

VRO™ Encoder Readout

Ultra Precise Position Readouts

Use on Encoders

Readout for Velmex Positioning Systems

One and two position readouts

VELMEX, INC.

Positioning Systems for Science and Industry

Velmex positioning products provide a variety of precise, yet simple, modular configurations to satisfy a broad range of applications where high precision and value are essential. Velmex applications are limited only by your imagination. For example:

- Measurement
- Antenna Alignment
- Automation
- Camera Positioning
- Film and Animation Work
- Inspection and QA/QC
- Medical And Biological Analysis
- Moving Probes, Sensors, Components
- Optical Focusing
- Photonics
- Pick and Place
- Prototyping
- Research and Testing
- Workhold Fixturing and Light Industrial
- And thousands of other uses.

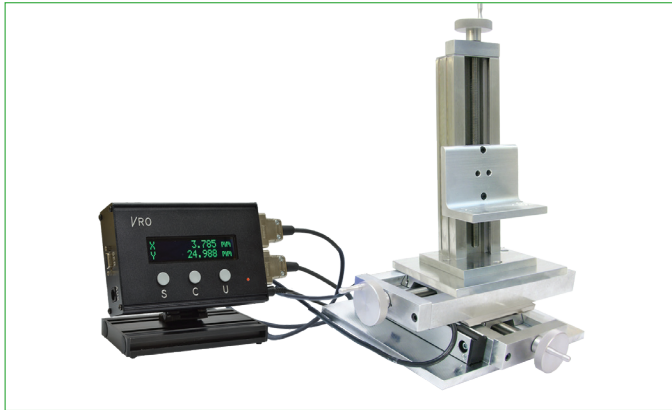
You are not limited to off-the-shelf items. Every Velmex product is built to order. We can customize your device to meet your exact requirements with:

- Rapid, standard or fine motion
- Locks
- Counters and Scales
- Position Encoders
- Special Finishes
- Prep for Special Environments
- Framing
- Plates and Brackets

Velmex's very broad range of positioning equipment for science and industry delivers quality, precision, selection and value.

VRO™ Introduction	3
Features	3
Configurations	4
Specifications	5
Dimensional Drawings	6
Options and Accessories	7

VRO™ Encoder Readout



*Velmex VXM Controllers can control motion on multiple axes.
Pictured: a VXM with single axis BiSlide®.*



Velmex VXM Controller connected to a Velmex XSlide™.

The Velmex VRO Digital Readout delivers precise position information generated by linear or rotary incremental encoders. This compact, microprocessor uses the latest OLED display and DSP micro-controller technology. While the VRO was designed for use with differential type encoders, it is fully compatible with single-ended encoders. It easily and accurately reads the position signals generated from the encoder connected to either a one or two axis motion control system.

The VRO's advanced technology delivers an exact, consistent performance and insures they are very efficient, reliable and easy to program. Its LED display has high visibility, high resolution and low energy consumption.

Features - VRO Encoder Readouts

Computer Connection – Connect to a PC, laptop or tablet via the optional RS-232 to USB interface or run standalone for added convenience. Function as a display for external computer commands and messages for added versatility.

Display – High visibility. Wide angle view for easy readability. The high contrast display is easily read in direct sunlight.

Readout – Output for direction, axis and unit of measure displays up to nine digits (not including decimal point) in either inches or metric. Display labels are user programmable for scale, decimal place axis and units to meet specific application requirements.

Encoder Interface – High speed interface with connected encoder at 1.6 Mhz – fast data return. Reads one axis with one interface or two axes with a second connection.

VRO Enclosure – Black anodized aluminum enclosure for strength and durability. Lightweight.

Power Supply – Universal AC power supply independent of the stage's power supply.



Pictured: Single Axis VRO

Auxiliary Connector – VRO functions can also be controlled via a 2-tab remote for operator convenience.

Program Buttons – Easy to activate buttons start/send; clear/change; end set-up and readings from the encoder(s).

Tilt Base – Optional tilt base or T-slot hinge allows mounting/placing where most convenient. With the hinge, the VRO can be added to the frame or structure of a Velmex BiSlide. Tilt angle changes view for added visibility and operator comfort.

LED Status Indicator – At-a-glance status indicator monitors connection to encoder.

Additional VRO™ Features:

- Automatic back-up of current settings.
- Sleep mode saves energy, extends life.
- Internal self-diagnostics makes troubleshooting easy.
- Compatible with all 5v incremental encoders.

Encoders interface with the VRO through Schmitt triggers and digital filtering with quadrature decoding returning instantaneous results at maximum resolution. The Velmex VRO Readout System can be used in conjunction with Velmex's VXM™ Motor Controller and with both manually-operated or motorized UniSlides®, BiSlides® and XSlides™.

VRO™ Configurations



VRO-1 - Reads and reports on an encoder connected to a single axis Velmex stage.



VRO-2 - Reads and reports on encoders connected to two different axis. Multiple VRO-2 can be used with multi-axis stages.



VRO-1B - One axis VRO-1 version with tilt base. Allows for easier reading.

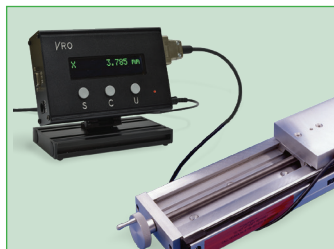


VRO-2B - Two axis VRO-2 version with tilt base.

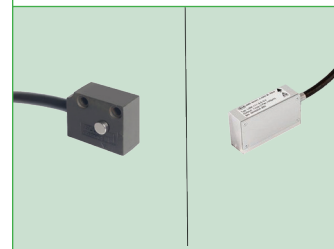
Encoders interface (connected to the BiSlide carriage) with the VRO through Schmitt triggers and digital filtering with quadrature decoding returning instantaneous results at maximum resolution.



The Velmex VRO Readout System can be used in conjunction with Velmex's VXM™ Motor Controller and with both manually-operated or motorized UniSlides®, BiSlides® and XSlides™.



VRO-1 (standard)	One Axes Encoder Readout
VRO-2	Two Axes Encoder Readout
VRO-1B and VRO-2B	Same as above with tilt base.
VRO1-H and VRO-2H	Same as VRO-1 and VRO-2 above with T-slot hinge for mounting on BiSlide framing.



Velmex offers linear inductive and magnetic encoders, along with rotary encoders for use with the VRO readout to measure position on Velmex stages.

Mounted directly on the slider (carriage), the encoders deliver a true and accurate reading of the slider's movement and position. The Ultra-Precision Measurement System's direct pin-point readings also reduce inaccuracies in the lead screw or caused by backlash. Magnetic and inductive encoder alternatives today have significant advantages over glass scale technology. Inductive and magnetic encoders are more durable, use non-contact sensing, integrate better, and offer high accuracy in combination with Velmex UniSlide® and BiSlide® Assemblies. Rotary encoders are used both on Velmex Rotary Tables and on XSlide™ Assemblies.

The VRO can report position in either Imperial English or metric. It can count revolutions. It also can report in degrees when connected to a rotary encoder.

VRO™ Specifications

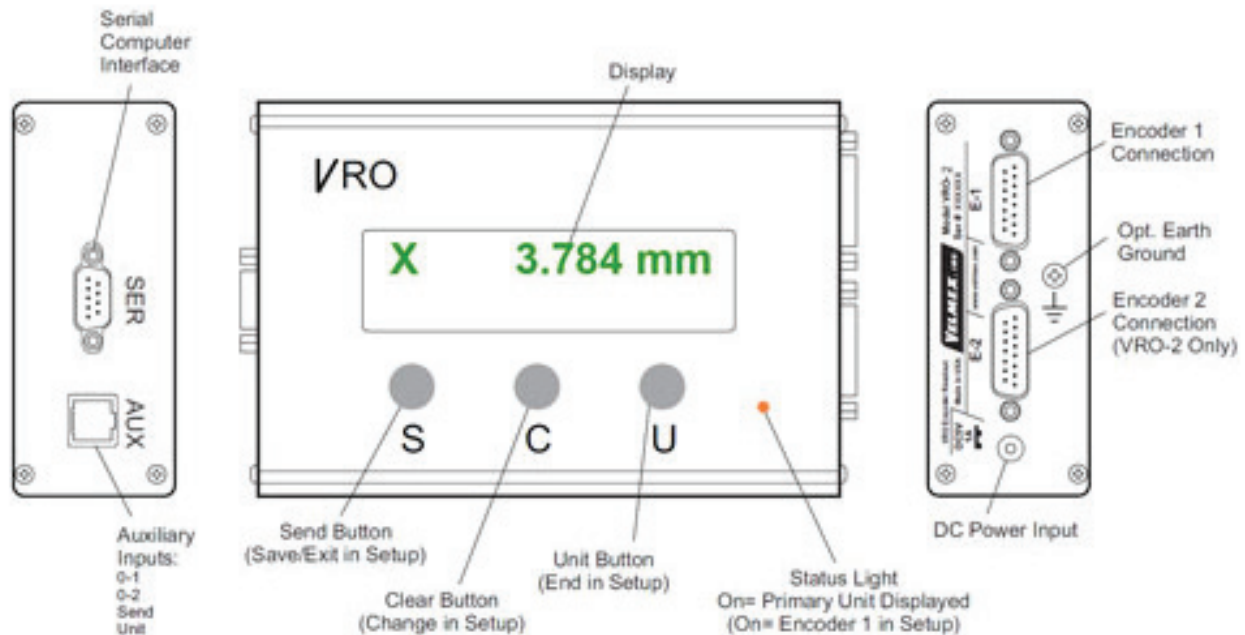
Dimensions:	
Weight	
- VRO -1	1.00 lbs. (.46 kg.)
- VRO-2	1.06 lbs. (.48 kg.)
Height	
- VRO -1 / 2	4.27" (108.5 mm)
- VRO -1B / 2B	5.50" (140 mm)
Width (all versions)	6.87" (174.5 mm)
Depth	
- VRO -1 / 2	1.89" (48 mm)
- VRO -1B / 2B	3.5" (89 mm)
Electrical Requirements	
AC Power Supply	90-264 VAC 0.4A 47-63Hz UL, CE, CSA, and TUV compliant
RS-232 Port Configuration	8 Data, No Parity, 1 Stop, 9600 baud rate default (19200, 38400 baud rate user settable)
VRO Readout	5VDC± 2% 1.0A
Operating Temperature	35 -95 F (2 -3 5 C)
Relative Humidity	10% - 90% (non-condensing)
Display	
Format	2 Line x 16 Character
Type	OLED, Green
Contrast Ratio	2000:1 (readable in direct sunlight)
Character Height	9 mm (0.35")
Viewing Angle	160 degrees
Half-life	50,000 hours
Enclosure composition	Aluminum Black Anodized, IP30 rated - RoHS compliant
Performance	
Maximum displayable count:	±999,999,999
Maximum internal count:	±2,147,483,647
Maximum count rate:	1.6 MHz
Encoder Compatibility	
Encoder	4.87 to 5.13 VDC, 330 ma max input. Differential or Single Ended Interface
Encoder Inputs	4x quadrature differential line receivers, Schmitt trigger with low pass digital filtering
Maximum power output	330 ma per encoder



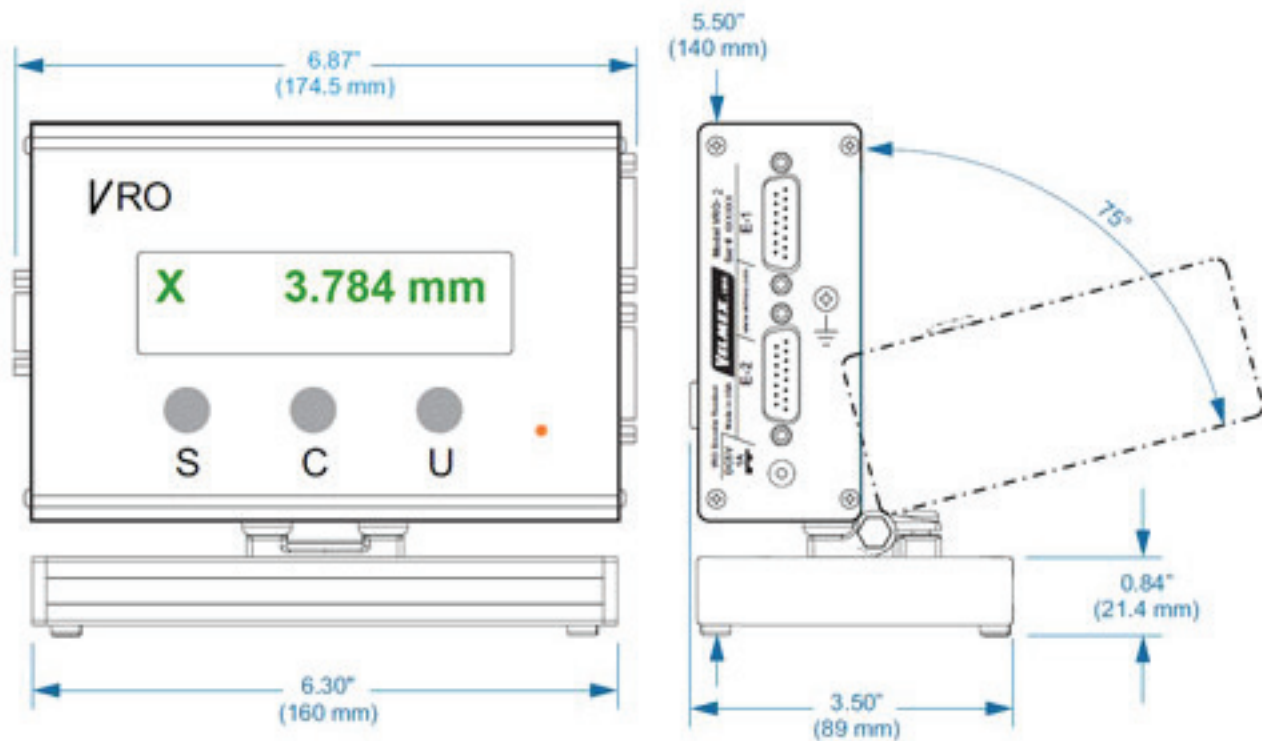
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VRO™ Dimensional Drawings

VRO-1 / 2 (front and side views)



VRO-1B / 2B (front and side views)



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Options and Accessories for VRO™ Encoder Readout



Tilt Base – Optional tilt base changes the tilt angle for added visibility and operator comfort.



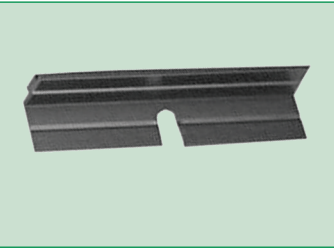
Power Supply – Basic DC Power Supply. Power strips is also available for plugging in multiple VROs and/or VXM™ Controllers.



Adapter Cables – Various adapters are available to connect to computer via USB and to various brands of linear and rotary encoders.



VRO-Tab 2 – Hand-held, two button remote which provides a convenient capture (upload VRO reading to computer) and reset of the VRO for faster data collection.



T-slot Hinge – T-slot hinge allows mounting and placing were most convenient. With the T-slot, the VRO can be easily added to the support structure that might be used with a Velmex BiSlide®.



End Caps – Rubber end caps protect the corners of the VRO Readout and the component connections from accidental damage.



International Power Adapters – A variety of international-rated power adapters are available.



Vinyl Bag – A clear vinyl bag protects the VRO from fogging in high moisture situations and/or transporting outdoors.

Display Mode Commands

- E Enable On-Line/Setup mode with echo “on”
 - F Enable On-Line/Setup mode with echo “off”
 - C or N Clear/Null (zero) encoder position registers
 - < Clear (zero) encoder 1 position register
 - > Clear (zero) encoder 2 position register
 - U Display Primary Unit
 - u Display Secondary Unit
 - B Blank display (Sleep mode)
- Status request commands:
- V Verify Readout’s status, VRO sends “D” to host to indicate in Display mode
 - 1 Send raw count encoder 1 to host
 - 2 Send raw count encoder 2 to host
 - X Send displayed encoder 1 primary position to host
 - x Send displayed encoder 1 secondary position to host
 - Y Send displayed encoder 2 primary position to host
 - y Send displayed encoder 2 secondary position to host
 - S Send formatted display to host (same as “S” button) See “setO” command to configure format
 - # Send count for # times “S” button pressed



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On-Line/ Setup Mode Commands

Q	Quit On-Line mode (return to Display mode)
quit	Quit On-Line mode without backing-up changes
res	Reset VRO (returns to Power-up display)
fpsetup	Display Front Panel setup menu
lock	Disable Front Panel setup mode at power-up
unlock	Enable Front Panel setup mode at power-up (default)
I1v	Preset encoder 1 (raw) count to value "v", v= 0 to +/- 2147483647
I2v	Preset encoder 2 (raw) count to value "v", v= 0 to +/- 2147483647
PT[[Start Pass-Through mode
]	Close Pass-Through mode and maintain current screen
]]	Close Pass-Through mode and restore "On-Line" screen

Status request commands:

V	Verify Readout's status, VRO sends "S" to host to indicate in Setup mode
~	Read state of buttons/inputs
@	Read analog converted value of input voltage (755 to 805)
getD0	Read firmware version
getD1	Read date code
getD2	Read number of axes (1= 1 encoder, 2=2 encoder)
getD3	Read model number
getO	Read Output format used by Send ("S" button and "S" command)
getQ	Read Quadrature direction setting (0= both std, 1= 1 inv, 2= 2 inv, 3= both inv)
getAX	Read Axis label for encoder 1
getAY	Read Axis label for encoder 2
getUX	Read primary Unit label for encoder 1
getUx	Read secondary Unit label for encoder 1
getUY	Read primary Unit label for encoder 2
getUy	Read secondary Unit label for encoder 2
getPX	Read primary decimal Place for encoder 1
getPx	Read secondary decimal Place for encoder 1
getPY	Read primary decimal Place for encoder 2
getPy	Read secondary decimal Place for encoder 2
get*X	Read primary Multiplier for encoder 1
get*x	Read secondary Multiplier for encoder 1
get*Y	Read primary Multiplier for encoder 2
get*y	Read secondary Multiplier for encoder 2
get/X	Read primary Divisor for encoder 1
get/x	Read secondary Divisor for encoder 1
get/Y	Read primary Divisor for encoder 2
get/y	Read secondary Divisor for encoder 2

Set commands:

setD0	Set VRO to default settings (all settings get cleared)
setD1	Set Front Panel setup to defaults
setD2	Set Scaling, Decimal Place, and Units to defaults
setD3	Set Output format to defaults
setOv	Set Output format used by Send, v= 1,2,X,x,Y,y,U,C,L,<space> (max 100 char)
setQv	Set Quadrature counting direction (v= 0= both std, 1= 1 inv, 2= 2 inv, 3= both inv)
setAXv	Set Axis label for encoder 1, v= any ASCII character
setAYv	Set Axis label for encoder 2, v= any ASCII character
setUXv	Set primary Unit label for encoder 1, v= any 2 ASCII characters
setUxv	Set secondary Unit label for encoder 1, v= any 2 ASCII characters
setUYv	Set primary Unit label for encoder 2, v= any 2 ASCII characters
setUyv	Set secondary Unit label for encoder 2, v= any 2 ASCII characters
setPXv	Set primary decimal Place for encoder 1, v= 0 to 8
setPxv	Set secondary decimal Place for encoder 1, v= 0 to 8
setPYv	Set primary decimal Place for encoder 2, v= 0 to 8
setPyv	Set secondary decimal Place for encoder 2, v=0 to 8
set*Xv	Set primary Multiplier for encoder 1, v= 1 to 200000
set*xv	Set secondary Multiplier for encoder 1, v= 1 to 200000
set*Yv	Set primary Multiplier for encoder 2, v= 1 to 200000
set*yv	Set secondary Multiplier for encoder 2, v= 1 to 200000
set/Xv	Set primary Divisor for encoder 1, v= 1 to 200000
set/xv	Set secondary Divisor for encoder 1, v= 1 to 200000
set/Yv	Set primary Divisor for encoder 2, v= 1 to 200000
set/yv	Set secondary Divisor for encoder 2, v= 1 to 200000



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Encoders

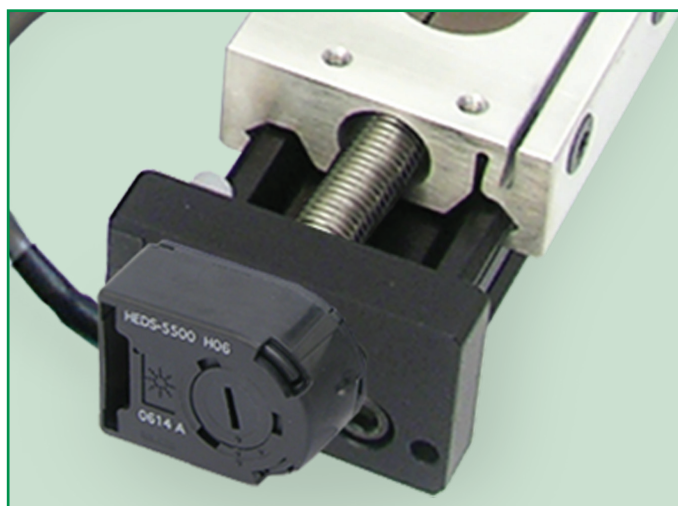
The VRO Readout was designed for differential type encoders, however, it is fully compatible with single-ended encoders. The Encoder styles Velmex offers on it's positioning stages are:



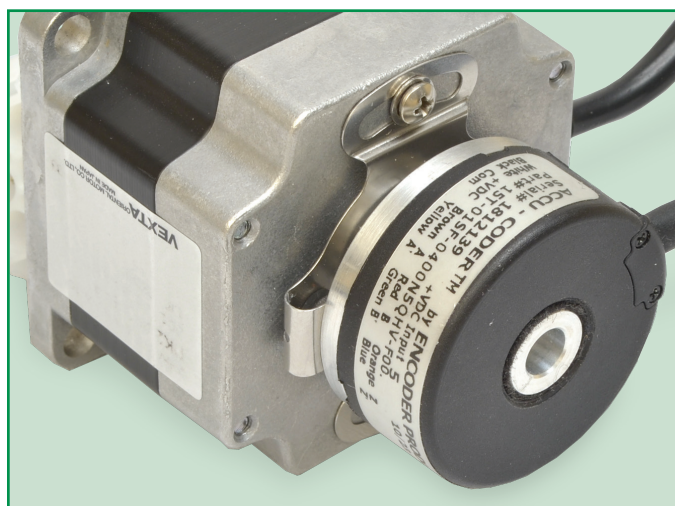
Inductive Linear Encoders – For manual and motorized BiSlide® linear stages and UniSlide® linear stages and elevating tables. (Cannot be used with A15 or A25 Series manual or MA15 or MA25 Motorized UniSlides.)



Magnetic Linear Encoder – For manual and motorized BiSlide and UniSlide linear stages. (Cannot be used with A15 or A25 Series manual or MA15 or MA25 Motorized UniSlides.)



Single-ended Optical Rotary Encoder – For manual and motorized XSlides linear stages. Can also be used on manual lead screw driven UniSlide and BiSlide stages

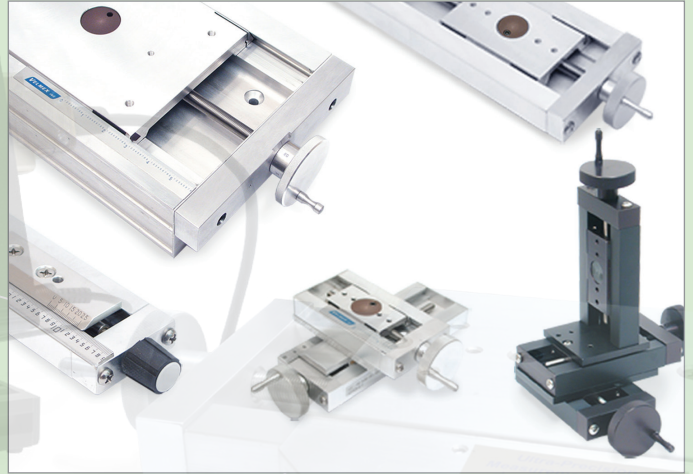


Differential Optical Rotary Encoder – For use with a double-shaft stepper motor. Can be used on motorized UniSlide, BiSlide and XSlide stages and Rotary Tables.

More Positioning Solutions from Velmex

Velmex manufactures standard and custom linear and rotary motion-control positioning equipment for scientific, research, machining and industrial applications. Velmex produces UniSlide®, BiSlide® and XSlide™ manual and motor-driven assemblies; manual and motor-driven XY tables, rotary tables, elevating tables and turntables; VXM™ motor controls and VRO™ digital readouts. Products include slides, stages and actuators in a variety of configurations and a broad range of sizes and payload capacities.

Velmex UniSlide® Assemblies are available in a variety of configurations, models and sizes including Linear Slide Assemblies, Elevating Tables and XY Tables.



Velmex BiSlide® Assemblies offer durable, easy-to-configure, low cost and modular design for a highly effective and very versatile positioning device.



Velmex XSlide™ Assemblies are compact positioning stages, highly suitable for high performance scanning of smaller loads. They are very effective in limited space applications.



VELMEX, INC.

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Velmex, Inc.

7550 State Routes 5 & 20 • Bloomfield, NY 14469-9389

TF: 800.642.6446
F: +1.585.657.6153
www.velmex.com

• P: +1.585.657.6151
• P: +1.585.624.1080
• E: info@velmex.com

Visit the Velmex web site at www.velmex.com for more details and specifications on all the Velmex stages; along with motors, controllers, encoders and readouts. The site includes CAD files, numerous examples, news and updates.

Velmex is leader in delivering rugged, reliable, precision positioning systems at a reasonable cost. We have helped thousands of companies and organizations with solutions to the application challenges. If you need help in designing a positioning system, please contact us and to talk with one of our Application Engineers.