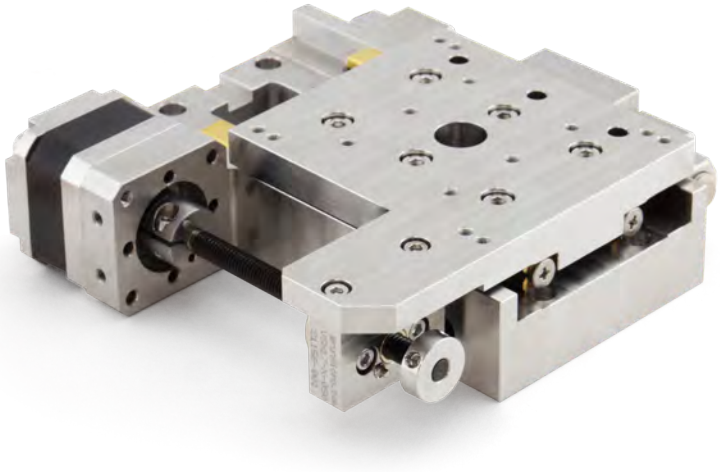
VSM17-X Translation Stage

Modular UHV Linear Sample Transporter

ARUN MICROELECTRONICS LTD

AML ultra high vacuum compatible modular linear translation stages provide translation for loads of up to several tens of kilograms. They can be used standalone or as part of a complex motion system, as they are compatible with the range of VSM17 modular stage. They have very high rigidity, which is necessary where several transporters are stacked for compound motion or where offset loads are present. They are manufactured with UHV compatible material and construction methods and utilise AML UHV stepper motors.



FEATURES

- Standard travels from 50 to 200 mm
- 5 µm resolution (1 µm for option HR)
- Better than 0.5 µm repeatability
- Maximum speed 15 mm/s (3 mm/s for option HR)
- Suitable for use to 1 x 10^{-10} mBar
- UHV-prepared aluminium construction as standard
- Stainless steel construction available (option SS)
- Bakeable to 150°C (200°C for option SS)
- Features AML D35.1 stepper motor
- Can optionally be fitted with limit switches or an optical encoder
- High resolution, radiation resistant and dry lubricated versions available
- Directly stackable for XYZ orientations
- Compatible with all VSM17 modular stages
- May be customised for specific requirements

SPECIFICATIONS

Specification	VSM17-X-050	VSM17-X-100	VSM17-X-150	VSM17-X-200
Travel	50 mm	100 mm	150 mm	200 mm
Resolution	5 µm (1 µm for option HR)			
Maximum Speed	15 mm/s (3 mm/s for option HR)			
Repeatability	Better than 0.5 µm			
Centred Load Capacity (Normal)	50 kg			
Maximum Load Moment	30 Nm			
Axial Load Force @ 500 Hz 1 A Phase Current	15 kg			
Backlash	Less than resolution			
Roll, Pitch and Yaw (Unloaded)	±48 µrad	±90 µrad	±80 µrad	±70 µrad
Roll, Pitch and Yaw Compliance	16 µrad/Nm	32 µrad/Nm	29 µrad/Nm	26 µrad/Nm
Straightness of Travel	3 µm/100 mm			
Leadscrew Accuracy	0.027/100 mm			
Stepper Motor	AML D35.1			
Vacuum	1 x 10^{-10} mBar			
Maximum Temperature	150°C (200°C for option SS) (reduces to 120°C when an optical encoder is fitted)			
MTBF (5 kg load and 30% duty cycle)	15,000 hrs			
Mass Including Motor	1 kg	1.6 kg	2.1 kg	2.7 kg
Mass Including Motor (option SS)	2.2 kg	4.4 kg	6 kg	8 kg

NOTES

MATERIALS: The major components of standard stages are manufactured from 6061 T6 aluminium. The material surface is processed to obtain a thin, dense aluminium oxide coating which reduces diffusion and desorption at UHV. A 304L stainless steel version can be specified using option code “SS”.

BACKLASH: Backlash in the gearbox of the VSM17-X is controlled by special gearing and is negligible. Backlash between the nut and leadscrew, and axial float in the bearings is controlled by a constant force spring and is much less than the resolution. If the transporter is used for motion with a significant vertical component (>30°), the load provided by the carriage weight is sufficient to eliminate backlash and the spring can be removed. In these cases, mount with the motor at the top. Since speeds are low, acceleration forces are negligible.

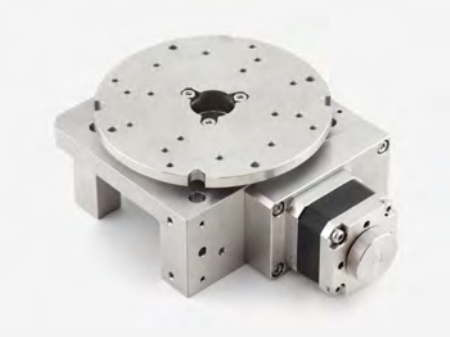
ROLL COMPLIANCE: Multiple-axis mechanisms can produce varying roll moments about the bottom transporter. The VSM17-X carriage will deflect about the roll axis at 5 µradian per Nm. To achieve this performance the transporter must be fixed to an extremely rigid, flat baseplate, using all of the base fixings.

LUBRICATION: Running surfaces are dissimilar materials or dry lubricated with molybdenum disulfide. Leadscrews are lubricated with Nyetorr® 6300 UHV grease. Dry lubrication can be specified.

VERNIER STOP: These transporters may be driven to the vernier stops at the limits of their travel and stalled without damage.

STACKED MECHANISMS: For multi-axis motion, mount the stage moving the load vertically on top of the others to avoid adding their weight to its load.

RELATED PRODUCTS



VSM17-R

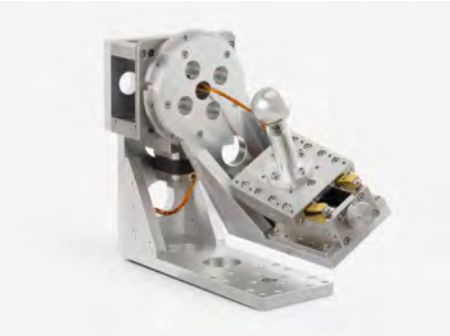
High Performance, Modular UHV Rotation Stage.

Rotation stage suitable for use in UHV. Can support loads of up to 100 kilograms. Resolutions from 0.1° to 0.005° with 360° of continuous rotation.

VSM17-Z

High Performance, Modular UHV Stage for Z-Axis Translation.

Linear vertical translation stage suitable for use in UHV. Can support loads of up to several kilograms and travel from 50 mm. Designed specifically for Z-axis translation with its high load capacity.



VSM17-G

High Performance, Modular UHV Goniometer Stage.

Goniometer stage suitable for use in UHV. It is possible to build a Euler goniometer with a common centre of rotation.

ORDERING INFORMATION

Order Code	
VSM17-X-xxx	Linear stage (xxx=travel in mm)
VSM17-X-xxx-SS	Linear stage, stainless steel
VSM17-X-xxx-HR	Linear stage, 1 µm resolution
VSM17-X-xxx-LS	Linear stage with 2 x limit switches
VSM17-X-xxx-EA	Linear stage with encoder (absolute)
VSM17-X-xxx-R	Linear stage, radiation resistant

Example Order Code	
VSM17-X-100-HR-LS-R	Linear stage, 100 mm travel, 1 µm resolution, limit switches, radiation resistant.

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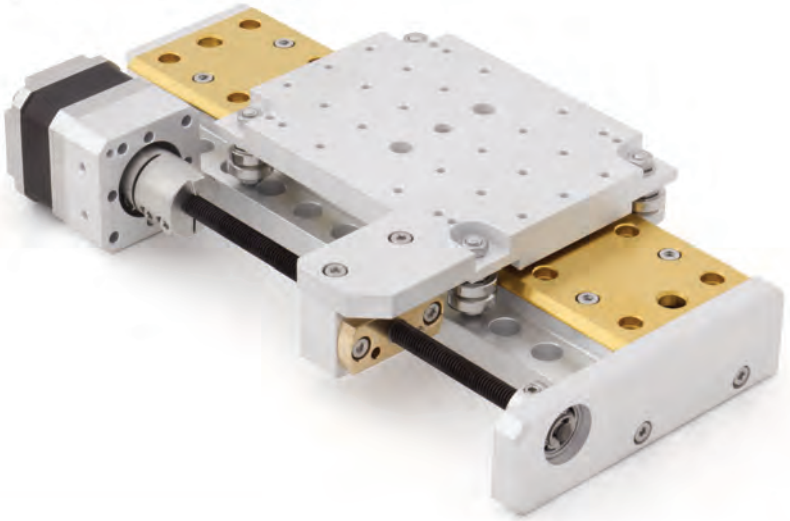
VSM23-X Datasheet

Modular UHV Linear Sample Transporter

ARUN MICROELECTRONICS LTD

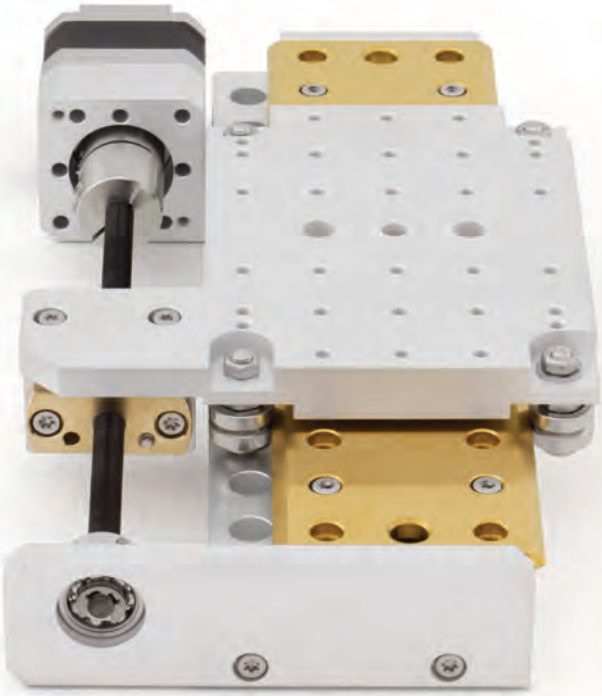
AML ultra high vacuum compatible modular linear translation stages provide long travel with minimum height for loads of up to 20 kilograms. They have widely spaced 'V' roller guides and are useful in simpler compound mechanisms where torsional loads are small.



Smooth motion is provided by a diamond corrected lead-screw and a matched nut to ensure good positional stability, and incorporate a preloaded leadscrew nut to eliminate backlash.

They can be used standalone or in combination with other VSM modular stages to create multi-axis mechanisms.

FEATURES



- Standard travels from 100 to 450 mm
- 5 µm resolution (1 µm for option HR)
- Better than 0.5 µm repeatability
- Maximum speed 25 mm/s (5 mm/s for option HR)
- Suitable for use to 1 x 10^{-10} mBar
- Load capacity to 20 kg
- UHV-prepared aluminium construction as standard
- Stainless steel construction available (option SS)
- Bakeable to 150°C (200°C for option SS)
- Features AML D35.1 stepper motor
- Limit switch and encoder options available
- High resolution, radiation resistant and dry lubricated versions available
- Compatible with all VSM modular stages
- May be customised for specific requirements

SPECIFICATIONS

Specification	VSM23-X	Option HR
Travel (mm)	100 / 150 / 200 / 250 / 300 / 350 / 400 / 450	
Resolution	5 µm	1 µm
Maximum Speed	25 mm/s	5 mm/s
Bi-Directional Repeatability	±0.45 µm	
Centred Load Capacity (Normal)	20 kg	
Maximum Load Moment	10 Nm	
Axial Load Capacity @ 500 Hz/s 1000 Hz 1A Phase Current	10 kg	
Backlash	±1 µm	
Roll and Pitch	±40 µrad	
Roll and Pitch Compliance	285 µrad/Nm	
Leadscrew Accuracy	0.027/100 mm	
Stepper Motor	AML D35.1	AML D35.1 + SG35-005
Vacuum	1 x 10^{-10} mBar	
Maximum Temperature	150°C (200°C for option SS) (reduces to 120°C when an optical encoder is fitted)	
MTBF (5 kg load and 30% duty cycle)	15,000 hrs	
Mass for 100 mm Travel	1.3 kg	1.6 kg
Mass Increase per 50 mm Travel	0.25 kg	0.25 kg

NOTES

MATERIALS: The major components of standard stages are manufactured from 6061 T6 aluminium. The material surface is processed to obtain a thin, dense aluminium oxide coating which reduces diffusion and desorption at UHV. A 304L stainless steel version can be specified using option code “SS”.

BACKLASH: Backlash in the gearbox of the high resolution (option code “HR”) VSM23-X is controlled by special gearing and is negligible. Backlash between the nut and leadscrew is controlled by a pre-loaded nut and is much less than the resolution. If the transporter is used for motion with a significant vertical component (>45°), the load provided by the carriage weight is sufficient to eliminate backlash and the spring can be removed. In these cases, mount with the motor at the top. Since speeds are low, acceleration forces are negligible.

CARRIAGE COMPLIANCE: The carriage will deflect under load moments about the principal axes by 285 µrad/Nm. In most applications the load deflection will be constant and can be compensated for in the sample mount. For stacked XY motions in a horizontal plane, the movement of the carriage and load on the upper transporter will produce a varying moment about the axis of the lower transporter. Minimise this by stacking the shorter transporter on the longer.

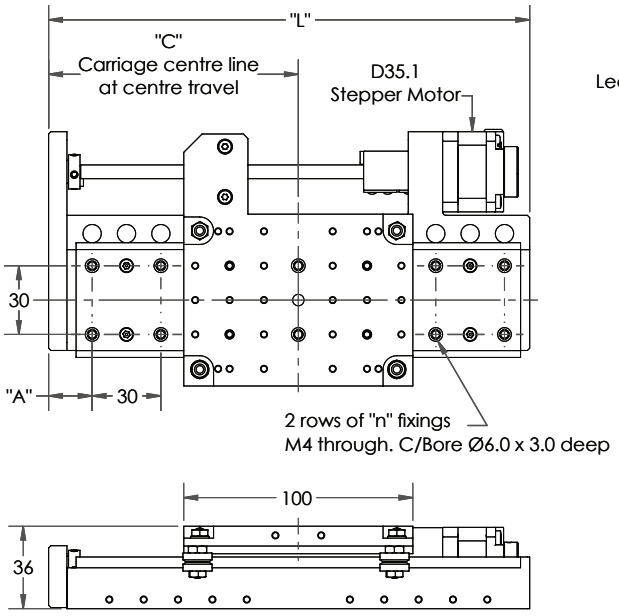
LUBRICATION: Running surfaces are dissimilar materials or dry lubricated with molybdenum disulfide. Leadscrews are lubricated with Nyetorr® 6300 UHV grease. Dry lubrication can be specified.

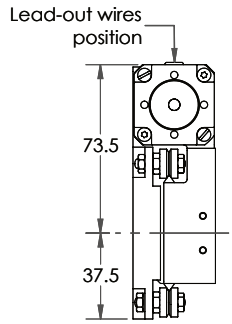
VERNIER STOP: These transporters may be driven to the vernier stops at the limits of their travel and stalled without damage.

STACKED MECHANISMS: For multi-axis motion, mount the stage moving the load vertically on top of the others to avoid adding their weight to its load.

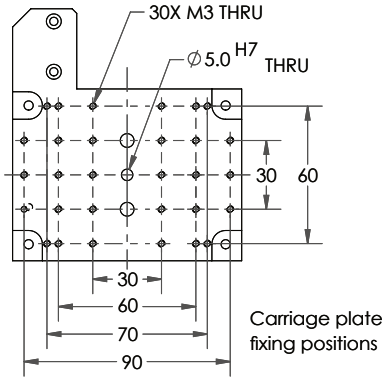
DIMENSIONS

VSM23-X

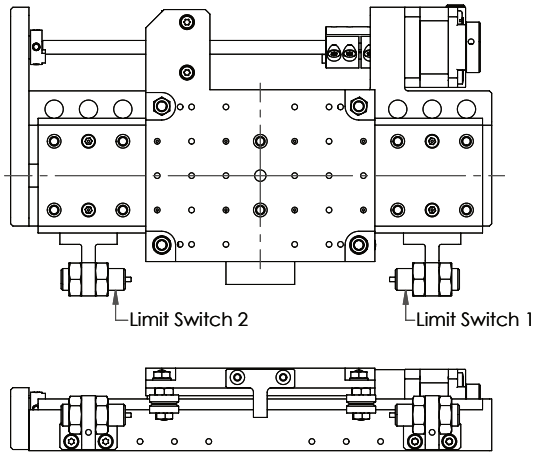


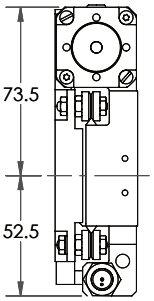


Travel mm	L	C	A	n
100	210	109	19	7
150	260	134	44	7
200	310	159	39	9
250	360	184	34	11
300	410	209	29	13
350	460	234	24	15
400	510	259	19	17
450	560	284	44	17

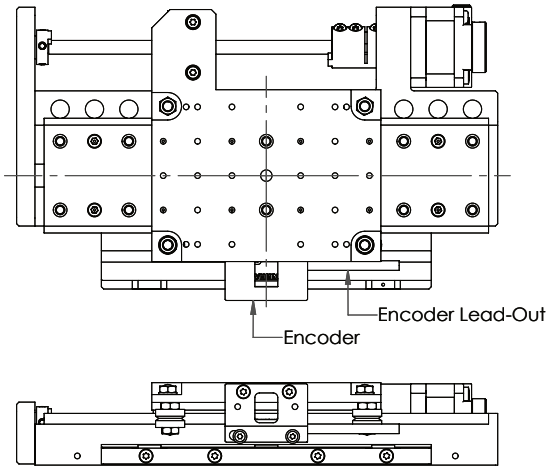


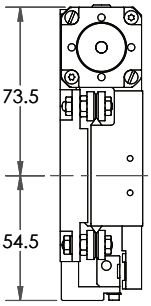
Limit Switch Option (LS)





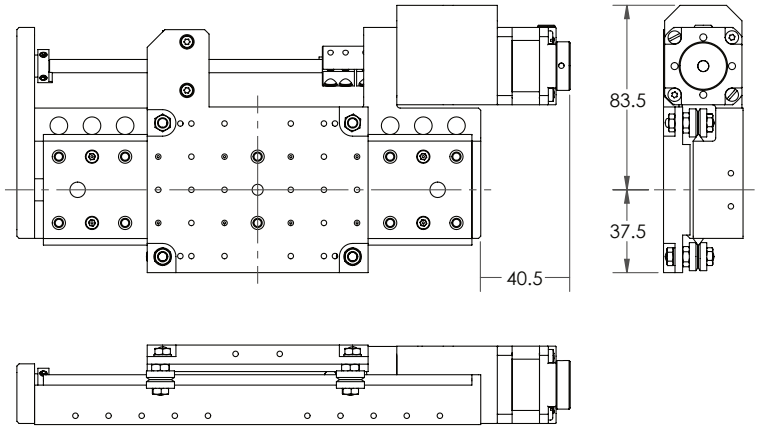
Encoder Option (ER/EA)

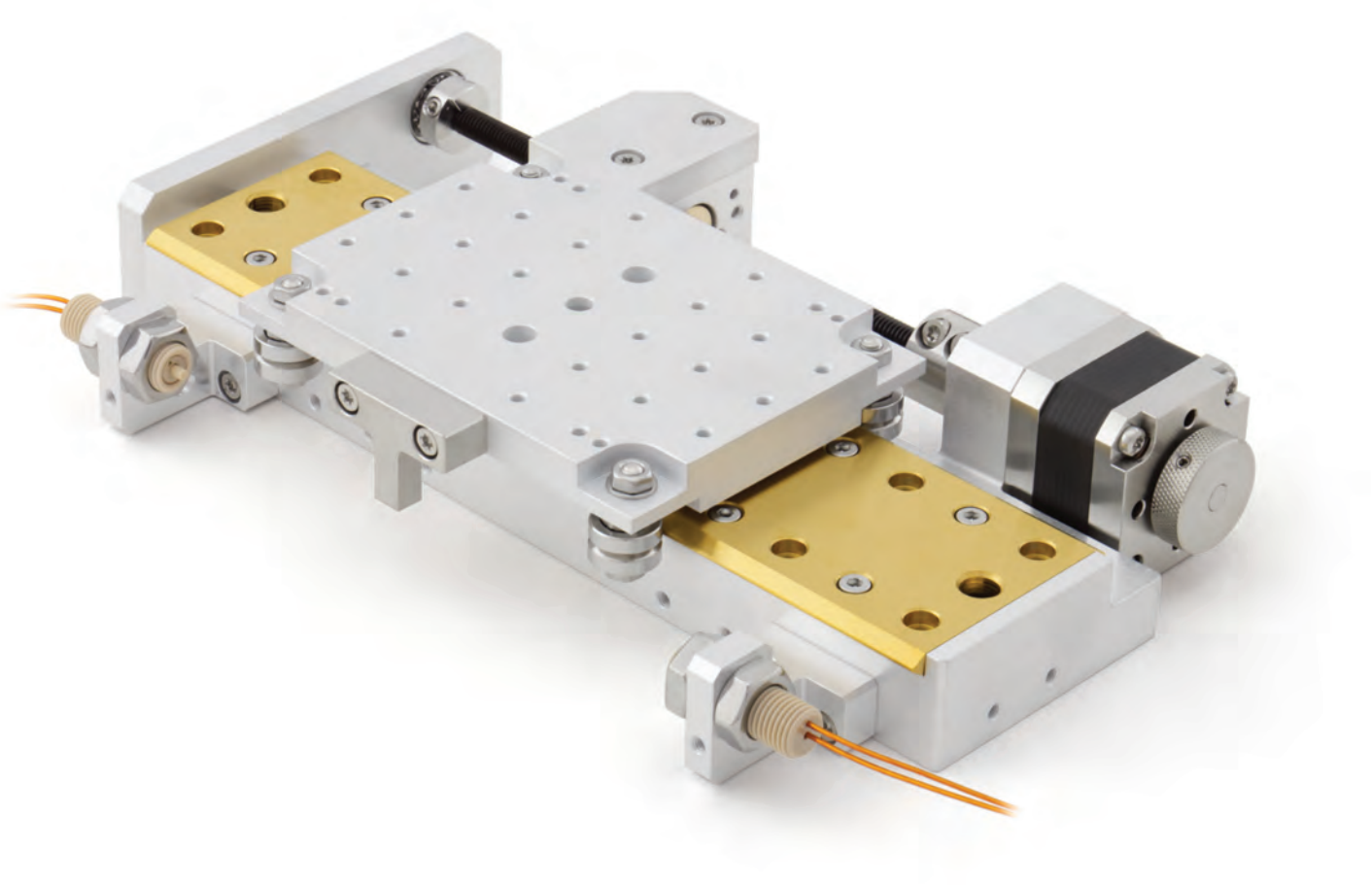




DIMENSIONS

High Resolution Option (HR)





VSM23-X-100-LS:

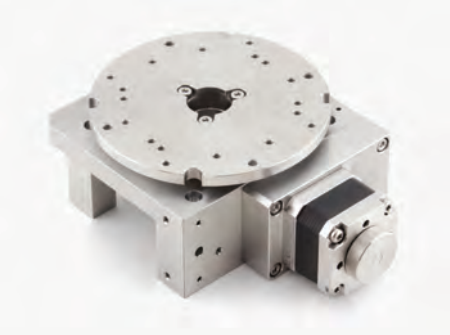
Modular UHV linear stage with limit switches.

RELATED PRODUCTS

VSA MOUNTING BRACKETS AND TABLE

Mounting Brackets and Table For UHV Compatible Stages.

AML UHV compatible mounting brackets for use with VSM stages. Used to reorient stages and create complex multi-axis mechanisms with standard products. Constructed with lightweight uhv-prepared aluminium to reduce mass whilst maintaining stability.



VSM17-R

High Performance, Modular UHV Rotation Stage.

Rotation stage suitable for use in UHV. Can support loads of up to 100 kilograms. Resolutions from 0.1° to 0.005° with 360° of continuous rotation.

SMD3

Single-axis Bipolar Stepper Motor Drive.

Engineered to operate vacuum-compatible stepper motors with maximum performance while minimising temperature rise. It is optimised for use with AML UHV-compatible motors.

ORDERING INFORMATION

Order Codes	
VSM23-X-xxx	Linear stage (xxx=travel in mm)
VSM23-X-xxx-SS	Linear stage, stainless steel
VSM23-X-xxx-HR	Linear stage, 1 µm resolution
VSM23-X-xxx-LS	Linear stage with 2 x limit switches
VSM23-X-xxx-ER	Linear stage with encoder (incremental)
VSM23-X-xxx-EA	Linear stage with encoder (absolute)
VSM23-X-xxx-R	Linear stage, radiation resistant

Example Order Code	
VSM23-X-400-HR-ER	Linear stage, 400 mm travel, 1 µm resolution, incremental encoder.