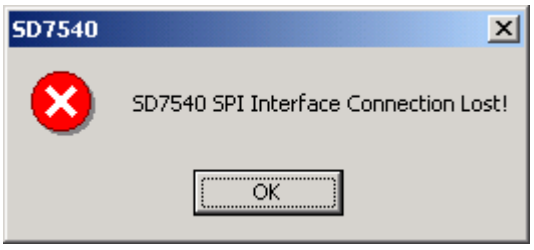


9. If a change to a setting is required, the new setting is selected from the appropriate field. By pressing the ***Defaults*** button, the default settings will appear:
   - RESOLUTION 2000 steps/revolution;
   - IDLE 20 %;
   - CURRENT 80 %;

10. By pressing the ***Apply*** button, the new settings will be saved in the driver's nonvolatile memory. The process of saving and verifying the new settings will take about 8 seconds. During this time a warning to wait is displayed in the status display of the window. When the process ends, a message that the command is accepted is displayed.
11. Pressing the ***Test On*** button starts the self test. The motor will move back and forth quarter of a revolution with slow speed until the ***Test*** button is pressed again.

Pressing the ***Recall*** button (in the menu above) will display the SMD's current settings in the data windows.

ERROR MESSAGES:



- Check if power is applied to the motor;
- Check the wire connection;
- Check if the correct COM port is selected;

Important User Information
The products and application data described in this manual are useful in a wide variety of different applications. Therefore, the user and others responsible for applying these products described herein are responsible for determining the acceptability for each application. While efforts have been made to provide accurate information within this manual, AMCI assumes no responsibility for the application or the completeness of the information contained herein. Throughout this manual the following two notices are used to highlight important points.

WARNINGS tell you when people may be hurt or equipment may be damaged if the procedure is not followed properly.

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Standard Warranty
ADVANCED MICRO CONTROLS, INC. warrants that all equipment manufactured by it will be free from defects, under normal use, in materials and workmanship for a period of [18] months. Within this warranty period, AMCI shall, at its option, repair or replace, free of charge, any equipment covered by this warranty which is returned, shipping charges prepaid, within one year from date of invoice, and which upon examination proves to be defective in material or workmanship and not caused by accident, misuse, neglect, alteration, improper installation or improper testing. The provisions of the “STANDARD WARRANTY” are the sole obligations of AMCI and excludes all other warranties expressed or implied. In no event shall AMCI be liable for incidental or consequential damages or for delay in performance of this warranty.

Returns Policy
All equipment being returned to AMCI for repair or replacement, regardless of warranty status, must have a Return Merchandise Authorization number issued by AMCI. Call (860) 585-1254 with the model and serial numbers along with a description of the problem. A “RMA” number will be issued. Equipment must be shipped to AMCI with transportation charges prepaid. Title and risk of loss or damage remains with the customer until shipment is received by AMCI.

24 Hour Technical Support Number
Technical Support, in the form of documents, FAQs, and sample programs, is available from our website, www.amci.com. 24 Hour technical support is also available on this product. For technical support, call (860) 583-7271. Your call will be answered at the factory during regular business hours, Monday through Friday, 8AM - 5PM EST. During non-business hours, an automated system will ask you to leave a detailed message and the telephone number that you can be reached at. The system will page an engineer on call. Please have your product model number and a description of the problem ready before you call.