# **Precision Linear Stage**

## High Velocity and Precision due to Magnetic Direct Drive



## **V-551**

- Travel ranges to 230 mm
- Velocity up to 0.5 m/s
- High guiding accuracy
- Compact design with 160 mm width

#### **Reference-class linear positioner**

Thanks to the smooth-running precision linear guides with crossed roller bearings, the linear positioner is particularly suitable for scanning applications with constant velocity. The anti-creep system reliably prevents cage creep. The guides have high load capacity and high precision under all operating conditions.

#### Linear motors

Linear motors are electromagnetic direct drives. They dispense with mechanical components in the drivetrain and transfer the drive force directly and friction-free to the motion platform. The drives reach high velocities and accelerations. Ironless motors are particularly suitable for positioning tasks with the highest demands on precision because there is no undesirable interaction with the permanent magnets. This allows smooth running even at the lowest velocities and at the same time, there is no vibration at high velocities. Nonlinearity in control behavior is avoided and any position can be controlled easily. The drive force can be set freely.

#### Direct position measuring

Position measuring is performed with the highest accuracy directly at the motion platform so that nonlinearity, mechanical play or elastic deformation have no influence on position measuring. Position measuring is performed with the highest accuracy directly at the motion platform so that nonlinearity, mechanical play or elastic deformation have no influence on position measuring. The stages are equipped with absolute encoders. They supply explicit position information that enables immediate determination of the position. This means that referencing is not required during switch-on, which increases efficiency and safety during operation.

#### **Application fields**

Industry and research. Automation. Metrology. Photonics and precision scanning in semiconductor or flat panel display manufacturing

Motion	Unit	Tolerance	V-551.2B	V-551.4B	V-551.7B
Active axes			х	х	х
Travel range in X	mm		60	130	230
Maximum velocity in X, un- loaded	mm/s		500	500	500
Straightness error in Y (straightness)	μm	Тур.	±1	±1	±2
Straightness error in Z (flat- ness)	μm	Тур.	±2	±2	±2
Angular error around Y (pitch)	μrad	Тур.	±50	±100	±100
Angular error around Z (yaw)	μrad	Тур.	±50	±50	±50

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Positioning	Unit	Tolerance	V-551.2B	V-551.4B	V-551.7B
Minimum incremental moti- on in X	μm	Тур.	0.002	0.002	0.002
Unidirectional repeatability in X	μm	Тур.	±0.01	±0.01	±0.01
Bidirectional repeatability in X	μm	Тур.	0.1	0.1	0.1
Reference switch			-	-	-
Limit switches			Hall effect, N/O contact, 5 V, TTL	Hall effect, N/O contact, 5 V, TTL	Hall effect, N/O contact, 5 V, TTL
Integrated sensor			Absolute linear encoder	Absolute linear encoder	Absolute linear encoder
Sensor signal			BISS-C	BiSS-C	BiSS-C
Sensor signal period	μm		-	-	-
Sensor resolution	nm		1	1	1

Drive Properties	Unit	Tolerance	V-551.2B	V-551.4B	V-551.7B
Drive type			Ironless 3-phase linear motor	Ironless 3-phase linear motor	Ironless 3-phase linear motor
Nominal voltage	V		48	48	48
Nominal current, RMS	A	Тур.	1.5	1.5	1.5
Peak current, RMS	A	Тур.	10	10	10
Drive force in X	N	Тур.	27	27	27
Peak force in X	N		180	180	180
Force constant	N/A		18	18	18
Resistance phase-phase	Ω	Тур.	5.4	5.4	5.4
Inductance phase-phase	mH		1.8	1.8	1.8
Back EMF	V·s/m	Max.	16	16	16
Pole pitch N-N	mm		30	30	30

Mechanical Properties	Unit	Tolerance	V-551.2B	V-551.4B	V-551.7B
Permissible push force in Y	N	Max.	50	50	50
Permissible push force in Z	N	Max.	150	150	150
Moved mass in X, unloaded	g		2200	2700	4900
Guide			Crossed roller guide	Crossed roller guide	Crossed roller guide
Overall mass	g		4200	5500	9700
Material			Aluminum, black anodized	Aluminum, black anodized	Aluminum, black anodized

Miscellaneous	Unit	V-551.2B	V-551.4B	V-551.7B
Operating temperature ran- ge	°C	5 to 40	5 to 40	5 to 40
Connector		HD D-sub 26 (m)	HD D-sub 26 (m)	HD D-sub 26 (m)
Sensor connector		D-sub 15 (f)	D-sub 15 (f)	D-sub 15 (f)
Recommended controllers/ drivers		C-891, C-885 with C-891.10C885, A- 811.CE, G-901	C-891, C-885 with C-891.10C885, A- 811.CE, G-901	C-891, C-885 with C-891.10C885, A- 811.CE, G-901

Note on sensor resolution: interpolated Note on minimum incremental motion: With ACS NanoPWM Connecting cables are not included in the scope of delivery and must be ordered separately.

At Pl, technical data is specified at 22 ±3 °C. Unless otherwise stated, the values are for unloaded conditions. Some properties are interdependent. The designation "typ." indicates a statistical average for a property; it does not indicate a guaranteed value for every product supplied. During the final inspection of a product, only selected properties are analyzed, not all. Please note that some product characteristics may deteriorate with increasing operating time.



## Drawings / Images











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V-551, view from above and side views, dimensions in mm



# Drawings / Images



XY setup of modified V-551 linear stages with 130 mm travel range and an optional drag chain

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## Drawings / Images



An XYZ assembly consisting of three V-551 linear stages each with 60 mm travel range. The Z axis was modified and has magnetic compensation of the weight force.

## **Order Information**

### V-551.2B

Precision linear stage, 160 mm width, 60 mm travel range, 150 N load capacity, absolute encoder, 1 nm sensor resolution, ironless 3-phase linear motor

#### V-551.4B

Precision linear stage, 160 mm width, 130 mm travel range, 150 N load capacity, absolute encoder, 1 nm sensor resolution, ironless 3-phase linear motor

## V-551.7B

Precision linear stage, 160 mm width, 230 mm travel range, 150 N load capacity, absolute encoder, 1 nm sensor resolution, ironless 3-phase linear motor