



DSM S-Series
Integrated Stepper Motor / Driver

Installation Manual

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Safety Notice

Only qualified personnel should attempt the start-up procedure or troubleshoot this equipment. This equipment may be connected to other machines that have rotating parts or parts that are controlled by this equipment. Improper use can cause serious or fatal injury.

Precautions



WARNING: Do not touch any circuit board, power device or electrical connection before you first ensure that no high voltage is present at this equipment or other equipment to which it is connected. Electrical shock can cause serious or fatal injury.



WARNING: Be sure that you are completely familiar with the safe operation and programming of this equipment. This equipment may be connected to other machines that have rotating parts or parts that are controlled by this equipment. Improper use can cause serious or fatal injury.



WARNING: The stop input to this equipment should not be used as the single means of achieving a safety critical stop. Drive disable, motor disconnect, motor brake and other means should be used as appropriate.



WARNING: Improper operation or programming may cause violent motion of the motor shaft and driven equipment. Be certain that unexpected motor shaft movement will not cause injury to personnel or damage to equipment.



CAUTION: The safe integration of this equipment into a machine system is the responsibility of the machine designer. Be sure to comply with the local safety requirements at the place where the machine is to be used. In Europe these are the Machinery Directive, the Electromagnetic Compatibility Directive and the Low Voltage Directive. In the United States this is the National Electrical code and local codes.



CAUTION: The DSM has components which are sensitive to Electrostatic Discharge (ESD). All handling should be done at an ESD protected workstation.



CAUTION: To prevent equipment damage, be certain that input and output signals are powered and referenced correctly.



CAUTION: To ensure reliable performance of this equipment be certain that all signals to/from the DSM are shielded correctly.



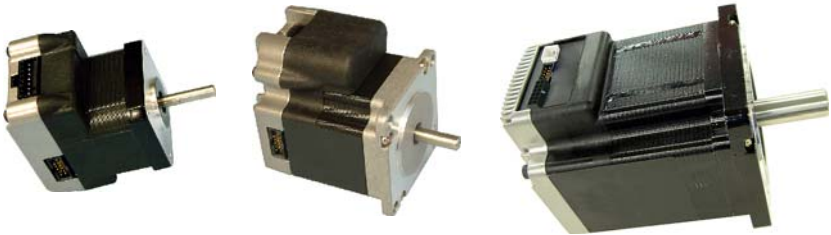
CAUTION: Avoid locating the DSM immediately above or beside heat generating equipment, or directly below water steam pipes.



CAUTION: Avoid locating the DSM in the vicinity of corrosive substances or vapors, metal particles and dust.

2.1 DSM S-Series integrated motor and driver

The DSM S-Series high-torque integrated motor and driver is ideal for designers who want the simplicity of a motor with on-board electronics. The DSM allows the system designer to decide the best method of control. The drive's integrated electronics eliminates the need to run the motor cabling through the machine, reducing the potential for problems due to electrical noise. The DSM is a small, powerful and inexpensive solution that will reduce system cost, design and assembly time for a large range of stepping motor applications.



The DSM family use a NEMA17, NEMA23 or NEMA34 1.8° high torque motor combined with a microstepping drive, and accept up to 14 resolution settings from 1/2 to 256 microsteps per step. Setup parameters can be changed 'on-the-fly' or downloaded and stored in non-volatile memory with the use of a simple user interface program which is provided, eliminating the need for external switches or resistors. The versatile, compact DSM is available in multiple configurations to fit various system needs.

Features include:

- Integrated microstepping drive/NEMA high torque motor.
- Available in various stack lengths from 13 to 47 (model dependent).
- +24 to +75 VDC input voltage (optional +12 to +48VDC on DSMS17).
- Optically isolated +5 to +24VDC inputs, sourcing or sinking.
- Automatic current reduction.
- Automatic communication configuration.
- Factory-fitted optical encoder (options D5 and D10).
- Rear knob for manual positioning (option M).
- Interfacing by 30cm (12in) flying leads (optional 7-pin terminal block or 12-pin IDC connector on DSMS17).
- Graphical User Interface (GUI) for easy parameter setup.
- Extremely compact.

A “Baldor Motion Toolkit CD” is available. This contains the Baldor SPI Interface software, used for communicating and configuring the DSM.

This manual is intended to guide you through the installation of the DSM. The chapters should be read in sequence.

The *Basic Installation* section describes the mechanical installation of the DSM. The following sections require knowledge of the low level input/output requirements of the device that will control the DSM, and an understanding of computer software installation. If you are not qualified in these areas you should seek assistance before proceeding.

Note: You can check that you have the latest releases by visiting the website www.baldormotion.com/supportme.

2.1.1 Option availability

Model	'D' encoder options		'F' flying leads option	'P' connector option	'C' connector option	'M' control knob option
	500 line	1000 line				
DSMS 17	Yes 10-pin connector Index mark Direction output	Yes 10-pin connector - Direction output	Yes All models	Yes All models	Yes All models	Yes All models
DSMS 23	Yes 10-pin connector Index mark Direction output	Yes 10-pin connector - Direction output	Yes All models	Yes All models	Yes All models	Yes All models
DSMS 34	Yes Flying leads Index mark -	Yes Flying leads Index mark -	Yes All models	No	Yes All models	Yes All models

Note: A DSM cannot have the encoder and control knob options fitted simultaneously.

2.2 Receiving and inspection

When you receive your DSM, there are several things you should do immediately:

1. Check the condition of the packaging and report any damage immediately to the carrier that delivered your DSM.
2. Remove the DSM from the shipping container and remove all packing material. The container and packing materials may be retained for future shipment.
3. Verify that the catalog number of the DSM you received is the same as the catalog number listed on your purchase order. The catalog/part number is described in the next section.
4. Inspect the DSM for external damage during shipment and report any damage to the carrier that delivered it.
5. If the DSM is to be stored for several weeks before use, be sure that it is stored in a location that conforms to the storage humidity and temperature specifications shown in section 3.1.1.

2.2.1 Identifying the catalog number

Different models of DSM are available. As a reminder of which product has been installed, it is a good idea to write the catalog number in the space provided below.

DSM catalog number: **DSMS** _____ - _____ - _____

Installed in: _____

Date: _____

A description of a catalog number is shown here, using the example **DSMS34F-3B-D10**:

	Meaning	Alternatives
DSMS	DSM S-series family	-
34	NEMA 34 frame size	17 =NEMA 17; 23 =NEMA 23
F	Flying lead connections	P =7-pin terminal block C =12-pin IDC connector
3	Large stack size	1 =Small stack size; 2 =Medium stack size
B	Supply voltage 24 - 75VDC	A =Supply voltage 12 - 48VDC
D10	(Optional) Differential encoder, 1000 line	D5 =Differential encoder, 500 line; M =Manual control knob

2.3 Units and abbreviations

The following units and abbreviations may appear in this manual:

V	Volt (also VAC and VDC)
W	Watt
A	Ampere
Ω	Ohm
m Ω	milliohm
μ F	microfarad
pF	picofarad
mH	millihenry
Φ	phase
ms	millisecond
μ s	microsecond
ns	nanosecond
mm	millimeter
m	meter
in	inch
ft	feet
lb-in	pound inch (torque)
N-m	Newton meter (torque)
ADC	Analog to Digital Converter
ASCII	American Standard Code for Information Interchange
AWG	American Wire Gauge
CDROM	Compact Disc Read Only Memory
CTRL+E	on the PC keyboard, press Ctrl then E at the same time.
DAC	Digital to Analog Converter
EMC	Electromagnetic Compatibility
HMI	Human Machine Interface
ISO	International Standards Organization
Kbaud	kilobaud (the same as Kbit/s in most applications)
MB	megabytes
Mbps	megabits/s
(NC)	Not Connected
NEMA	National Electrical Manufacturers Association
RF	Radio Frequency
SPI	Serial Peripheral Interface

3.1 Introduction

You should read all the sections in *Basic Installation*.

It is important that the correct steps are followed when installing the DSM. This section describes the mechanical installation of the DSM.

3.1.1 Location requirements

Ensure you have read and understood the warnings and cautions in section 1.

The safe operation of this equipment depends upon its use in the appropriate environment. The following points must be considered:

- The DSM is designed to be mounted indoors, permanently fixed and located.
- The DSM must be secured by the holes in the faceplate.

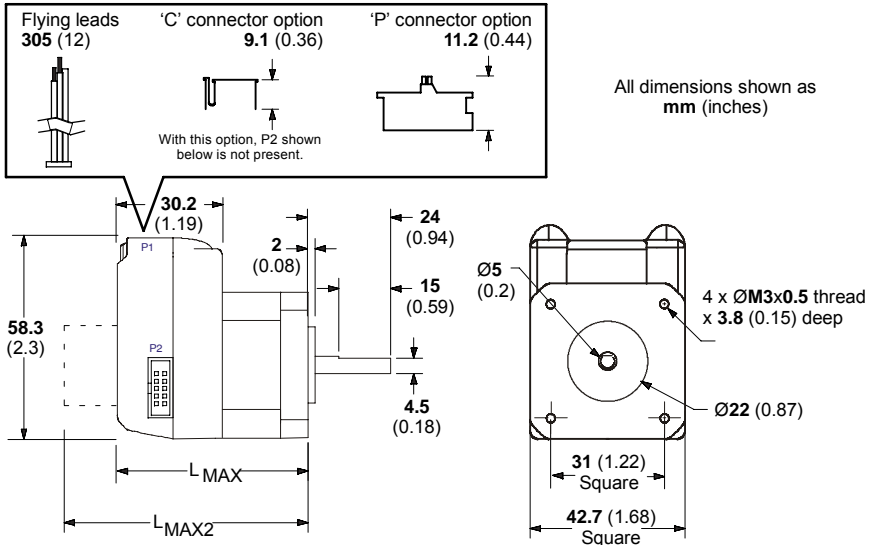
Because the DSM consists of two core components, a drive and a motor, attention must be paid to the thermal specifications of both the motor and the electronics. The following maximum temperatures apply to the DSM:

- The DSM heat sink temperature must not exceed 85°C (185°F).
- The DSM motor temperature must not exceed 100°C (212°F).

3.1.2 Mounting the DSM

Ensure you have read and understood the location requirements in section 3.1.1. Mount the DSM by the four holes in the faceplate. M5 bolts or screws are recommended.

3.1.2.1 Dimensions - DSMS17



DSM Model	Dimensions (mm / inches)		Weight g / oz
	L _{MAX}	L _{MAX2} (with encoder or control knob)	
DSMS17x-1A	55.9 (2.20)	70.9 (2.79)	294.8 (10.4)
DSMS17x-2A	61.7 (2.43)	76.7 (3.02)	340.2 (12.0)
DSMS17x-3A	70.4 (2.77)	85.6 (3.37)	430.9 (15.2)

Figure 1 - Package dimensions - DSMS17



WARNING: Use care when installing the mounting screws on all DSMS17 models. The mounting holes on the flange are not drilled through, so the maximum length for screw threads into the motor flange is 3.5mm (0.14 in). See Figure 2. The maximum torque for the M3x0.5 screw is 9 kg·cm (7.8 lb·in) with a thread engagement of 6.5 threads (3.3 mm deep). A lesser thread engagement diminishes the maximum torque.

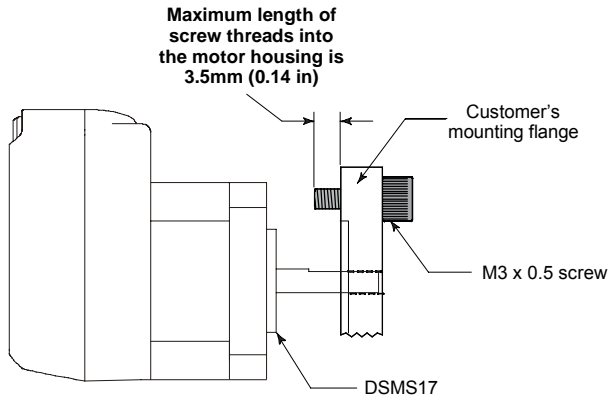
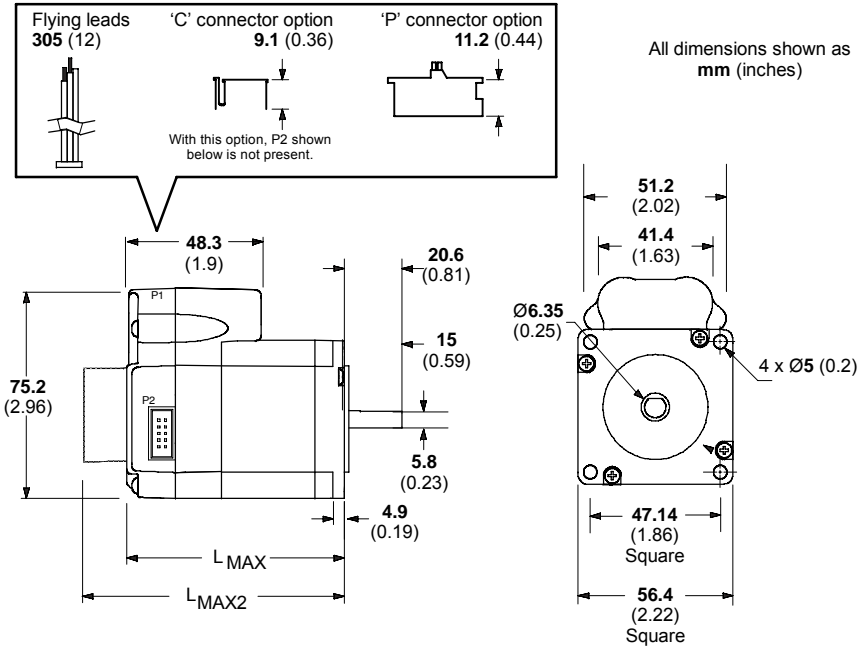


Figure 2 - Screw thread limitation - DSMS17

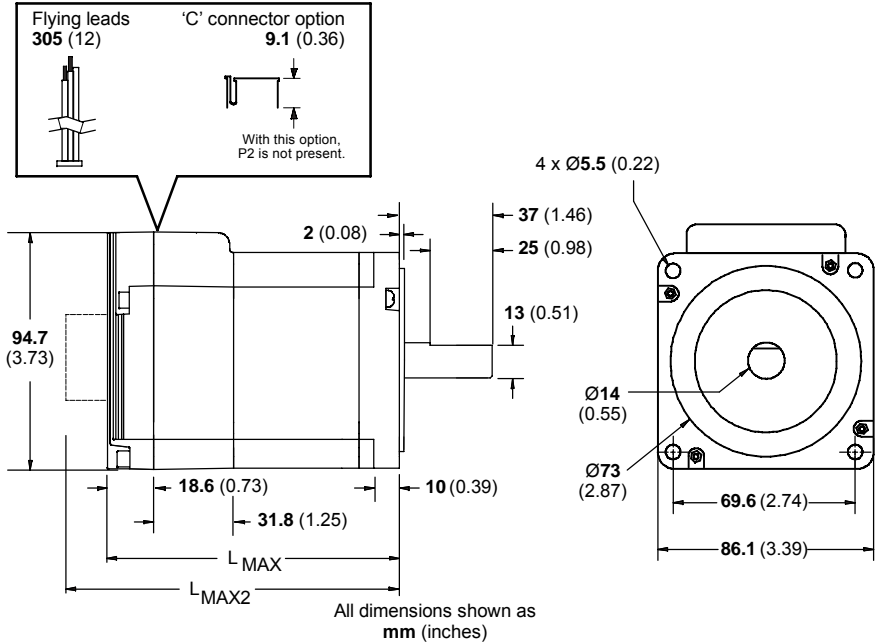
3.1.2.2 Dimensions - DSMS23



DSMS Model	Dimensions (mm / inches)		Weight kg / lb
	L _{MAX}	L _{MAX2} (with encoder or control knob)	
DSMS23x-1B	67.31 (2.65)	85.34 (3.36)	0.61 (1.35)
DSMS23x-2B	76.71 (3.02)	94.74 (3.73)	0.75 (1.65)
DSMS23x-3B	98.55 (3.88)	116.6 (4.59)	1.11 (2.45)

Figure 3 - Package dimensions - DSMS23

3.1.2.3 Dimensions - DSMS34



Motor Stack	Dimensions (mm / inches)		Weight
	L_MAX	L_MAX2 (with control knob)	kg / lb
DSMS34F-1B	94.2 (3.71)	112.3 (4.42)	1.9 (4.19)
DSMS34F-2B	114.3 (4.50)	132.3 (5.21)	2.5 (5.5)
DSMS34F-3B	154.2 (6.07)	172.2 (6.78)	4.0 (8.8)

Figure 4 - Package dimensions - DSMS34

Note: Optional encoders are mounted internally on models DSMS34. For this reason, only the control knob option increases the dimensions of the standard model.

3.1.2.4 Securing DSM cables

Some applications may require that the DSM moves with the axis motion. If this is a requirement of your application, the motor leads and the encoder leads (if fitted) must be properly anchored. Secure the flying leads to the motor body using adhesive cable clamps. This will prevent flexing and tugging which can cause damage at critical connection points in the DSM electronics and the encoder (if fitted).

Do not bundle the logic leads or encoder leads together with the DSM power leads.

3.1.3 Other requirements for installation

- The DSM requires a power supply as described in section 4.2.
- A PC that fulfills the following specification:

	Minimum specification	Recommended specification
Processor	Intel Pentium 133MHz	Intel PentiumII 400MHz or faster
RAM	32MB	128MB
Hard disk space	40MB	60MB
CD-ROM	A CD-ROM drive	
USB port	USB port	
Screen	800 x 600, 256 colors	1024 x 768, 16-bit color
Mouse	A mouse or similar pointing device	
Operating system	Windows 95, Windows NT	Windows 98, Windows ME, Windows NT, Windows 2000 SP1 or Windows XP

- A USB-SPI cable (connected as shown in section 4.4.1). Part CBL055-501 is recommended.
- Your PC operating system user manual might be useful if you are not familiar with Windows.

4.1 Introduction

This section describes the input and output connections of the DSM.

Logic level cables must not run parallel to power cables. Power cables will introduce noise into the logic level cables and make the system unreliable. Logic level cables must be shielded to reduce the chance of induced noise. The shield needs to be grounded at the signal source to AC ground; the other end of the shield must not be connected. This allows the shield to act as a drain.



WARNING: Do not connect or disconnect any wiring when power is applied! Disconnect the AC power side to power down the DC power supply. For battery operated systems, connect a transient suppressor across the power switch to prevent arcs and high voltage spikes.

4.1.1 Basic connections

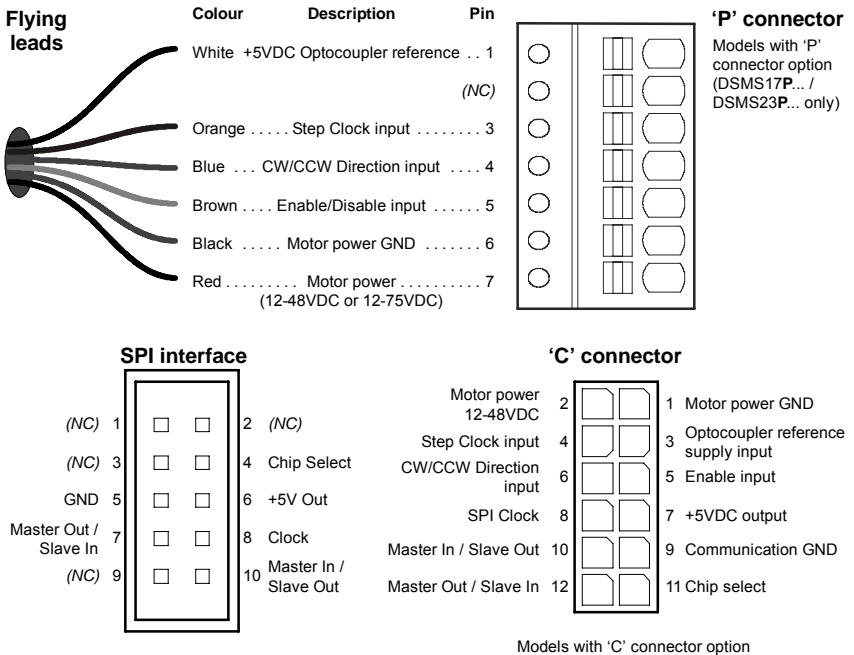


Figure 5 - Basic connection summary

4.2 Motor power input

The DSM requires an unregulated DC power supply. The power supply current will depend upon voltage and load, but will not exceed 2A (DSMS17 / DSMS23) or 4A (DSMS34).

Location	Flying leads (red and black), 'P' connector, or 'C' connector
Input voltage range	+12 to +48VDC (DSMS17) +12 to +75VDC (DSMS23, DSMS34)
Voltage ripple	±10%
Input current	2A maximum (DSMS17 / DSMS23) 4A maximum (DSMS34)



WARNING: The maximum +75VDC input voltage of the DSM includes motor back EMF, power supply ripple and high line.

A characteristic of all motors is back EMF. Back EMF is a source of current that can push the output of a power supply beyond the maximum operating voltage of the driver. As a result, damage to the stepper driver could occur over a period of time. Care should be taken so that the back EMF does not exceed the maximum input voltage rating of the DSM.

Cable length, wire gauge and power conditioning devices play a major role in the performance of the DSM. The length of the DC power supply cable to a DSM should not exceed 15m (50 ft). If cabling of 15m (50ft) or longer is required, the additional length may be gained by adding an AC power supply cable (see Figures 6 and 7). Power supply leads to the DSM need to be twisted. If more than one DSM is to be connected to the same power supply, run separate power and ground leads from the supply to each driver.

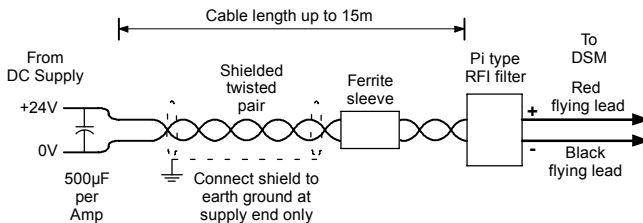


Figure 6 - Power supply connections, cable length less than 15m

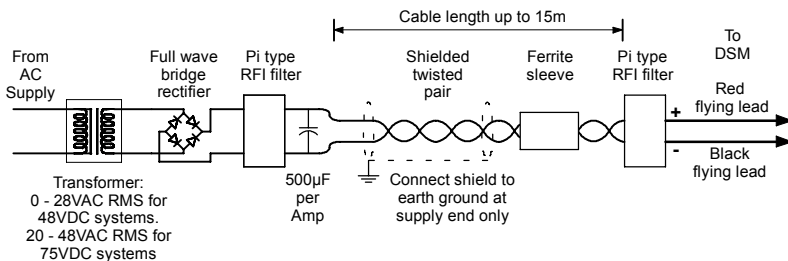


Figure 7 - Power supply connections, cable length more than 15m

4.2.1 Wire sizes

Table 1 describes the wire sizes to provide optimal protection against EMI and RFI. Correct wire size is determined by the current requirement and the cable length. The actual cable type, wire gauge, shield type and filtering devices used are dependent on the customer's application and system. Always use shielded twisted pairs for AC and DC supply cables. For logic wiring (see section 4.3) AWG22 wire is recommended.

Supply current	Cable length (meters)	Cable length (feet)	Minimum Wire Gauge	
			AWG	mm ²
1A peak	3	10	20	0.5
	8	25	20	0.5
	15	50	18	1.0
	23	75	18	1.0
	30	100	16	1.3
2A peak	3	10	20	0.5
	8	25	18	1.0
	15	50	16	1.3
	23	75	14	2.0
	30	100	14	2.0
3A peak	3	10	18	1.0
	8	25	16	1.3
	15	50	14	2.0
	23	75	12	3.3
	30	100	12	3.3
4A peak	3	10	18	1.0
	8	25	16	1.3
	15	50	14	2.0
	23	75	12	3.3
	30	100	12	3.3

Table 1 - Power wire ratings

4.3 Logic inputs

The DSM has three optically isolated logic inputs. These inputs are isolated to minimize or eliminate electrical noise coupled onto the drive control signals, and are over-voltage protected. The inputs may be configured as either sinking inputs or sourcing inputs (model dependent, see section 4.3.3), with the Optocoupler Reference (white) lead as the reference. This allows the DSM to be interfaced to a variety of controllers.

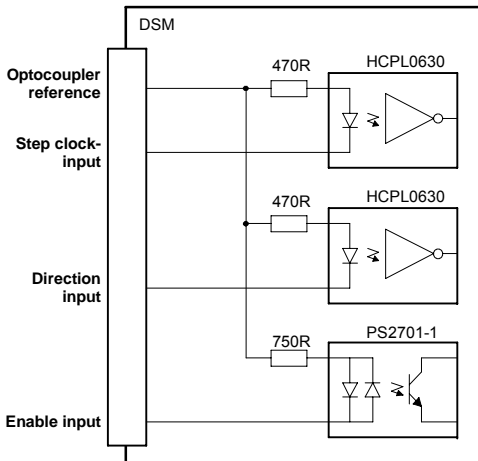


Figure 8 - Opto-isolated digital input circuit (sinking only)

4.3.1 Logic input descriptions

4.3.1.1 Step clock (orange flying lead)

The step clock input is where the motion clock from the control circuitry will be connected. The motor will advance one microstep in the plus or minus direction (based upon the state of the direction input) on the step clock edge that causes the opto-isolator to be active. The size of this increment or decrement will depend on the microstep resolution setting. The maximum frequency on the step clock input is 2.0MHz, with a minimum pulse width of 400ns.

4.3.1.2 Direction (blue flying lead)

The direction input controls the CW/CCW direction of the motor. A logic high (default, unconnected) will cause the motor to rotate in the CW direction (seen while looking at the face of the motor). A logic low on the input will cause the motor to rotate in the CCW direction. This input is synchronized to the positive going edge of the step clock input. The direction input may be connected by means of a switch.

4.3.1.3 Enable (brown flying lead)

This input can be used to enable or disable the driver output circuitry. A logic high (when the enable switch is open, see Figures 9 and 10), causes the driver outputs to be enabled and step clock pulses will cause the motor to advance. A logic low (when the input switch is

closed) will cause the driver output circuitry to be disabled. Note that the internal sine/cosine position generator will continue to increment or decrement as long as step clock pulses are being received by the DSM. The enable input is not synchronized to any other input and may be changed at any time.

4.3.2 Input timing

The direction input and the microstep resolution inputs are internally synchronized to the positive going edge of the step clock input. When a step clock transitions from low to high on the positive going edge, the state of the direction input and microstep resolution settings are latched. Any changes made to the direction and/or microstep resolution will occur on the rising edge of the step clock pulse following this change. Run Current and Hold Current changes are updated immediately (see section 5.2.2).

4.3.3 Sinking / sourcing input configuration

All DSMS17, 23 and 34 models can be wired to create sinking inputs, where a reference voltage between +5 and +24VDC is connected to the Optocoupler Reference (white) lead. The isolated inputs are then interfaced to a sinking output (which utilizes the same supply as the opto coupler reference input) such as a switch, open collector, or PLC output. To maintain isolation, the input power source should not be connected to the motor power source.

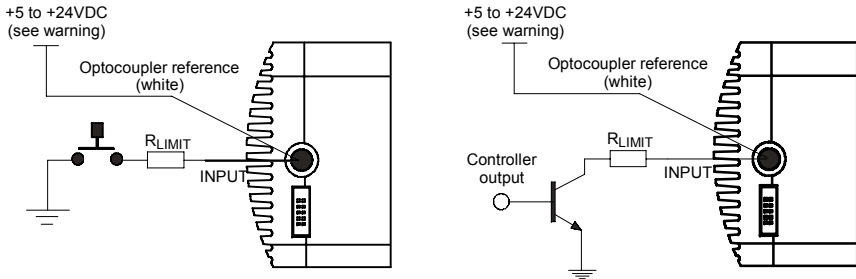


Figure 9 - Sinking input configurations

Models with the 'C' connector option, and all DSMS34 models, can be wired to create sourcing inputs where the Optocoupler Reference (White) lead is connected to ground. The isolated inputs are then sourced to between +5 to +24VDC from a switch, open collector, or PLC output.

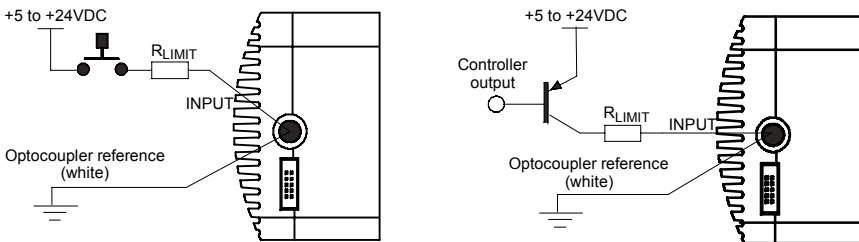


Figure 10 - Sourcing input configurations

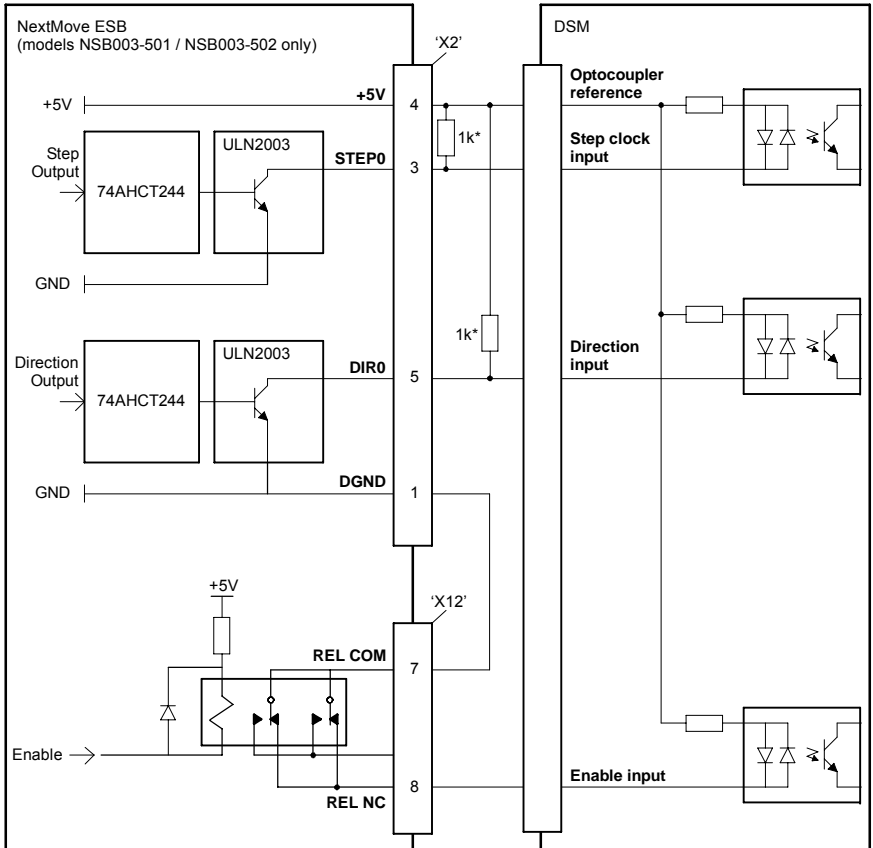


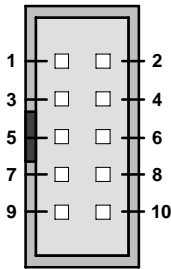
Figure 11 - Sourcing input connections from a typical controller (e.g. NextMove ESB models NSB003-501/502)

Note: * The 1k pull up resistors are optional, but can help prevent noise affecting the DSM's inputs.

4.4 SPI interface

DSM setup parameters are changed via an SPI (Serial Peripheral Interface) port. This port uses a 10-pin IDC header, and connects to a USB port on your PC. The recommended method of connecting the SPI port to the PC is by using parameter setup cable CBL055-501. The PC requires a standard USB port.

4.4.1 SPI connector



Location	10-pin IDC header (DSMS17... / DSMS23...) Additional flying leads (DSMS34...) Typical mating connector: AMPMODU MT (Amp 102398-3)	
Pin	Name	Description
1	(NC)	
2	(NC)	
3	(NC)	
4	CS	Chip select
5	GND	Communication ground
6	+5V out	+5VDC output
7	MOSI	Master Out / Slave In
8	CLK	Clock
9	(NC)	
10	MISO	Master In / Slave Out



WARNING: The +5VDC output on the SPI connector is used for the setup cable only. This output is not designed to power external devices.

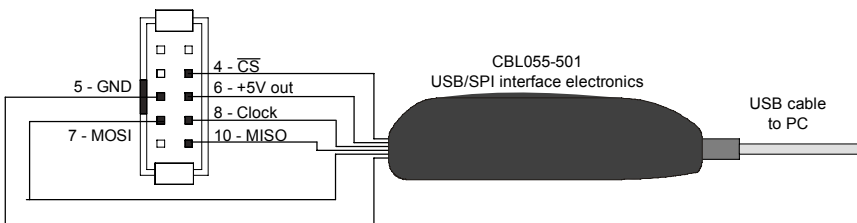


Figure 12 - SPI interface wiring

4.4.2 SPI signal descriptions

4.4.2.1 +5V out

This output is a voltage supply for the setup cable only. It is not designed to power any external devices

4.4.2.2 CLK

The clock is driven by the master and regulates the flow of the data bits. The master may transmit data at a variety of baud rates. The clock cycles once for each bit that is transferred.

4.4.2.3 MISO

Carries output data from the DSM back to the SPI master. Only one DSM can transmit data during any particular transfer.

4.4.2.4 CS

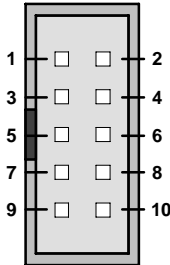
This signal is used to turn multiple DSMs on or off.

4.4.2.5 MOSI

Carries output data from the SPI Master to the DSM.

4.5 Encoder interface (optional)

The DSM is available with an optional factory mounted encoder, with either 500 or 1000 lines per revolution (i.e. 2000 or 4000 quadrature counts per revolution). On DSMS34 models the encoder is internally mounted, so the footprint of the DSM does not increase. To use encoder feedback, a controller that can receive encoder feedback signals will be required, such as NextMove ESB.



Location	10-pin IDC header (DSMS17 / DSMS23) Additional flying leads (DSMS34) Typical mating connector: AMPMODU MT (Amp 102398-3)		
Pin	Flying lead colour	Name	Description
1	-	(NC)	-
2	Yellow/red	+5V in	Power supply to encoder
3	Yellow/black	GND	Ground
4	-	(NC)	-
5	Yellow/green	CHA-	Channel A signal complement
6	Yellow/blue	CHA+	Channel A signal
7	Yellow/orange	CHB-	Channel B signal complement
8	Yellow/brown	CHB+	Channel B signal
9	Yellow/grey	CHZ-	Index channel signal complement
10	Yellow/violet	CHZ+	Index channel signal

The 500 line and 1000 line encoders have a maximum output frequency of 400,000 quadrature counts per second, equivalent to a maximum frequency for the A and B signals of 100kHz. The 500 line encoder has an index mark.

<u>Pin / Flying lead</u>	<u>Description</u>
6 Yellow/blue	Channel A+
5 Yellow/green	Channel A-
8 Yellow/brown	Channel B+
7 Yellow/orange	Channel B-
10 Yellow/violet	Channel Z+ (Index)
9 Yellow/grey	Channel Z- (Index)

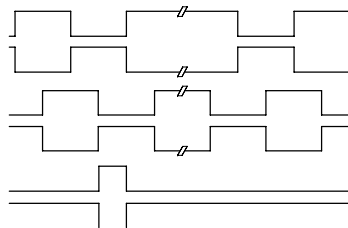


Figure 13 - Encoder output signals

4.6 'C' connector

All models are available with an optional 12-pin keyed pin and receptacle for interfacing the power and I/O. To connect the USB/SPI parameter setup cable to the 12-pin connector, use adapter cable CBL054-502. This also provides a connection for the prototype development cable CBL054-503, which provides flying lead connections.

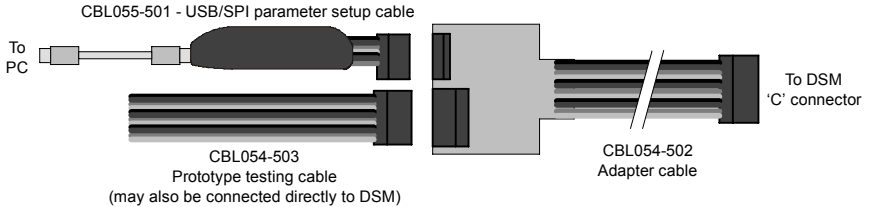
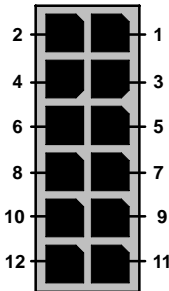


Figure 14 - Cable connections

4.6.1 'C' connector details



Location	12-pin female pin header Mating connector: AMP Micro Mate-N-Lock (1-794617-2) receptacle or equivalent		
Pin	Colour	Name	Description
1	Black	GND	Motor power ground
2	Red	Motor power	+12 to +48VDC motor power
3	White	Optocoupler reference	+5 to +24VDC optocoupler reference supply
4	Orange	Step	Step clock input
5	Brown	Enable	Enable input
6	Blue	Direction	CW/CCW direction input
7	Yellow	+5V out	+5VDC output
8	Violet	CLK	SPI clock
9	Grey	GND	Communication ground
10	Green	MISO	SPI Master In, Slave Out
11	White/ Orange	CS	Chip select
12	White/ Blue	MOSI	SPI Master Out, Slave In

Wire colours refer to the prototype testing cable CBL054-503.
For descriptions of each signal, see sections 4.3 and 4.4.



WARNING: The pinout of the 12-pin 'C' connector option is not the same as the standard 10-pin SPI connector.

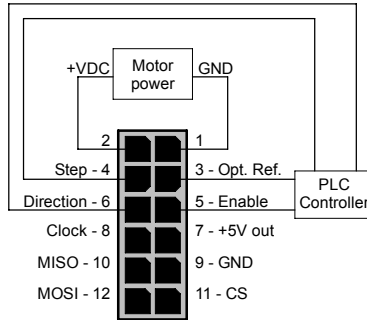


Figure 15 - 12-pin 'C' connector option - SPI interface wiring

4.7 Connection summary - minimum system wiring

As a guide, Figure 16 shows an example of the typical minimum wiring required to operate the DSM in conjunction with a NextMove ESB controller.

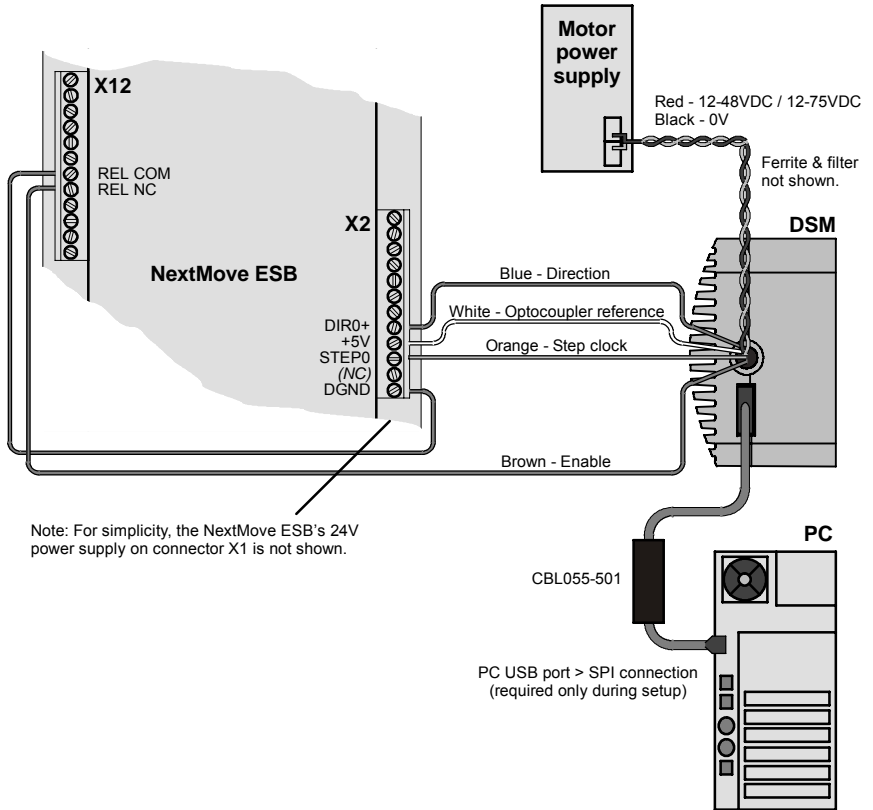


Figure 16 - Example minimum system wiring (flying leads)

5.1 Introduction

The motor interface is accessed through the Baldor SPI Interface software, which is an easy to install and easy to use program used to set the DSM's parameters. The Baldor SPI Interface is included on the Baldor Motion Toolkit CD.

5.1.1 Connecting the DSM to the PC

The DSM is connected to the PC using a standard USB port. It is recommended to use the optional CBL055-501 parameter setup cable (see section 4.4).

5.1.2 Installing the USB driver

When the parameter setup cable (CBL055-501) is connected to the PC, Windows XP will automatically detect it and display the Found New Hardware Wizard. It is now necessary to install the drivers, which are provided on the CD supplied with the cable. Alternatively, the driver files can be downloaded from www.baldormotion.com/support/supportme and placed in a temporary folder on the PC.

1. Choose the *No, not this time* option and click **Next >**.
2. Choose the *Install from a list or specific location (Advanced)* option and click **Next >**.
3. Check the *Include this location in the search* option. Click **Browse** and locate the drivers folder on the CD. For downloaded files, locate the temporary folder containing the extracted files. Click **Next >**.
4. When Windows finds the required driver files, a dialog will warn that they have not passed 'Windows Logo testing'. This is normal for the parameter setup cable's USB driver, so click **Continue Anyway** to continue with the installation.
5. When the *Completing the Found New Hardware Wizard* message appears, click **Finish**.

After a few moments, the Found New Hardware Wizard will appear a second time, ready to install the virtual COM port driver.

5.1.3 Installing the virtual COM port driver

As soon as the USB driver has been installed, the PC starts to communicate with the parameter setup cable's interface. This immediately reveals the other part of the interface's hardware, the virtual communications port (VCP), which provides communication with the DSM motor. The VCP also requires drivers to be installed, which is why the Found New Hardware Wizard appears a second time.

1. Choose the *No, not this time* option and click **Next >**.
2. Choose the *Install from a list or specific location (Advanced)* option and click **Next >**.
3. Check the *Include this location in the search* option. The previously used location should already be selected, but if not click **Browse** and locate the required folder. Click **Next >**.

4. When Windows finds the required VCP driver files, a dialog will warn that they have not passed 'Windows Logo testing'. This is normal for the parameter setup cable's VCP driver, so click **Continue Anyway** to continue with the installation.
5. When the *Completing the Found New Hardware Wizard* message appears, click **Finish**.

A final Found New Hardware message will appear to inform you that the hardware is now ready to use.

5.1.4 Determining the virtual COM port number

The parameter setup cable's virtual COM port appears as a normal COM (serial) port in Windows, and is automatically allocated a COM port number. It will be necessary to select this COM port on the Port, USB/Serial menu of the *Baldor SPI Interface* software to allow communication with the DSM motor.

1. In Windows, right-click the My Computer icon and choose Properties.
2. Choose the Hardware tab and click **Device Manager**.
3. Expand the *Ports (COM & LPT)* item.
4. Look for the entry named *Baldor USB to SPI Parameter Setup Cable (COM...)*. The value that appears after COM is the port number. Make a note of this number.

The DSM is now ready to be configured using the Baldor SPI Interface software.

Note: If the MotiFlex e100 is later connected to a different USB port on the host computer, Windows may report that it has found new hardware. Either install the driver files again for the new USB port, or connect the MotiFlex e100 to the original USB port where it will be recognized in the usual way.

5.1.5 Installing Baldor SPI Interface

You will need to install the Baldor SPI Interface software to configure the DSM.

1. Insert the CD into the drive.
2. After a few seconds the setup wizard should start automatically. If the setup wizard does not appear, select Run... from the Windows Start menu and type

d:\Baldor_SPI_Interface.exe

where **d** represents the drive letter of the CD device.

Follow the on-screen instructions to install the software. The setup Wizard will copy the files to appropriate folders on the hard drive.

5.1.6 Starting the controller and DSM

If you have followed the instructions in the previous sections, you should have now connected power sources, inputs and outputs, and the USB cable linking the PC with the DSM. Before you apply power for the first time, it is very important to verify the following:

- Inspect all power connections for accuracy, workmanship and tightness.
 - Verify that all wiring conforms to applicable codes.
 - Check all signal wiring for accuracy.
1. Turn on the controller (e.g. NextMove ESB, if connected).
 2. Turn on the motor power supply.

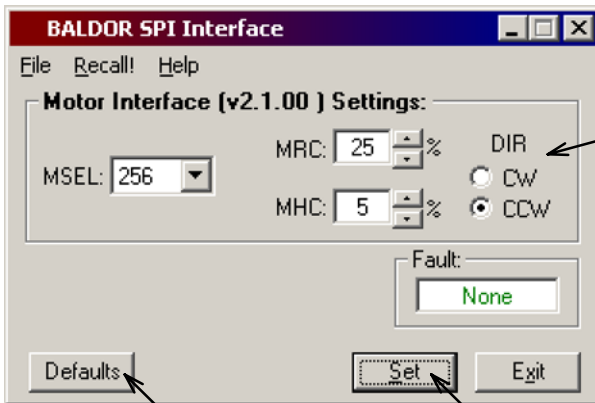
5.2 Baldor SPI Interface

The Baldor SPI Interface is a simple application for configuring the DSM. The single window contains all the controls necessary to setup the motor hold current, motor run current, microstepping resolution and direction override (certain models only).

5.2.1 Starting Baldor SPI Interface

On the Windows **Start** menu, select Programs, BALDOR SPI Interface, BALDOR SPI Interface.

The software will try immediately to establish communication with the DSM. If this step fails, the word "Disconnected" will appear in red. Check that the DSM is powered and that the cable is connected, then choose the Port menu item. Select the appropriate USB port from the list of USB/Serial port options (this is the COM port number found in Windows Device Manager - see section 5.1.4).



Click in the boxes or use the arrow buttons to adjust values.

The CW/CCW options appears for all DSMS34 models, and for DSMS17 models with the 'C' connector option.

To revert to default settings, click **Default**, followed by **Set**.

To send the changes to the DSM, click **Set**.

5.2.2 Configuration parameters

There are 4 configuration parameters for the DSM. Parameter settings are saved to memory when the Set button is clicked. These parameters may all be changed 'on-the-fly'. The following table summarizes the parameters and their function, range, units and default setting.

Parameter	Name	Range	Units	Default
MHC	Motor hold current	0 - 100	%	5
MRC	Motor run current	1 - 100	%	25
MSEL	Microstep resolution	2, 4, 5, 8, 10, 16, 25, 32, 50, 64, 125, 128, 250, 256	microsteps per step	256
DIR	Motor direction override	0 or 1		CW

5.2.2.1 Motor Hold Current (MHC)

The MHC parameter sets the motor hold current as a percentage of the full output current of the driver. If the hold current is set to 0, the output circuitry of the driver section will disable when the hold current setting becomes active. The hold current setting becomes active 200ms following the last step clock pulse.

5.2.2.2 Motor Run Current (MRC)

The Motor Run Current (MRC) parameter sets the motor run current to a percentage of the full output current of the DSM driver section.

5.2.2.3 Direction Override (DIR)

The DIR parameter changes the motor direction relative to the direction input signal, adapting the direction of the DSM to operate as your system requires. On DSMS17, this parameter is only available on models with the 'C' connector option (see section 4.6).

5.2.2.4 Microstep Resolution Select (MSEL)

The MSEL parameter specifies the microstep resolution of the DSM. The following table lists valid MSEL parameter settings.

Binary values: MSEL =	Steps per revolution	Decimal values: MSEL =	Steps per revolution
2	400	5	1000
4	800	10	2000
8	1600	25	5000
16	3200	50	10000
32	6400	125	25000
64	12800	250	50000
128	25600		
256	51200		

6.1 Introduction

This section explains common problems and their solutions.

6.1.1 Problem diagnosis

If you have followed all the instructions in this manual in sequence, you should have few problems installing the DSM. If you do have a problem, read this section first.

6.1.2 Further support

If you need to contact Baldor technical support by telephone or fax, contact details are provided at the front of this manual. Please have the following information ready:

- The model number or serial number of your DSM (if known).
- A clear description of what you are trying to do.
- A clear description of the symptoms that you can observe.
- The type of motion generated in the motor shaft.
- Give a list of any parameters that you have setup.

6.1.3 Communication problems

If the problem is not listed below please contact Baldor technical support.

Symptom	Check
Baldor SPI interface cannot detect the DSM	<p>Check that the DSM is powered.</p> <p>Check that the SPI interface cable is properly connected. If you have made your own SPI cable, check that it is wired correctly and properly connected.</p>

6.1.4 Motor control problems

Symptom	Check
Controller outputs appears to be working, but will not cause DSM to turn.	<p>Check that the DSM is powered.</p> <p>Check that the logic connections between motor and controller are correct.</p> <p>Confirm that the sense of the enable input is correct to enable the motor (section 4.3.1.3).</p>
Controller reports that the DSM is not moving and drops the enable line.	<p>If the encoder option is present, confirm that it has been properly connected to the controller's encoder input and is not subject to interference. If the controller is expecting a feedback signal but does not receive one, it may assume the DSM is not turning. This could cause the controller to report a following error, to disable the DSM, or both.</p>

7.1 Introduction

This section provides technical specifications of all DSM models.

7.1.1 Input power

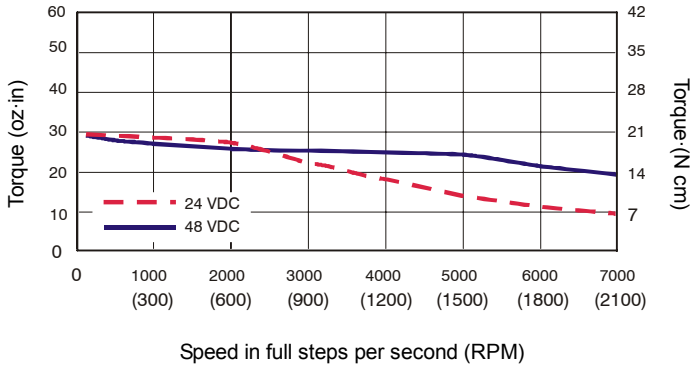
<i>Description</i>	DSMS17...	DSMS23...	DSMS34...
Required supply type	Unregulated DC		
Ripple voltage	±10%		
Minimum supply voltage	+12VDC	+12VDC	+12VDC
Maximum supply voltage	+48VDC	+75VDC	+75VDC
Input current (maximum)	2A	1.5A	4A



WARNING: The maximum +75VDC input voltage of the DSM includes motor back EMF, power supply ripple and high line.

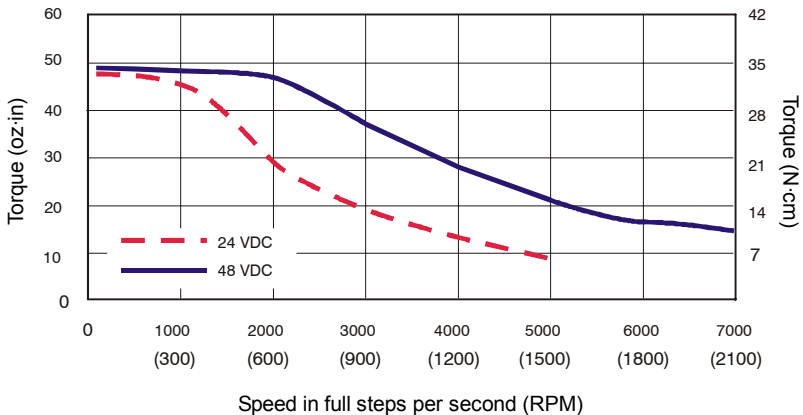
7.1.2 Motor speed & torque - DSMS17

7.1.2.1 DSMS17x-1A...



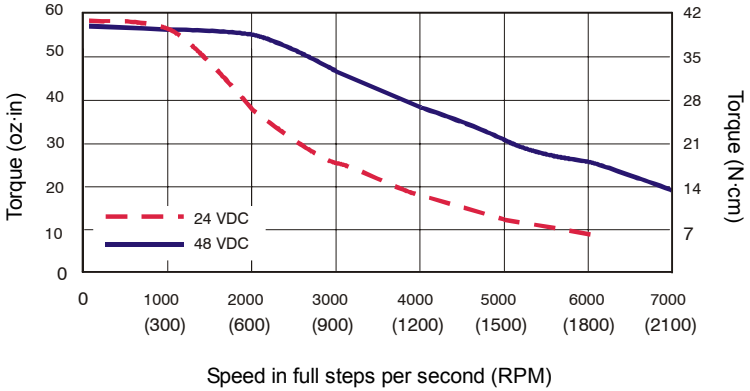
Description	Value
Holding torque	22.6 N-cm (32 oz-in)
Detent torque	1.17 N-cm (1.66 oz-in)
Rotor inertia	0.038 kg-cm ² (0.00053 oz-in-s ²)

7.1.2.2 DSMS17x-2A...



Description	Value
Holding torque	42.4 N-cm (60 oz-in)
Detent torque	1.47 N-cm (2.08 oz-in)
Rotor inertia	0.057 kg-cm ² (0.00080 oz-in-s ²)

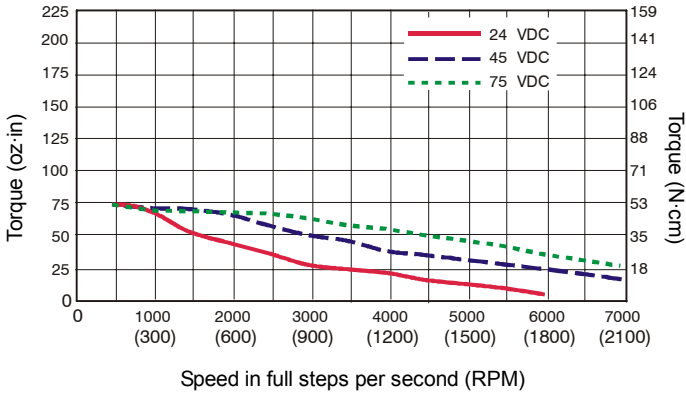
7.1.2.3 DSMS17x-3A...



Description	Value
Holding torque	52.9 N-cm (74.9 oz-in)
Detent torque	2.45 N-cm (3.47 oz-in)
Rotor inertia	0.082 kg-cm ² (0.00116 oz-in-s ²)

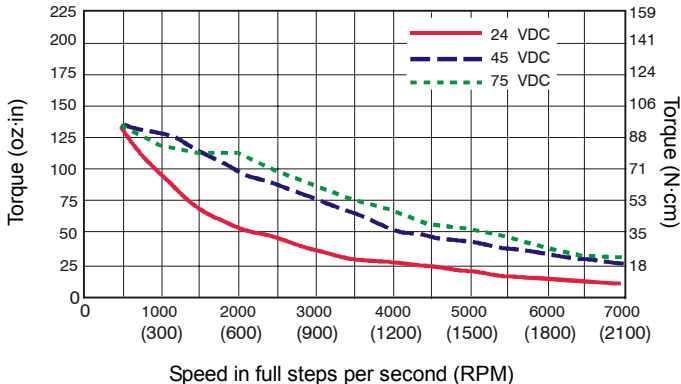
7.1.3 Motor speed & torque - DSMS23

7.1.3.1 DSMS23x-1B...



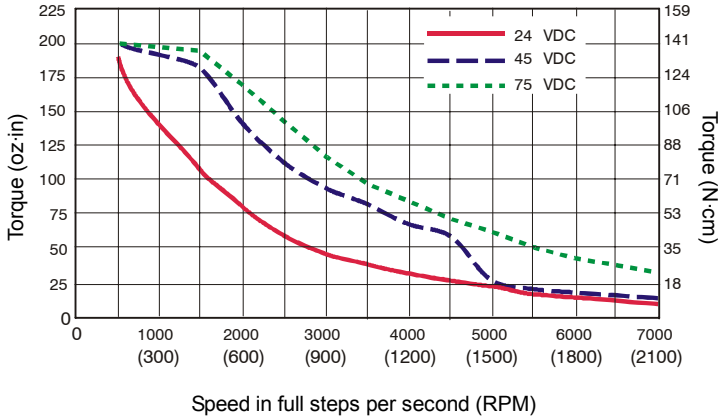
Description	Value
Holding torque	64 N·cm (90 oz·in)
Detent torque	2.7 N·cm (3.9 oz·in)
Rotor inertia	0.18 kg·cm ² (0.0025 oz·in·s ²)

7.1.3.2 DSMS23x-2B...



Description	Value
Holding torque	102 N·cm (144 oz·in)
Detent torque	3.92 N·cm (5.6 oz·in)
Rotor inertia	0.26 kg·cm ² (0.0037 oz·in·s ²)

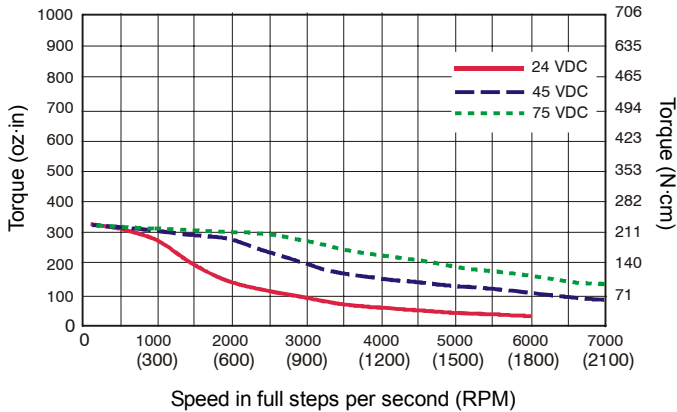
7.1.3.3 DSMS23x-3B...



Description	Value
Holding torque	169 N-cm (239 oz-in)
Detent torque	6.86 N-cm (9.7 oz-in)
Rotor inertia	0.46 kg-cm ² (0.0065 oz-in-s ²)

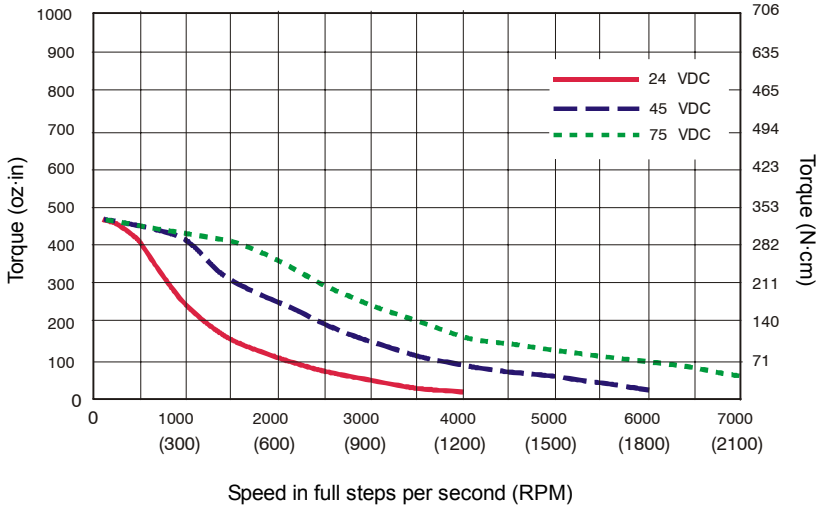
7.1.4 Motor speed & torque - DSMS34

7.1.4.1 DSMS34x-1B...



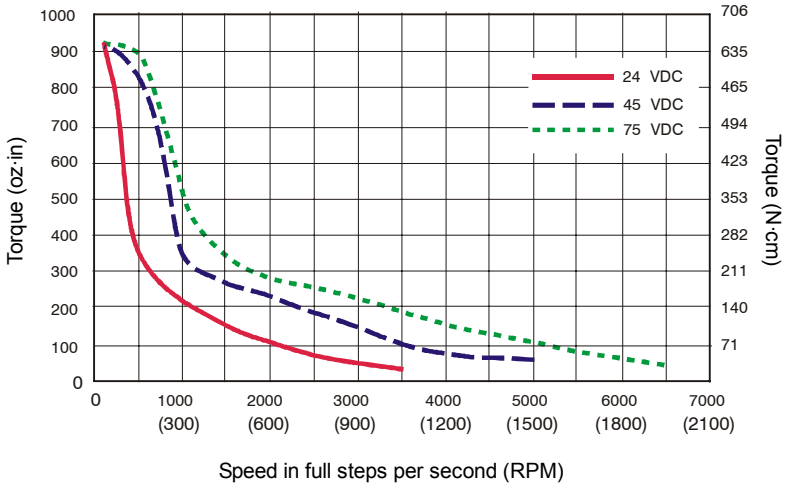
Description	Value
Holding torque	269 N·cm (381 oz·in)
Detent torque	7.7 N·cm (10.9 oz·in)
Rotor inertia	1.0 kg·cm ² (0.01416 oz·in·s ²)

7.1.4.2 DSMS34x-2B...



Description	Value
Holding torque	406 N·cm (575 oz·in)
Detent torque	10.0 N·cm (14.16 oz·in)
Rotor inertia	1.6 kg·cm ² (0.02266 oz·in·s ²)

7.1.4.3 DSMS34x-3B...



<i>Description</i>	Value
Holding torque	749 N·cm (1061 oz·in)
Detent torque	14.0 N·cm (19.83 oz·in)
Rotor inertia	3.4 kg·cm ² (0.04815 oz·in·s ²)

7.1.5 Encoder options

7.1.5.1 500 line encoder (DSMS...-D5)

<i>Description</i>	Unit	Value
Type		Differential
Supply voltage	VDC	5
Supply current	mA	10
Output voltage high low	VDC	2.5V (min) 0.5V (max)
Output current	mA	3 (25°C / 77°C) 2 (100°C / 212°F)
Phase A to B		90° ±18° electrical
Index pulse width		90° ±36° electrical
Bandwidth	kHz	100
Inertia (maximum)		0.20 g·cm ² 0.28 x 10 ⁻⁵ oz·in·sec ²
Weight		5.07 g (0.18 oz)
Operating temperature min max		-40°C (-40°F) 100°C (212°F)
Storage temperature min max		-50°C (-58°F) 125°C (257°F)
Humidity max		90%, non-condensing

7.1.5.2 1000 line encoder (DSMS...-D10)

<i>Description</i>	Unit	Value
Type		Differential
Supply voltage	VDC	5
Supply current	mA	57
Output	VDC	2.5V, -20mA 0.8V, +20mA
	high low	
Phase A to B		90° ±30° electrical
Index pulse width		90° ±30° electrical
Bandwidth	kHz	100
Inertia (maximum)		0.57 g·cm ² 8.0 x 10 ⁻⁶ oz·in·sec ²
Operating temperature	min max	-40°C (-40°F) 100°C (212°F)
Storage temperature	min max	-40°C (-40°F) 100°C (212°F)
Humidity	max	90%, non-condensing

7.1.6 Digital inputs

<i>Description</i>	Unit	Value
Type		Opto-isolated
Supply voltage Maximum Minimum	VDC	24 5
Input forward voltage (max) Step clock / Direction Enable	VDC	1.7 1.4
Input current (typical, 5V) Step clock / Direction Enable	mA	10.6 6.7
Input current (maximum allowable) Step clock / Direction Enable	mA	15 9.4
Maximum input frequency	MHz	2.0

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If you have any suggestions for improvements to this manual, please let us know. Write your comments in the space provided below, remove this page from the manual and mail it to:

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LT0227A01

Printed in UK
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