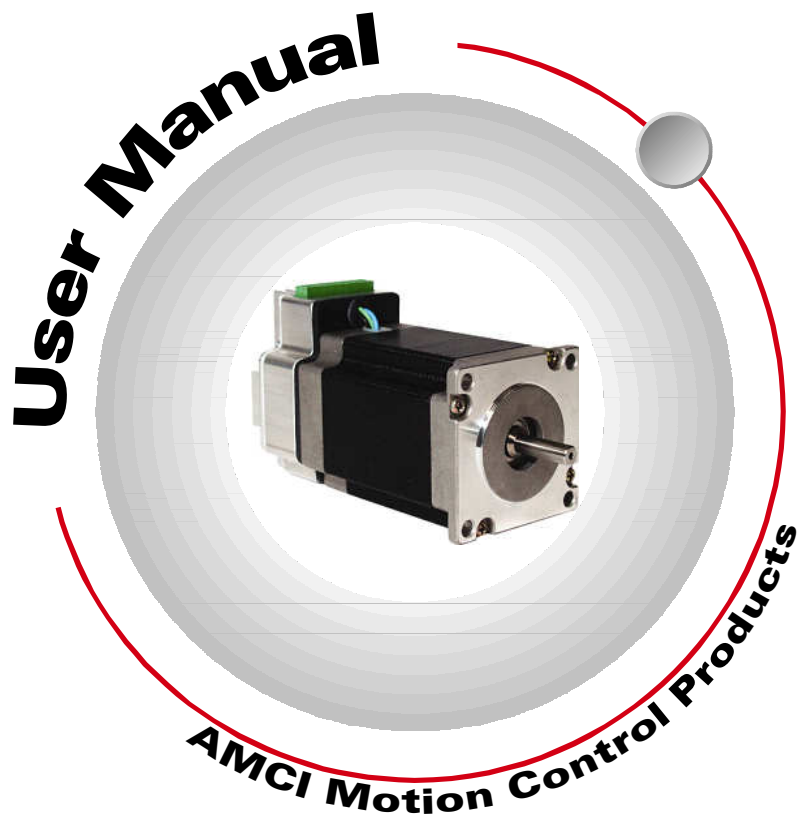


# **SMD23**

## **Integrated Stepper Drive & Motor**



## **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.

**CAUTIONS** tell you when equipment may be damaged if the procedure is not followed properly. No patent liability is assumed by AMCI, with respect to use of information, circuits, equipment, or software described in this manual. The information contained within this manual is subject to change without notice. UNDER NO CIRCUMSTANCES WILL ADVANCED MICRO CONTROLS, INC. BE RESPONSIBLE OR LIABLE FOR ANY DAMAGES OR LOSSES, INCLUDING INDIRECT OR CONSEQUENTIAL DAMAGES OR LOSSES, ARISING FROM THE USE OF ANY INFORMATION CONTAINED WITHIN THIS MANUAL, OR THE USE OF ANY PRODUCTS OR SERVICES REFERENCED HEREIN.

## **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.

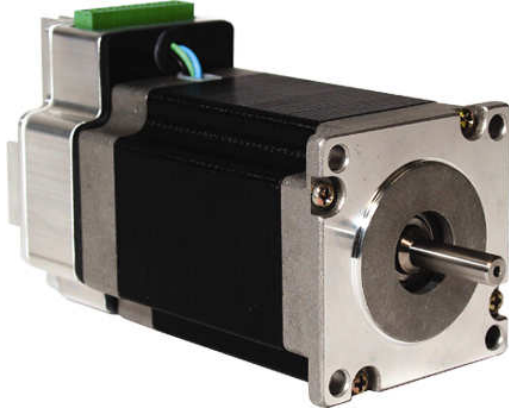
## **24 Hour Technical Support Number**

Technical Support, in the form of documents, FAQs, and sample programs, is available from our website, [www.amci.com](http://www.amci.com). 24 Hour technical support is also available on this product. For technical support, call (860) 585-1254. 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.

## **Revision History**

This manual, AMCI number 940-0S050, supercedes revision 1.3 of the SMD Series Integrated Stepper Driver and Motor manual. First released, April 17, 2007 it removes the SMD34's and slightly modifies the format

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

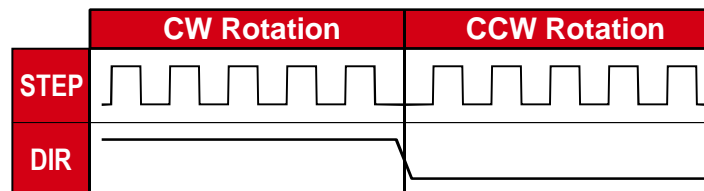


The SMD is a self-contained stepper motor and drive package, capable of optimizing a wide variety of industrial stepper motor control applications. It is no longer necessary to run a cable from the indexer to the drive and then a cable from the drive to the motor. Now you simply have to connect the step 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 SMD23's use step and direction control signals generated from an external source such as AMCI's 3202 or 3601 stepper control modules. A logical diagram of the inputs is shown below.



The SMD23's are powered by an external DC supply with an operating range of 24 to 75Vdc. There is an additional control input that can be used to disable the motor. This input can be left floating if you are not using the disable motor feature.

## **SMD23 Motor and Drive Specifications**

### **Environmental Specifications**

#### *Supply Voltage*

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



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

#### *Operating Temperature*

32° to 122°F (0° to 50°C) Also, see Operating Notes on the following page.

#### *Storage Temperature*

-40° to 185°F (-40° to 85°C)

#### *Relative Humidity*

0 to 95%, non-condensing

### **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<sup>2</sup> (0.26 kg-cm<sup>2</sup>)  
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<sup>2</sup> (0.46 kg-cm<sup>2</sup>)  
Weight – 2.48 lbs (1.13 kg)

### **Electrical Specifications**

#### *Motor Current*

User Selectable – 3.4 Arms max 0.3 – 3.4 Arms 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%

## ***SMD23 Motor and Drive Specifications (continued)***

### **Digital Inputs**

*Three opto-isolated differential inputs:*

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 on Temperature Specifications**

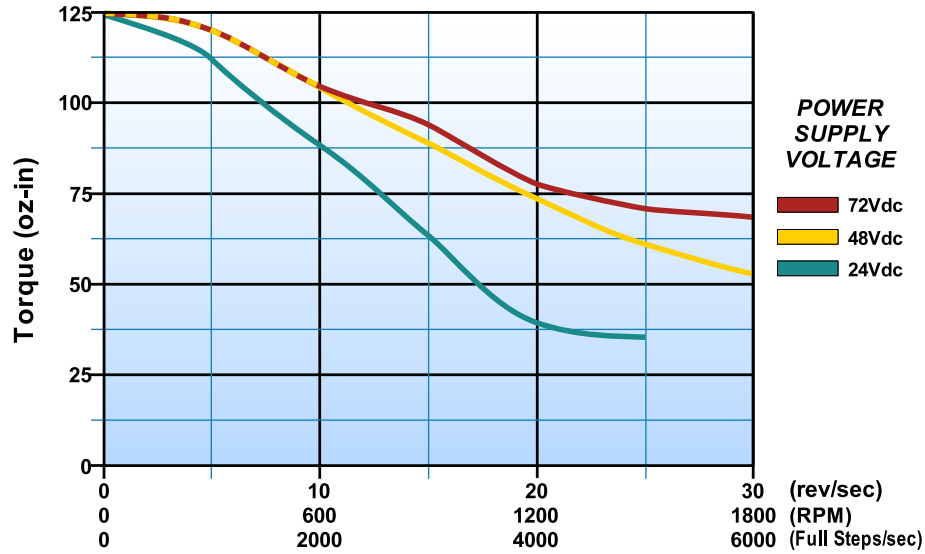
The maximum temperature of the SMD motor must not exceed 100°C(212 °F) and maximum temperature of the SMD drive heat sink must not exceed 85°C(185 °F). If these temperatures are exceeded the SMD thermal protection circuit will shut down the drive.

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 drive 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.

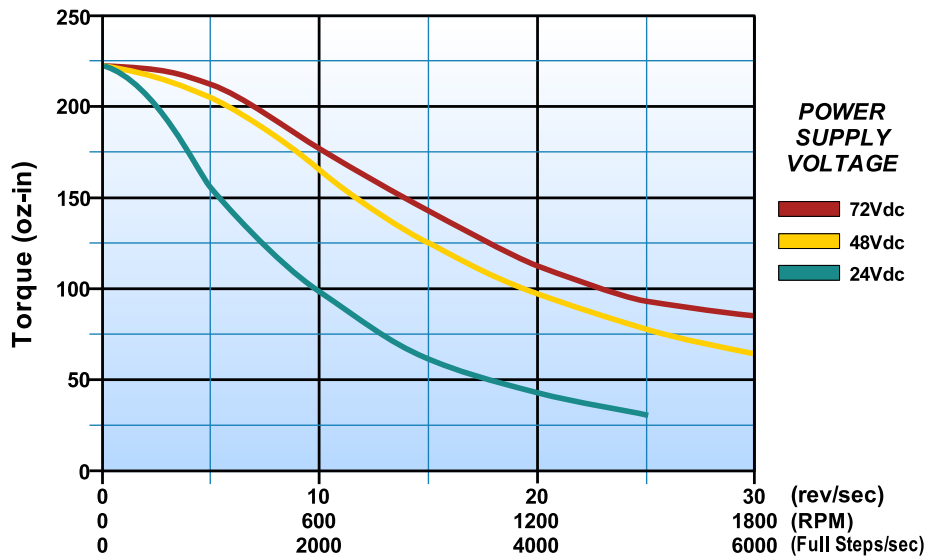
**SMD23 Torque Curves**

**SMD23-130**



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

**SMD23-240**

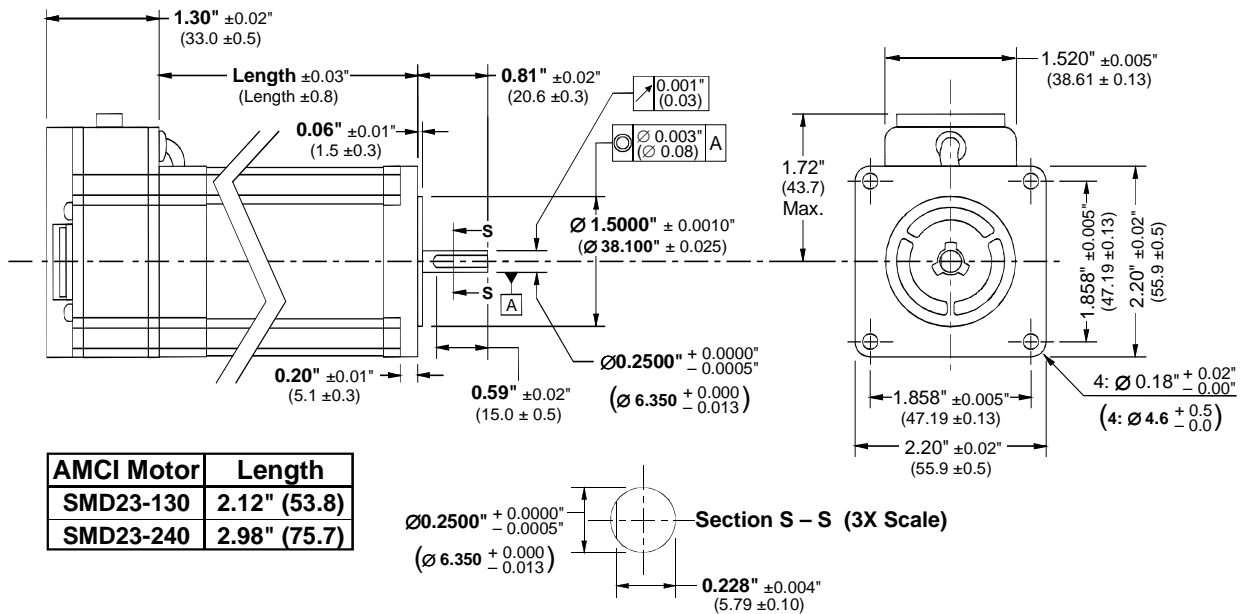


All measurements taken at 100% current (3.4A) and 2000 steps/rev

## INSTALLATION

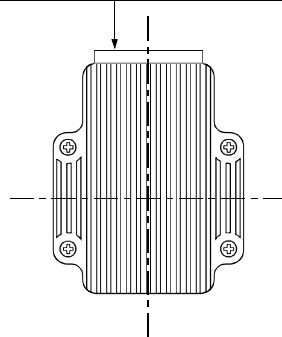
The mounting flange functions as both a mounting mechanism and also a heatsink. Mount the SMD to a thermally conductive surface that is as large as possible. Heat is conducted from the SMD to the mounting fixture resulting in motor/drive cooling. For proper cooling, the SMD must be mounted with the heatsink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

### SMD23 Outline Drawings

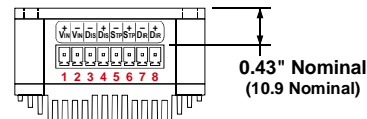


### REAR VIEW

Indexer Input Connector (8 Pins)  
Mates with AMCI #: MS-8P  
Phoenix Contact #: MC1,5/8-ST-3,81



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



## SMD23 Electrical Installation

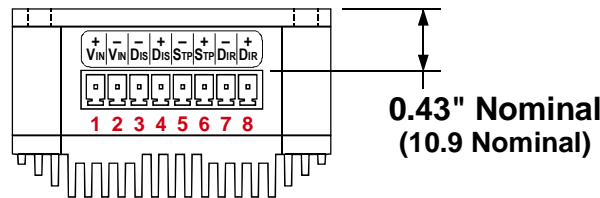


Power supply inputs are NOT reverse connection protected. Applying reverse voltage will damage unit.

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

### Control Signal Wiring

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



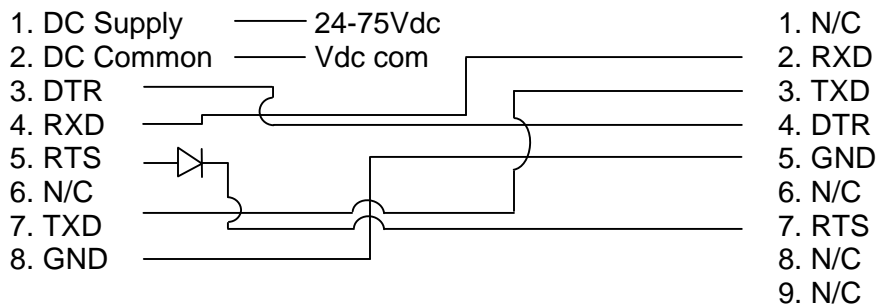
### Programmer Wiring – CSMD-5 cable

SMD Connector – AMCI part # MS-8P

Serial Port Connector – DB-9

#### To SMD

#### To PC Serial Port



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

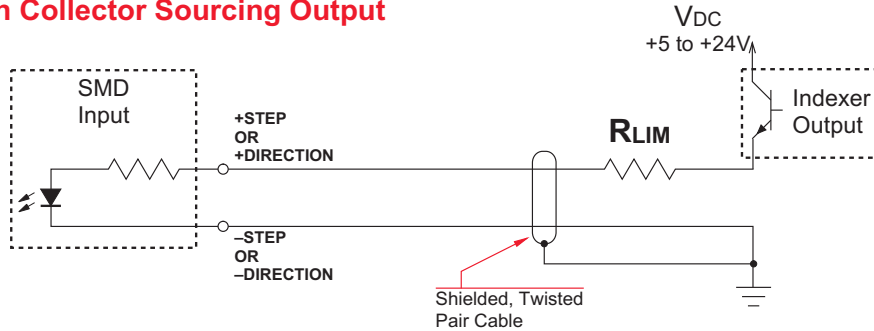
The eight pin connector of the SMD is used for programming and control. The SMD drive monitors the TXD signal coming from the computer's serial port for a specific sequence of data. When the SMD receives this data, it enters programming mode. To exit programming mode you must cycle power on the SMD and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

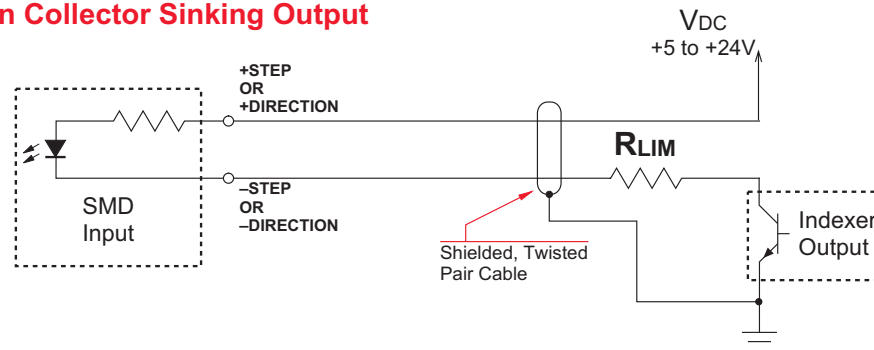
The SMD is built with differential inputs for optimal noise immunity. However many stepper control circuits use single-ended (sinking or sourcing) control signals. The following schematics show the correct wiring when using the SMD with single-ended control signals.

### Open Collector Sourcing Output



V <sub>DC</sub>	R <sub>LIMIT</sub>
5 Volts	None
12 Volts	2.0 K $\Omega$
15 Volts	2.0 K $\Omega$
24 Volts	3.9 K $\Omega$

### Open Collector Sinking Output



Note: SMD input resistor value – 316 ohm

## Disable Input Wiring

The Disable input circuit is the same as step and direction inputs. Electrical connections, instructions, and comments are the same, except that the input resistor value is 1K.

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.

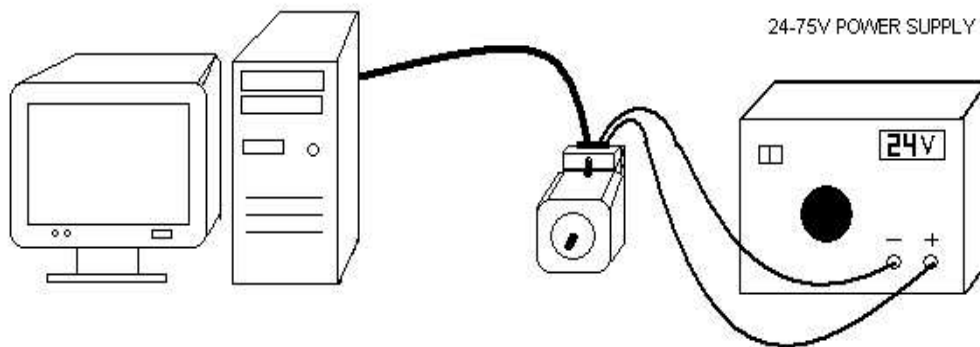
The SMD does not accept directional pulses while the Disable Input is active.

## Changing the SMD23 Configuration Settings

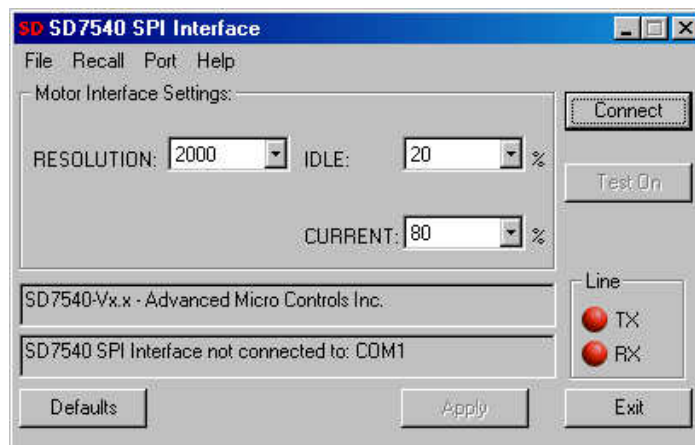
Equipment required for changing the drive settings:

- Power supply – 24 to 75VDC, 4Amps;
- Programming cable - AMCI CSMD-5, 5 ft serial cable(optional). It connects the drive to a PC. The connections are described in this document. The drive 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](http://www.amci.com));

### Procedure:



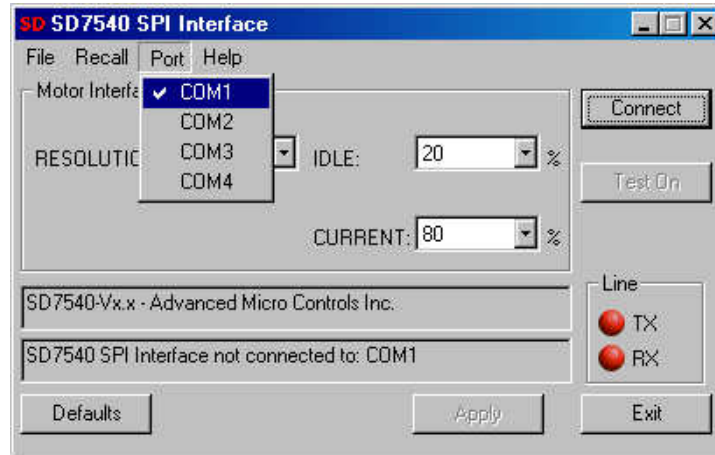
1. Install the AMCI SPI Programming software on the PC.
2. Connect the programming cable(AMCI part# CSMD-5, optional) to the SMD.
3. Connect the power supply to the same connector (follow the specified polarity).
4. Connect the D-Sub connector of the programming cable to the serial port of the PC.
5.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



## Changing the SMD23 Configuration Settings (continued)

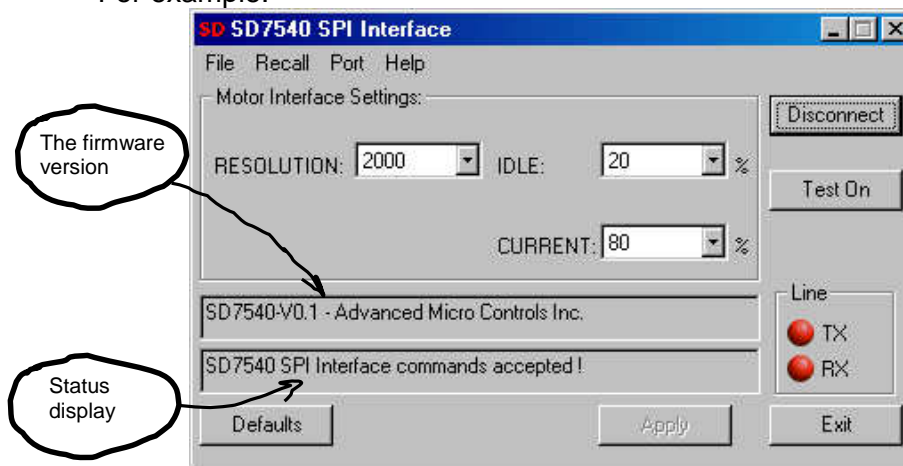
### Procedure: (continued)

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



7. Turn on the power supply to the drive.
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 drive will be displayed (RESOLUTION, IDLE and CURRENT), together with the identification of the Drive. 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% (Motor Current when motor is idle)
- CURRENT: 80% (Operating Current)

## Changing the SMD23 Configuration Settings (continued)

### Procedure: (continued)

10. By pressing the **Apply** button, the new settings will be saved in the drive'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;

**NOTES:**



***ADVANCED MICRO CONTROLS INC.***

20 GEAR DRIVE, TERRYVILLE, CT 06786 T: (860) 585-1254 F: (860) 584-1973

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