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Note: Throughout this catalog you'll see **Keywords in RED**. To get more information, including access to drawings, specs, photos of examples and the latest innovations, go to our web site, www.velmex.com, and enter the corresponding **Keyword in the Quick Search Box**.

Motors & Controls



VXM Stepping Motor Control

VXM is a Complete Motor Control Solution

The VXM is a high integration stepping motor controller for “plug and run” with Velmex motor driven products. Reliable performance is achieved with a powerful RISC Microcontroller that directly controls motor phase switching and all other interface functions. The VXM uses an optimized modulated method to produce resonance free motor torque. This proven design is a dependable and low cost solution for high precision positioning requirements.

Firmware

- A single VXM can control 4 motors
- Nonvolatile memory for user programs
- Use interactively with a computer, PLC or standalone
- Special looping commands for doing raster scanning and matrix patterns
- Programmable output trigger to signal external devices
- FIFO buffer to capture motor positions on input trigger
- Conditional branching command
- Automatic “return to position before branch” for pick-and-place from within matrix patterns
- Software/input interrupt capability
- Complex motion profiles with “Continuous Index Mode”
- With two VXMs coordinated motion to produce angle, arcs and circles
- Backward compatible with previously manufactured Velmex NF90 and VP9000

Software

- Velmex COSMOS utility program for easy setup, test and programming
- Examples written in C, LabView, VisualBasic, QuickBasic and other languages

Hardware

- Controller with serial interface/indexer/driver, AC power supply and all cables
- Power switch, Status LEDs, Jog, Run and Stop input buttons on the front
- Multipurpose input and output
- 10 bit analog input for external sensor, setting speed or analog joystick control
- Optically isolated limit switch inputs
- Compatible with size 17 to 34 hybrid step motors rated from 0.4 to 4.7 amps with 6 or 8 wire connections
- 100-200 VAC input desktop power supply that is UL, CE, CSA and TUV safety agency compliant
- Energy saving by automatically de-energizing motors at a standstill

Modular or Integrated Versions from One to Four Axis



1 or 2 motor operation in a compact package



3 or 4 motor with two linked controls. Plug and Play operation makes for the first (Master) VXM the controller for up to 4 motors.



Rack mountable version integrates VXM(s) and power supply(s) into a 19”x 5.25” rack panel.



Model VXM-1 (1 Axis)



Model VXM-2 (2 Axis)



Model VXM-3 (3 Axis)



Model VXM-4 (4 Axis)



Model VXM-1R
(Rack Panel 1 axis)



Model VXM-2R
(Rack Panel 2 axis)



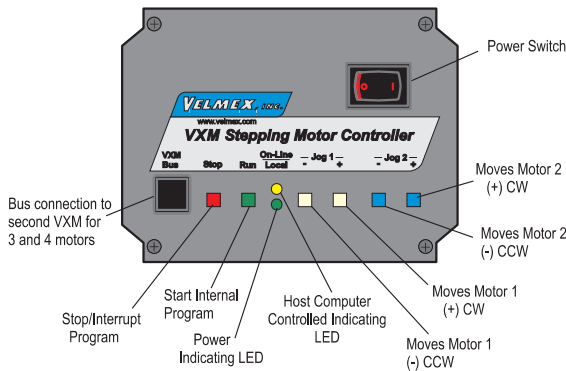
Model VXM-3R
(Rack Panel 3 axis)



Model VXM-4R
(Rack Panel 4 axis)

External Features

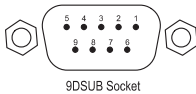
Front (Model VXM-2)



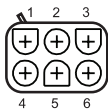
Pin No. Name

- | | |
|---|---------------|
| 1 | No Connection |
| 2 | Tx |
| 3 | Rx |
| 4 | Gnd |
| 5 | |
| 6 | |
| 7 | |
| 8 | |
| 9 | No Connection |

RS-232 Port



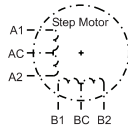
VXM Motor Cable Connector



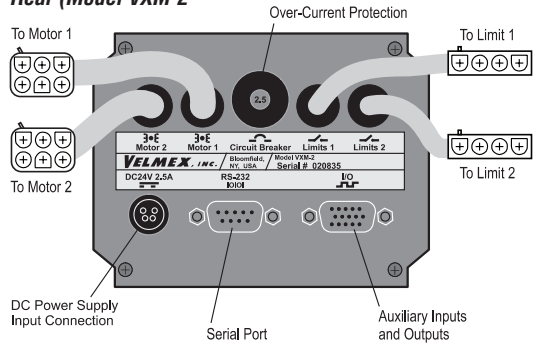
AMP MATE-N-LOK 1-480704-0
(mates with: 1-480705-0 on Motor)

Pin No. Motor

- | | |
|---|----|
| 1 | BC |
| 2 | B2 |
| 3 | AC |
| 4 | A2 |
| 5 | A1 |
| 6 | B1 |



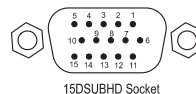
Rear (Model VXM-2)



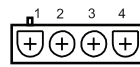
Pin No. Name

- | | |
|----|--------------------------|
| 1 | OV (Common Ground) |
| 2 | +5V Output |
| 3 | Ain (Analog in) |
| 4 | Run Input |
| 5 | I1 (Input 1) |
| 6 | I2 (Input 2) |
| 7 | I3 (Input 3) |
| 8 | I4 (Input 4) |
| 9 | OV (Common Ground) |
| 10 | J1- (Jog Mtr 1 Negative) |
| 11 | J1+ (Jog Mtr 1 Positive) |
| 12 | J2- (Jog Mtr 2 Negative) |
| 13 | J2+ (Jog Mtr 2 Positive) |
| 14 | O1 (Output 1) |
| 15 | O2 (Output 2) |

Auxiliary I/O Connection



VXM Limit Cable Connector



AMP MATE-N-LOK 1-480702-0
(mates with: 1-480703-0)

Pin No. Motor

- | | |
|------|---------|
| 1, 4 | Common |
| 2 | CCW (-) |
| 3 | CW (+) |

Easy Programming with Simple Commands

Example No. 1	Motor Run	Function
---------------	-----------	----------

Set index and run 1 Incremental index motor one 400 step positive

I1M400 , R



Example No. 2	Motor Run	Function
---------------	-----------	----------

Set index and run 1 Incremental index motor one 600 step negative

I2M600 , R



149 Commands Give You Maximum Versatility

VXM Program Stored

Motor commands:

ImMx	Set steps to incremental Index motor CW (positive) m = motor no. (1, 2, 3, 4), x = 1 to 16,777,215
ImM-x	Set steps to incremental Index motor CCW (negative) m = motor no. (1, 2, 3, 4), x = 1 to 16,777,215
IAMx	Set Absolute Index distance, m = motor no. (1, 2, 3, 4), x = ±1 to ±16,777,215
IAM0	Index motor to Absolute zero position, m = motor no. (1, 2, 3, 4)
IAM-0	Zero motor position for motor no. m, m = 1, 2, 3, 4
ImM0	Index motor until positive limit is encountered, m = motor no. (1, 2, 3, 4)
ImM-0	Index motor until negative limit is encountered, m = motor no. (1, 2, 3, 4)
(i3,i1...)	Combine Index commands to run simultaneously on two VXM controllers connected by VXM bus
SmMx	Set speed of motor (70% power), m = motor no. (1, 2, 3, 4), x = 1 to 6000 step/sec.
SAMx	Set speed of motor (100% power), m = motor no. (1, 2, 3, 4), x = 1 to 6000 step/sec.
SmM-x	Read and assign analog input value to motor m speed (70% power), x = range
SAMM-x	Read and assign analog input value to motor m speed (100% power), x = range
AmMx	Acceleration/deceleration, m = motor no. (1, 2, 3, 4), x = 1 to 127

Looping/branching commands:

L0	Loop continually from the beginning or Loop-to-marker of the current program
LMO	Sets the Loop-to-marker at the current location in the program
LM-0	Resets the Loop-to-marker to the beginning of the current program
Lx	Loop from beginning or Loop-to-marker x-1 times (x = 2 to 65,535), when the loop reaches its last count the non-loop command directly preceding will be ignored

L-x	Loop from beginning or Loop-to-marker x-1 times, alternating direction of motor 1, when the loop reaches its last count the non-loop command directly preceding will be ignored
LAx	Loop Always from beginning or Loop-to-marker x-1 times (x = 2 to 65,535)
LA-x	Loop Always from beginning or Loop-to-marker x-1 times, alternating direction of motor 1
LM-2	Loop once from beginning or Loop-to-marker reversing index direction of motor 2
LM-3	Loop once from beginning or Loop-to-marker reversing index direction of motors 1 and 2
Jx	Jump to beginning of program number x, x = 0 to 4
JMx	Jump to beginning of program number x and come back for More after program x ends, x = 0 to 4
JM-x	Similar to JMx except automatically moves back from absolute indexes after program x ends: For pick-and-place within matrix looping patterns

Pausing command:

Px	Pause x tenths of a second, (x = 0 to 65,535)
P-x	Pause x tenths of a millisecond, (x = 1 to 65,535)
PAx	Pause x tenths of a second (x = 0 to 65,535, 10 µsec pause when x = 0) Alternating output 1 high for duration of the pause
PA-x	Pause x tenths of a millisecond (x = 0 to 65,535, 10 µsec pause when x = 0) Alternating output 1 high for duration of the pause

Input/output commands*:

U0	Wait for a "low" on user input 1
U1	Wait for a low on user input 1, holding user input 1 high while waiting
U2	Enable Jog mode while waiting for input
U3	Disable jog mode while waiting for input
U4	User output 1 "low" (reset state)
U5	User output 1 high
U6	Send "WE" to host and wait for a "G" to continue

*There are 22 additional commands for addressing the I/Os on the second VXM of two linked controls.

U7	Start the Continuous Index with pulse on output 2		
U77	Start the Continuous Index with no output		
U8	Start the Continuous Index sending "@" to the host		
U9	End of Continuous Index with auto-decel to stop		
U91	End of Continuous Index with auto-generate a deceleration Index as next command		
U92	End of Continuous Index using next Index for deceleration to stop		
U99	End of Continuous Index with instantaneous stop		
U11	Skip next command if input 1 is high		
U12	Skip next command if input 2 is high		
U13	Wait for front panel button to jump to a program or continue: "Motor 1 jog -" button to jump to program no. 1, "Motor 1 jog+" button to jump to program no. 2, "Run" button to proceed in current program		
U14	User output 2 low (reset state)		
U15	User output 2 high		
U16	Optional User output 3 low (reset state)		
U17	Optional User output 3 high		
U18	Optional User output 4 low (reset state)		
U19	Optional User output 4 high		
U23	Wait for front panel button to jump to a program and come back or continue: "Motor 1 jog -" button to jump to program no. 1, "Motor 1 jog+" button to jump to program no. 2, "Run" button to proceed in current program		
U30	Wait for a low to high transition on user input 1		
U31	Wait for a low to high transition on user input 1, holding user output 1 high while waiting		
U32	Wait for "Motor 1 Jog -" button to be pressed on front panel with debouncing		
U33	Wait for "Motor 1 Jog +" button to be pressed on front panel with debouncing		
U50	Wait for a low and high on user input 1 with debouncing for a mechanical push-button switch		
U51	Wait for a low and high on user input 1 with debouncing for a mechanical push-button switch, holding user output 1 high while waiting		
U90	Wait for a low to high on the Run button or connection I/O, 4 with debouncing for a mechanical push-button switch		
		VXM Immediate Commands	
		Status request commands:	
		V	Verify Controller's status, VXM sends "B" to host if busy, "R" is ready, "J" if in the Jog/slew mode, or "b" if Jog/slewing
		X	Send current position of motor 1 to host (Motor can be in motion)
		Y	Send current position of motor 2 to host (Motor can be in motion)
		Z	Send current position of motor 3 to host (Motor must be stationary)
		T	Send current position of motor 4 to host (Motor must be stationary)
		M	Request memory available for currently selected program
		lst	List current program to host (ASCII text)
		x	Send last 4 positions of motor 1 to host that were captured by the "!" command or Input 4 trigger
		y	Send last 4 positions of motor 2 to host that were captured by the "!" command or Input 4 trigger
		#	Request the number of the currently selected motor
		*	Request the position when the last motor started decelerating (show position when "D" command or Stop/User input 4 used
		?	Read state of limit switch inputs for Motor 1 and 2 (8 bit binary value)
		~	Read state of User Inputs, Motor 1 and 2 Jog Inputs (8 bit binary value)
		\$	Read state of User Outputs (8 bit binary value)
		@	Read user analog input value
		B	Read Backlash compensation setting
		O	Read Indicate limit switch setting
		D	Read/Digitize motor position (Jog Mode)
		PM	Request the number of the current Program
		PMA	Request the current program associate number (255 = default/disabled)
		getMmM	Read motor type/size selected for axis m
		getDM	Read operating mode of VXM (8 bit binary value)
		getDO	Gets the VXM's firmware version in the format X.XX
		getD1	Gets the VXM's firmware date code in the format XX-XX-XX (month/date/year)

getD2	Return 2 if system is a single VXM, returns 4 if VXM is a Master
getDA	Read Analog Joystick Deadband setting
getJmM	Read first Jog Speed setting for motor m
getJAmM	Read first Analog Joystick range for motor m
getJmM	Read second Jog Speed setting for motor m
getJAmM	Read second Analog Joystick range for motor m
getLmM	Read mode of limits for motor m
getPmM	Read "Pulse Every x number Step" value for axis m
getPA	Read Pulse width used by setPmMx and U7
getI	Read operating mode for user inputs

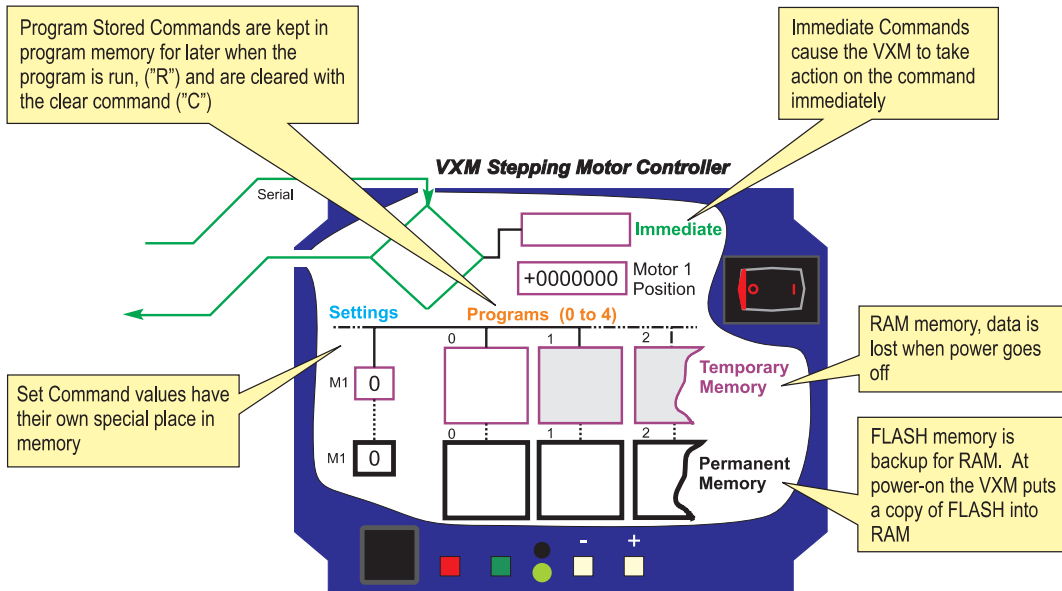
Operation commands:

C	Clear all commands from currently selected program
D	Decelerate to a stop(interrupts current index/program in progress)
E	Enable On-Line mode with echo "on"
F	Enable On-Line mode with echo "off"
G	Enable On-Line mode with echo off Grouping a <cr> with "A", ":", "W", "O" responses; Also Go after waiting or holding
H	Put Controller on Hold (stop after each command and wait for go)
K	Kill operation/program in progress and reset user outputs
N	Null (zero) motors 1, 2, 3, 4 absolute position registers
Q	Quit On-Line mode (return to Local mode)
R	Run currently selected program
!	Record motor positions for later recall with "x", "y" commands
rsm	Run save memory (saves setup/program values to nonvolatile memory)
res	Software reset control
del	Delete last command
[i1, i2...]	Send data to Slave through Master (two VXM controllers connected by VXM bus)
setD0	Set VXM back to factory defaults (All programs, settings, motor selections will be erased)
PMx	Select Program number x, x = 0 to 4
PM-x	Select and clear all commands from Program number x, x = 0 to 4

VXM Set Commands

setMmMx	Set axis m for motor type/size x
setDMx	Set VXM/VP9000 or NF90 emulation modes, and other operating parameters
setDAx	Set Analog Joystick Deadband value
setJmM	Set first Jog Speed setting motor m
setJAmM	Set first Analog Joystick range setting for motor m
setJmM	Set second Jog Speed setting for motor m
setJAmM	Set second Analog Joystick range for motor m
setLmMx	Set limit switch mode for axis m
setPmMx	Set "Pulse Every number Steps" on output 2 for axis m
setPAx	Set Pulse width used by setPmMx and U7 , x = 1 to 255 (10 microsecond increments)
setIx	Set operating mode of inputs
setBx	Set RS-232 Baud rate (9 = 9600, 19 = 19200, 38 = 38400)
Bx	Backlash compensation, 20 steps when x = 1, off when x = 0
Ox	Indicate limit switch Over-travel to host, off when x = 0, VXM sends "O" when x = 1 and hit limit, x = 3 program stops too
PMAx	Program Associate program x in Master to program x in Slave (Linked VXMs start the same time) (255 = default/disabled)

VXM Internal Function

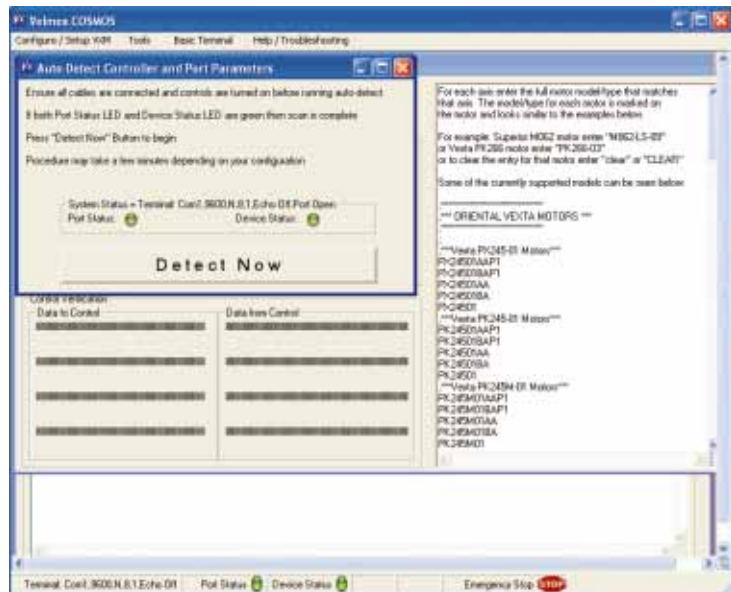


Get "Up and Running" in Record Time with C.O.S.M.O.S.™

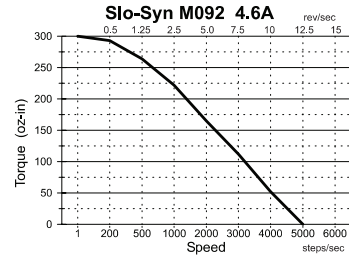
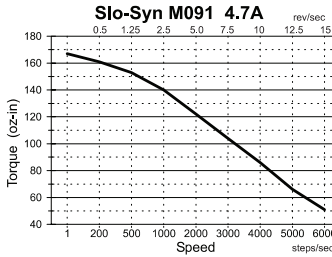
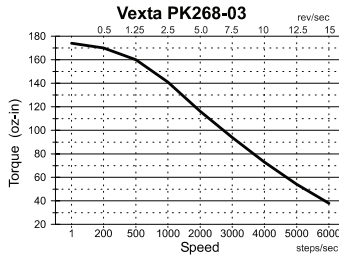
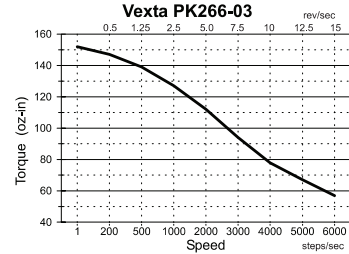
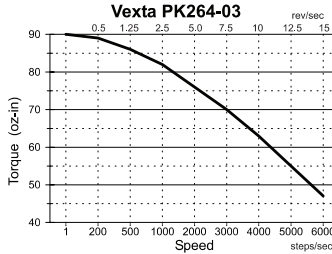
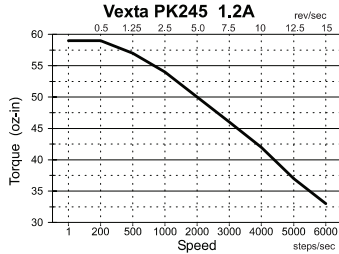
The Velmex COSMOS software for Windows is the easiest way to configure, program, and become familiar with the features of the VXM controller. COSMOS has the following capabilities:

- Test serial port for communications
- Retrieve and update setup information
- Display status and error messages
- Move motor(s) exact distances without programming or without learning any commands
- Enter commands directly to the VXM

COSMOS is included free with every VXM on CDROM, or it can be downloaded at www.velmex.com



Motor Performance



Options



USB Serial Adapter

The **USB Serial Adapter** connects the VXM to a computer USB port. This adapter will automatically be configured as a virtual COM serial port on a PC. This virtual COM port works exactly the same as a standard COM port allowing all software to address the VXM directly through a COM port number. Use this adapter with a computer with an available USB port, but no RS-232 (COM) serial port.



Digital Joystick

The optional **Digital Joystick** allows remote jog control of a one or two axis VXM controller. The Joystick provides on/off outputs that connect to the Jog Motor inputs on the Auxiliary I/O with the included 10 foot cable. An input switch allows toggling between 2 settable maximum speed values. The Joystick functions like the front panel jog buttons: Momentary = motor moves one step; Hold = accelerate slowly to settable speeds; Release = decelerate quickly to a stop.



Analog Joystick

The **Analog Joystick** derives speed and direction (velocity) from joystick position. Motor velocity is proportional to joystick distance from center and the settable speed ranges. Simultaneous two axis motion is accomplished with two VXMs. An input switch allows a single joystick to toggle between 2 motors of a 4 motor system. The Joystick is 1 million cycle design in a hand held size enclosure with a 10 foot cable.



Auxiliary I/O Breakout Module

The optional **Auxiliary I/O Breakout Module** is a convenient method to interface to the VXMs auxiliary I/O. Wire (26 to 18 AWG) connections can be made to all 15 I/Os using the screw type terminal blocks. A 6 foot cable and a PVC insulating boot is included.



I/O Splitter

The **I/O Splitter** allows both a joystick and the Auxiliary I/O Breakout Module to be connected to the VXM at the same time. The splitter has 8inch cables with a DB15HD plug connector to two DB15HD socket connectors.

Special Options

- Input terminal for data entry
- OEM mountable joysticks
- Potentiometer speed input
- Additional user outputs
- Half enclosure for OEM embedded applications
- Thumbwheel program selector switch
- Custom programming
- Customized cables & connectors

Backed by a 2 Year Warranty

Stepping Motor Controllers manufactured by Velmex are warranted to be free from defects for a period of two (2) years on all parts. Velmex's obligation under this warranty does not apply to defects due, directly or indirectly, to misuse, abuse, negligence, accidents, or unauthorized repairs, alterations, or cables/connectors that require replacement due to wear. Claims must be authorized, and a return authorization number issued before a product can be returned.

The warranty does not cover items which are not manufactured or constructed by Velmex, Inc. These components are warranted by their respective manufacturer.

Under the above warranty, Velmex will, at its option, either repair or replace a nonconforming or defective product.

The above warranty is the only warranty authorized by Velmex. Velmex shall in no event be responsible for any loss of business or profits, downtime or delay, labor, repair, or material costs, injury to person or property or any similar or dissimilar incidental or consequential loss or damage incurred by purchaser, even if Velmex has been advised of the possibility of such losses or damages.

Inasmuch as Velmex does not undertake to evaluate the suitability of any Velmex product for any particular application, the purchaser is expected to understand the operational characteristics of the product, as suggested in documentation supplied by Velmex, and to assess the suitability of Velmex products for this application.

This limited warranty give you specific legal rights which vary from State to State.

Specifications

Environmental:

Ambient Operating Temperature – 35° - 95° F (2° - 35° C)

Relative Humidity – 10% - 90% (non-condensing)

VXM

Function:

PWM Step Motor Controller for 1/2 Step Unipolar Motor Operation. RS-232 Interface, 9600, 19200, 38400 baud rate settable.

Physical:

VXM-1

Weight – 2.6 lbs (1.2 kg)

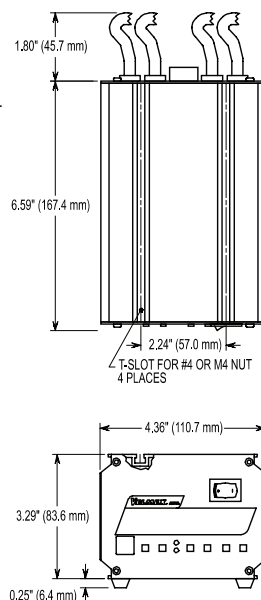
VXM-2

Weight – 2.9 lbs (1.3 kg)

Integrated 10 foot long Motor and Limit Cable(s)

Electrical Requirements:

24VDC 2.5A



Power Supply

Function:

Switch Mode Desktop Power Supply
Complies with FCC Class B,
EN55022B and UL1950,
CSA 22.2 234, EN60950, CE

Physical:

Weight 1.0 lbs (0.45kg)

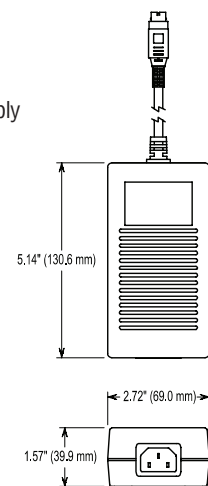
Integrated 1 meter (39")
output cable. Removable
AC Cord included.

Electrical Requirements:

100-240VAC 2A 50-60Hz

Output (to VXM):

24VDC 2.5A





Request for Quotation

Please copy and fill in this form for help in selecting your UniSlide Assembly.

Name _____ Phone _____

Company _____ Fax _____

Address _____ Email _____

City _____ State _____ Zip _____

Application Objective _____

Have you used UniSlide Assemblies before? Yes No

Operating environment is _____

Do you need UniSlide Assembly options? See pages 00 and 00.

I need nonmagnetic slides

A sketch or drawing of your application is helpful.

<i>Axis*</i>	<i>Travel Distance</i>	<i>Payload Weight</i>	<i>Measure Travel or Position?</i>		<i>Position Readout Resolution</i>	<i>Other Requirements</i>
X			Yes	No		
Y			Yes	No		
Z			Yes	No		
Rotary			Yes	No		

* See page 1.36 for orientation of XYZ axes.

Fax form to us at 585-657-6153