

High-Precision, High Load, Direct Drive Linear Stage

Wide Base for High Stability - Ideal for Scanning, Measuring, Machining, Imaging, Alignment



V-827

- Available travels of 300, 500, 750, and 1000mm
- Direct drive motor for efficient, dynamic performance
- Recirculating bearings for excellent straightness and flatness
- Best in class straightness and flatness
- Sin/cos or Abs Encoder for the best accuracy, repeatability, and safety (Absolute)

[Preliminary Datasheet](#)

Product overview

V-827 direct-drive linear stages are designed for high load, high throughput applications that also require long life, and high reliability.

The V-827 family of direct-drive stages offer superior straightness and flatness performance compared to similar motorized linear translation stages in the market. With a powerful, non-cogging, direct drive motor, the V-827 stage performs well in production environments.

The absolute encoder version provides not only 1nm resolution, but the safest and most efficient start, not requiring initialization or homing. The ultra-precision recirculating ball bearings are intended to be maintenance-free for the life of the stage.

Optional debris protection

The V-827 stage family is also available with side seals (SS) for protection from debris, making it ideal for laser processing and similar applications. The V-827 is designed for XY mounting and can be configured at the factory.

Three phase motors for higher dynamics and friction-free, maintenance-free operation

The three-phase linear motors driving the V-827 linear stage family transfer their force directly and friction-free to the motion platform. This eliminates backlash and play that can result from mechanical components like gears and leadscrews in the drivetrain. Ideal for high-velocity, high-acceleration applications, these motors feature a maintenance-free, frictionless design, ensuring longevity in demanding 24/7 operations. The controller's current limit settings allow easy motor disablement, preventing damage to the stage or the application.

Recirculating ball bearings for industrial and automation applications

Recirculating ball bearings are well established in industrial automation environments, known for their load capability, reliability and robustness. They provide a high level of smoothness, straightness, and flatness performance. The high load capacity of 150 kg guarantees long bearing lifetime.

Incremental and absolute encoder options

V-827 direct-drive stages are equipped with linear encoders that measure position with utmost accuracy directly at the motion platform, enhancing linearity and ensuring immunity to mechanical play and elastic deformation of indirect measuring methods. Incremental encoders, relying on 1Vpp sine/cosine signals, require a home signal to initiate. In contrast, absolute measuring linear encoders offer explicit position information, enabling immediate determination of the position. This eliminates the need for referencing during switch-on, enhancing both efficiency and safety during operation.

Choosing the right precision linear stage and motion controller

Selecting the right linear stage is pivotal for optimal performance in high-precision positioning, motion and automation applications. Factors such as resolution, load capacity, guiding accuracy, and repeatability must be carefully considered. The V-827 linear stage family provides exceptional geometric accuracy (flatness, straightness, pitch, and yaw) along with 150 nanometers bi-directional repeatability in a very compact package. With high dynamic properties, featuring 1 g acceleration and 2m/sec, these fast and accurate motorized stages are ideal for automation of highly accurate positioning tasks required for laser processing, inspection the mass production of precision devices.

Partnered with PI's A-8xx series motion controllers, these stages achieve unparalleled motion performance. PI's EtherCAT®-based controllers offer remarkable flexibility, facilitating the seamless integration of third-party equipment compatible with EtherCAT®. Advanced algorithms in the A-8xx series motion controllers, such as PILOT, allow for higher dynamics with reduced motor currents, virtually increasing the motor's force constant. Choose V-827 for precision, reliability, and efficiency in your motion applications.

Accessories and options

- Encoder type – 1Vpp Sin/Cos or Absolute BiSS output
- Single or multi-axis motion controllers and servo drives, integrated or distributed, ACS-powered
- Cables compatible with the A-8xx series of ACS-powered controllers.
- Multi-axis assemblies and cable management

Application fields

Laser Machining or ablation. Laser Micro-processing, patterning. Laser glass cutting. Pick and place. Automated precision assembly. X-ray or AOI inspection. Tomography. Wafer Dicing. Metrology. General Automation.

Specifications

Motion	V-827.300	V-827.500	V-827.750	V-827.1000	Unit	Tolerance
Active axes	X - axis					
Travel range	300	500	750	1000	mm	
MIM					μm	max.
Pitch ⁽¹⁾	35	45	60	60	μrad	max.
Yaw ⁽¹⁾	20	45	60	60	μrad	max.
Straightness ⁽¹⁾	2	3	4	4	μm	max.
Flatness ⁽¹⁾	3	4	5	5	μm	max.
Bidirectional repeatability	± 0.15	± 0.15	± 0.15	± 0.15	μm	max.
Positioning accuracy, calibrated ⁽²⁾	± 0.25	± 0.25	± 0.3	± 0.4	μm	max.

Mechanical properties	V-827.300	V-827.500	V-827.750	V-827.1000	Unit	Tolerance
Bearing	Precision recirculating bearing					
Motion platform	270 x 270	270 x 270	270 x 270	270 x 270	mm	
Stage Height	100	100	100	100	mm	
Load capacity, ⁽³⁾	150	150	150	150	kg	max.
Moving mass, unloaded	5	5	5	5	kg	typ.
Overall mass	18	25	32	45	kg	typ.
Materials	Hardcoat aluminum body					

Drive properties	V-827.300	V-827.500	V-827.750	V-827.1000	Unit	Tolerance
Drive type	3 Phase brushless linear motor					
Intermediate circuit voltage	300	300	300	300	V DC	max.
Peak force	720	720	720	720	N	max.
Nominal force	210	210	210	210	N	max.
Force constant, RMS	27.5	27.5	27.5	27.5	N/Arms	typ.
Peak Current	26.2	26.2	26.2	26.2	A	max.
Nominal Current, RMS	7.6	7.6	7.6	7.6	A	max.
Resistance, phase-phase	0.85	0.85	0.85	0.85	Ω	±10%
Inductance, phase-phase	0.7	0.7	0.7	0.7	mH	±10%
Back EMF, phase-phase	22.5	22.5	22.5	22.5	V/m/s	±10%
# of Pole Pairs						
Magnet Pitch NN	42	42	42	42	mm	typ.
Linear Velocity ⁽³⁾	2	2	2	2	m/s	typ.
Acceleration ⁽³⁾	10	10	10	10	m/s ²	max

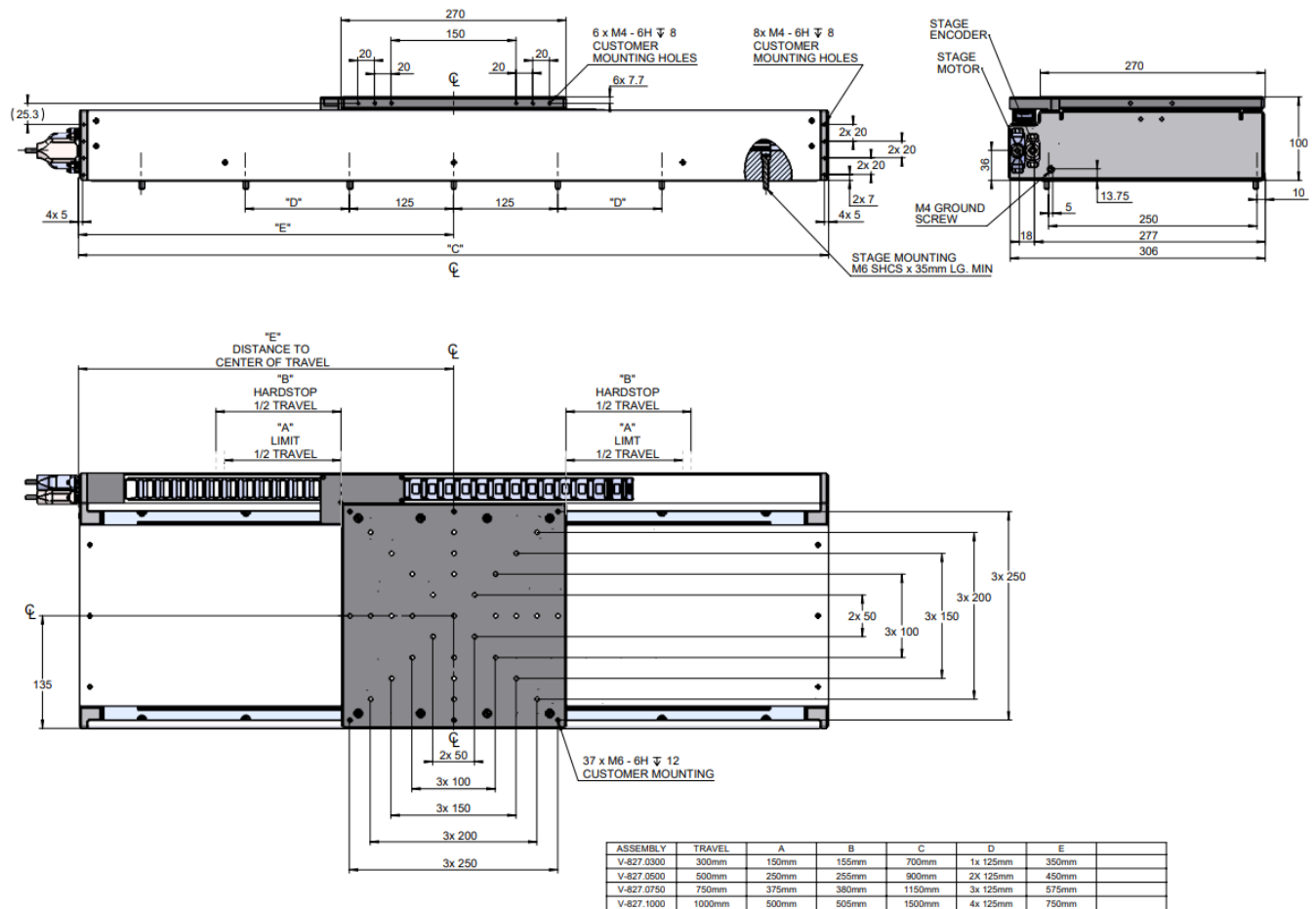
NOTES

- ⁽¹⁾ Dependent on the quality of the mounting surface, the payload, orientation, and external forces that act on the stage. Please contact PI for application-specific parameters. The specified values are static (no rotary motion during measuring) and without load.
- ⁽²⁾ The specified values are based on error compensation enabled by the controller. The positioner must be ordered with a controller from PI to reach these values. Accuracy values assume short-term duration and do not consider the long-term effects of thermal drift on the stage.
- ⁽³⁾ Can be limited by imbalance of the payload or the controller and the drive.

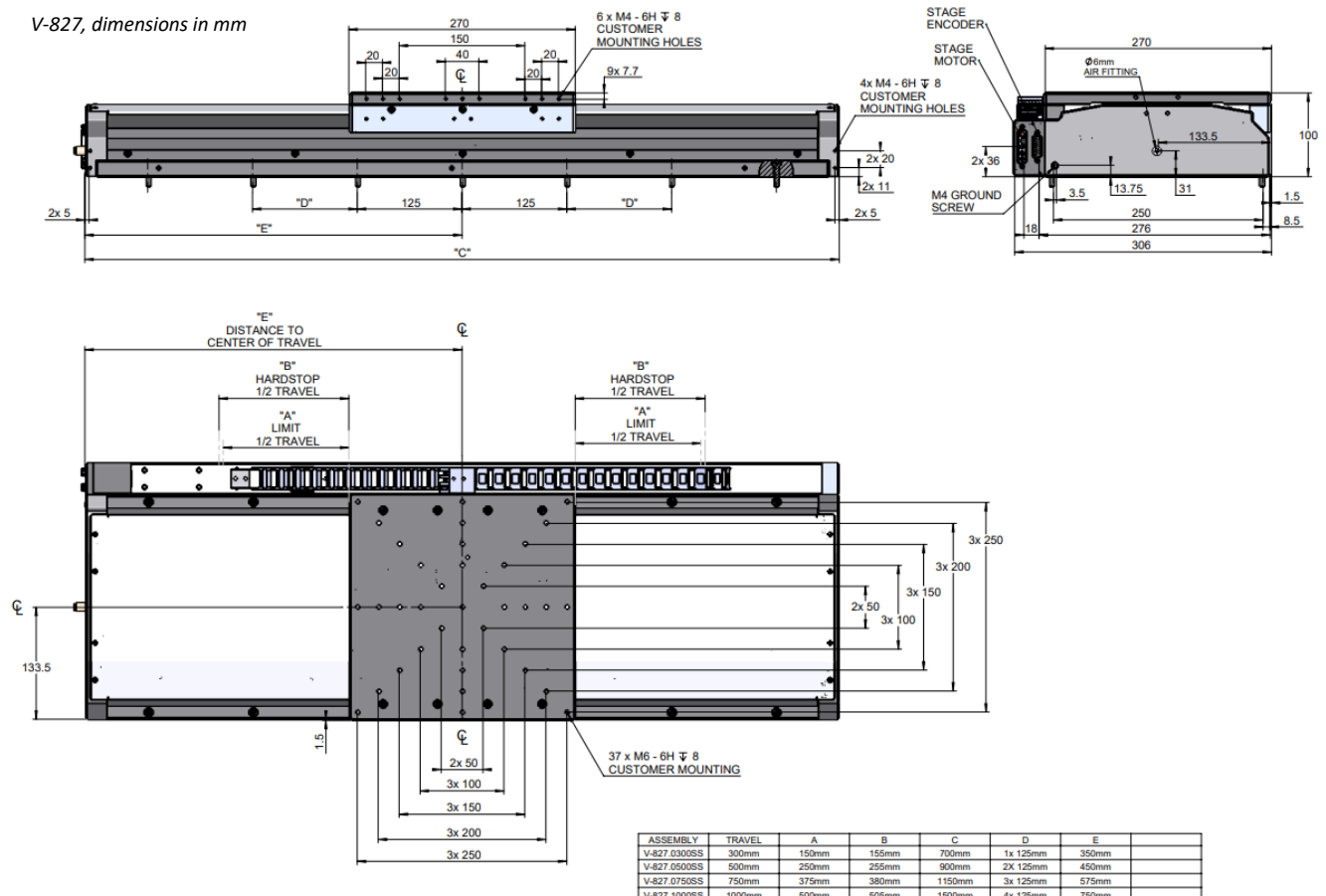
Measurement Sensor	V-827.xxxxA1	V-827.xxxxB1	Miscellaneous	V-827
Integrated sensor	Incremental linear encoder	Absolute linear encoder	Motor Connector	9W4 (male)
Sensor signal type	Sin/cos, 1 V pp	BiSS-C, 32 bit	Encoder Connector	DB15 (male)
Sensor resolution	1 nm	1 nm	Operating Temp Range	5 to 50 °C
Reference point switch	1 at middle of travel, 1 Vpp	N/A	Recommended Controller	A-81x Series
			Recommended Cables	A-82x Series
				A-85x Series

Drawings / Images

Dimensions without side seals



V-827, dimensions in mm



Ordering Information

V-827.0300A1

PIMag linear stage, 300mm travel recirculating ball bearing, 270mm wide motion platform, incremental sin/cos 1Vpp encoder, brushless 3-phase direct-drive motor

V-827.0300B1

PIMag linear stage, 300mm travel, recirculating ball bearing, 270mm wide motion platform, absolute encoder with BiSS-C signal transmission, brushless 3-phase direct-drive motor

V-827.0500A1

PIMag linear stage, 500mm travel, recirculating ball bearing, 270mm wide motion platform, incremental sin/cos 1Vpp encoder, brushless 3-phase direct-drive motor

V-827.0500B1

PIMag linear stage, 500mm travel, recirculating ball bearing, 270mm wide motion platform, absolute encoder with BiSS-C signal transmission, brushless 3-phase direct-drive motor

V-827.0750A1

PIMag linear stage, 750mm travel, recirculating ball bearing, 270mm wide motion platform, incremental sin/cos 1Vpp encoder, brushless 3-phase direct-drive motor

V-827.0750B1

PIMag linear stage, 750mm travel, recirculating ball bearing, 270mm wide motion platform, absolute encoder with BiSS-C signal transmission, brushless 3-phase direct-drive motor

V-827.1000A1

PIMag linear stage, 1000mm travel, recirculating ball bearing, 270mm wide motion platform, incremental sin/cos 1Vpp encoder, brushless 3-phase direct-drive motor

V-827.1000B1

PIMag linear stage, 1000mm travel, recirculating ball bearing, 270mm wide motion platform, absolute encoder with BiSS-C signal transmission, brushless 3-phase direct-drive motor

Add SS to above Part Numbers to order the side seal version. Example: V-827.0300A1SS, V-827.0300A1 with a side seal.