

A Johnson Electric Company



LINEAR VERTICAL ROTARY TILT

FB SERIES STANDARD STAGES



Precision Motorized Alignment Stages

Product Features

- Linear stages for 20mm to 200mm travel.
- Rotary Stage for continues motion
- Z-Wedge stage for 10mm travel
- Nanomotion's direct drive piezo motor with zero backlash and no hysteresis.
- Integrated 100nm (0.1µm) optical encoder.



Product Description

The FB Series of alignment stages are driven by Nanomotion's ultrasonic standing wave piezo motors, providing linear, rotary and vertical motion.

The FB Series of stages provide single and multi-axis motion performance for a wide range of applications in optical alignment, semiconductor, biomedical, and the analytical instrumentation markets. These compact stages are provided in both atmosphere and vacuum configurations and can support clean room operation to Class 10.

The FB Series is a modular design that allows for easy mounting for multi-axis applications. All FB Series stages are designed with precision optical encoders and precision crossed roller bearings, with the linear axes having an anti-migration device.





Stages

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Stages

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NOTE: Specifications subject to change without notice.

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FBS050020-10004

Linear Piezo Stage

Product Features

ORDERING INFORMATION

Part Number: FBS050020-10004

- Travel Range up to 20mm
- Motor: HR4
- Velocity up to 200mm/sec
- Load capacity up to 1kg
- Encoder resolution 0.1µm (optional to 10nm)

Product Description

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FBS050020-10004

Linear Piezo Stage

TECHNICAL SPECIFICATIONS

Mechanical Design Characteristics

Stage Plate Structure:	Aluminum
Motor:	Piezo Electric, Ultrasonic Standing Wave
Linear Bearings:	Precision crossed roller with anti-migration device
Encoder:	Linear optical scale with 20µm signal period and 0.1µm resolution, with home reference mark
Cable Lengths:	3m
MTBF:	30,000 hours
Stage Mass (g):	400
Moving Mass (g):	150

MECHANICAL DRAWINGS

[All drawings are shown in European view]

- Performance Specifications

Travel Range (mm):	20
Encoder Resolution (µm):	0.1 standard; (10nm optional)
Bi-directional Repeatability (µm):	1.0 standard; (0.1µm optional)
Maximum Velocity (mm/sec):	200
Straightness & Flatness (µm):	+/- 2
Pitch & Yaw (µrad):	+/- 25
Load Capacity (horizontal) (kg):	1
Load Capacity (vertical lift) (kg):	0.65
Dynamic Stall Force (N):	16
Motor Stiffness (N/µ):	2.8



5x Ø3.3⊽11.2 M4-6H⊽8







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FBV050020-10004

Linear Piezo Vacuum Stage

Y30D31A

ORDERING INFORMATION

Part Number:	FBV050020-10004 Vacuum Stage up to 10 ⁻⁷ Torr
Part Number:	FBU050020-10004 UHV Stage up to

- **Product Features**
- Travel Range up to 20mm
- Motor: HR4
- Velocity up to 100mm/sec
- Load capacity up to 2kg
- Encoder resolution 0.1µm (optional to 10nm)

Product Description

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FBV050020-10004

TECHNICAL SPECIFICATIONS

Mechanical Design Characteristics			Performance Specifications	
	Stage Plate Structure: Aluminum		Travel Range (mm): 20	
	Motor: Piezo Electric, U	Jltrasonic Standing Wave	Encoder Resolution (µm): 0.1 standard; (10nm optic	onal)
	Linear Bearings: Precision stainle	Precision stainless steel crossed roller with	Bi-directional Repeatability (µm): 1.0 standard; (0.1µm opti	ional)
	anti-migration d	levice	Maximum Velocity (mm/sec): 200	
	Encoder: Linear optical so 0.1um resolutio	cale with 20µm signal period and n. with home reference mark	Straightness & Flatness (µm): +/- 2	
	Cable Lengths: 3m		Pitch & Yaw (µrad): +/- 25	
	MTBF: 30,000 hours		Load Capacity (horizontal) (kg): 1	
	Stage Mass (g): 400		Load Capacity (vertical lift) (kg): 0.65	
	Moving Mass (g): 150		Dynamic Stall Force (N): 16	
	S (0)		Motor Stiffnors (N/u): 2.9	

MECHANICAL DRAWINGS

[All drawings are shown in European view]





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FBS050050-10004

Linear Piezo Stage

Product Features

ORDERING INFORMATION

Part Number: FBS050050-10004

- Travel Range up to 50mm
- Motor: HR4
- Velocity up to 200mm/sec
- Load capacity up to 2kg
- Encoder resolution 0.1µm (optional to 10nm)



Product Description

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FBS050050-10004

Linear Piezo Stage

Performance Specifications

TECHNICAL SPECIFICATIONS

Mechanical Design Characteristics

Stage plate structure:	: Aluminum	
Motor:	Piezo Electric, Ultrasonic Standing Wave	
Linear Bearings:	Precision crossed roller with anti-migration device	
Encoder:	Linear optical scale with 20µm signal period and 0.1µm resolution, with home reference mark	
Cable Lengths:	3m	
MTBF:	30,000 hours	
Stage Mass (g):	610	
Moving Mass (g):	226	

MECHANICAL DRAWINGS

[All drawings are shown in European view]

Travel Range (mm): 50 Encoder Resolution (μm): 0.1 standard; (10nm optional) Bi-directional Repeatability (μm): 1.0 standard; (0.1μm optional) Maximum Velocity (mm/sec): 200 Straightness & Flatness (μm): +/- 2 Pitch & Yaw (μrad): +/- 25 Load Capacity (horizontal) (kg): 2 Load Capacity (vertical lift) (kg): 0.65 Dynamic Stall Force (N): 16

Motor Stiffness (N/µ): 2.8





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FBV050050-10004

Linear Piezo Vacuum Stage

H24Y30D31A

ORDERING INFORMATION

Part Number:	FBV050050-10004 Vacuum Stage up to 10 ⁻⁷ Torr
Part Number:	FBU050050-10004 UHV Stage up to

- Product Features
- Travel Range up to 50mm
- Motor: HR4
- Velocity up to 100mm/sec
- Load capacity up to 2kg
- Encoder resolution 0.1µm (optional to 10nm)

Product Description

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FBV050050-10004

TECHNICAL SPECIFICATIONS

Γ	Mechanical Design Characteristics		Performance Specifications	
	Stage Plate Structure	Aluminum	Travel Range (mm):	50
	Motor	Piezo Electric, Ultrasonic Standing Wave	Encoder Resolution (µm):	0.1 standard; (10nm optional)
	Linear Bearings	Precision stainless steel crossed roller with	Bi-directional Repeatability (µm):	1.0 standard; (0.1µm optional)
		anti-migration device	Maximum Velocity (mm/sec):	200
	Encoder	Linear optical scale with 20µm signal period and 0.1µm resolution, with home reference mark	Straightness & Flatness (µm):	+/- 2
	Cable Lengths	3m	Pitch & Yaw (µrad):	+/- 25
	MTBF	30,000 hours	Load Capacity (horizontal) (kg):	2
Sta	Stage Mass (g)	610	Load Capacity (vertical lift) (kg):	0.65
	Moving Mass (g)	226	Dynamic Stall Force (N):	16
	0 (0)		Motor Stiffness (N/µ):	2.8

MECHANICAL DRAWINGS

[All drawings are shown in European view]



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5x Ø3.3⊽11.2 M4-6H⊽8

Outgassing data: <1% TML; <0.1% CVCM



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FBS075040-10008

Linear Piezo Stage

Product Features

ORDERING INFORMATION

Part Number: FBS075040-10008

- Travel Range up to 40mm
- Motor: HR8
- Velocity up to 200mm/sec
- Load capacity up to 3kg
- Encoder resolution 0.1µm (optional to 10nm).
 Mounted on axis center



Product Description

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FBS075040-10008

Linear Piezo Stage

TECHNICAL SPECIFICATIONS

_	Mechanical	Design	Characteristics
_	Mechanical	Design	Characteristics

Stage Plate Structure:	Aluminum
Motor:	Piezo Electric, Ultrasonic Standing Wave
Linear Bearings:	Precision crossed roller with anti-migration device
Encoder:	Linear optical scale with 20µm signal period and 0.1µm resolution, with home reference mark
Cable Lengths:	3m
MTBF:	30,000 hours
Stage Mass (g):	755
Moving Mass (g):	302

MECHANICAL DRAWINGS

[All drawings are shown in European view]

- Performance Specifications

Travel Range (mm):	40
Encoder Resolution (µm):	0.1 standard; (10nm optional)
Bi-directional Repeatability (µm):	1.0 standard; (0.1µm optional)
Maximum Velocity (mm/sec):	200
Straightness & Flatness (µm):	+/- 4
Pitch & Yaw (µrad):	+/- 40
Load Capacity (horizontal) (kg):	3
Load Capacity (vertical lift) (kg):	1.0
Dynamic Stall Force (N):	32
Motor Stiffness (N/µ):	3.0

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FBV075040-10008 Linear Piezo Vacuum Stage

ORDERING INFORMATION

Part Number:	FBV075040-10008 Vacuum Stage up to 10 ⁻⁷ Torr
Part Number:	FBU075040-10008 UHV Stage up to 10 ⁻¹⁰ Torr

Product Features

- Travel Range up to 40mm
- Motor: HR8
- Velocity up to 200mm/sec
- Load capacity up to 3kg
- Encoder resolution 0.1µm (optional to 10nm).
 Mounted on axis center



Product Description

The FB Series of alignment stages are driven by Nanomotion's ultrasonic standing wave piezo motors, providing linear, rotary and vertical motion.

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FBV075040-10008

TECHNICAL SPECIFICATIONS

3

Stage Plate Structure:	Aluminum
Motor:	Piezo Electric, Ultrasonic Standing Wave
Linear Bearings:	Precision stainless steel crossed roller with anti-migration device
Encoder:	Linear optical scale with 20µm signal period and 0.1µm resolution, with home reference mark
Cable Lengths:	3m
MTBF:	30,000 hours
Stage Mass (g):	755
Moving Mass (g):	302

MECHANICAL DRAWINGS

[All drawings are shown in European view]

- Performance Specifications

Travel Range (mm):	40
Encoder Resolution (µm):	0.1 standard; (10nm optional)
Bi-directional Repeatability (µm):	1.0 standard; (0.1µm optional)
Maximum Velocity (mm/sec):	200
Straightness & Flatness (µm):	+/- 4
Pitch & Yaw (µrad):	+/- 40
Load Capacity (horizontal) (kg):	3
Load Capacity (vertical lift) (kg):	1.0
Dynamic Stall Force (N):	32
Motor Stiffness (N/µ):	3.0
Outgassing data:	<1% TML; <0.1% CVCM

4x ϕ 5.6 THRU ALL ϕ 10 \forall 5.8 MOUNTING HOLES <u>C-BORED FARSIDE</u>









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FBS075060-10008 Linear Piezo Stage

Product Features

ORDERING INFORMATION

Part Number: FBS075060-10008

- Travel Range up to 60mm
- Motor: HR8
- Velocity up to 250mm/sec
- Load capacity up to 3kg
- Encoder resolution 0.1µm (optional to 10nm).
 Mounted on axis center



Product Description

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Linear Piezo Stage

TECHNICAL SPECIFICATIONS

FBS075060-10008

 Mechanical Design Characteristics 	
Stage Plate Structure:	Aluminum
Motor:	Piezo Electric, Ultrasonic Standing Wave
Linear Bearings:	Precision crossed roller with anti-migration device
Encoder:	Linear optical scale with 20µm signal period and 0.1µm resolution, with home reference mark
Cable Lengths:	3m
MTBF:	30,000 hours
Stage Mass (g):	1,025
Moving Mass (g):	405

MECHANICAL DRAWINGS

[All drawings are shown in European view]

- Performance Specifications

Travel Range (mm):	60
Encoder Resolution (µm):	0.1 standard; (10nm optional)
Bi-directional Repeatability (µm):	1.0 standard; (0.1µm optional)
Maximum Velocity (mm/sec):	250
Straightness & Flatness (µm):	+/- 4
Pitch & Yaw (µrad):	+/- 40
Load Capacity (horizontal) (kg):	3
Load Capacity (vertical lift) (kg):	1.0
Dynamic Stall Force (N):	32
Motor Stiffness (N/µ):	3.0













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FBV075060-10008 Linear Piezo Vacuum Stage

ORDERING INFORMATION

Part Number:	FBV075060-10008 Vacuum Stage up to 10 ⁻⁷ Torr
Part Number:	FBU075060-10008 UHV Stage up to 10 ⁻¹⁰ Torr

Product Features

- Travel Range up to 60mm
- Motor: HR8
- Velocity up to 250mm/sec
- Load capacity up to 3kg
- Encoder resolution 0.1µm (optional to 10nm).
 Mounted on axis center



Product Description

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FBV075060-10008

TECHNICAL SPECIFICATIONS

Mechanical Design Characteristics

Stage Plate Structure:	Aluminum
Motor:	Piezo Electric, Ultrasonic Standing Wave
Linear Bearings:	Precision crossed roller with anti-migration device
Encoder:	Linear optical scale with 20µm signal period and 0.1µm resolution, with home reference mark
Cable Lengths:	3m
MTBF:	30,000 hours
Stage Mass (g):	1,025
Moving Mass (g):	405

MECHANICAL DRAWINGS

[All drawings are shown in European view]

- Performance Specifications

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Travel Range (mm):	60
Encoder Resolution (µm):	0.1 standard; (10nm optional)
Bi-directional Repeatability (µm):	1.0 standard; (0.1µm optional)
Maximum Velocity (mm/sec):	250
Straightness & Flatness (µm):	+/- 4
Pitch & Yaw (µrad):	+/- 40
Load Capacity (horizontal) (kg):	3
Load Capacity (vertical lift) (kg):	1.0
Dynamic Stall Force (N):	32
Motor Stiffness (N/µ):	3.0
Outgassing data:	<1% TML; <0.1% CVCM





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FBS075100-10008 Linear Piezo Stage

ORDERING INFORMATION

Part Number: FBS075100-10008

Product Features

- Travel Range up to 100mm
- Motor: HR8
- Velocity up to 250mm/sec
- Load capacity up to 3kg
- Encoder resolution 0.1µm (optional to 10nm).
 Mounted on axis center



Product Description

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FBS075100-10008

Linear Piezo Stage

TECHNICAL SPECIFICATIONS

Mechanical Design Characteristics

Stage Plate Structure:	Aluminum
Motor:	Piezo Electric, Ultrasonic Standing Wave
Linear Bearings:	Precision crossed roller with anti-migration device
Encoder:	Linear optical scale with 20µm signal period and 0.1µm resolution, with home reference mark
Cable Lengths:	3m
MTBF:	30,000 hours
Stage Mass (g):	1,230
Moving Mass (g):	515

MECHANICAL DRAWINGS

[All drawings are shown in European view]

- Performance Specifications

Travel Range (mm):	100
Encoder Resolution (µm):	0.1 standard; (10nm optional)
Bi-directional Repeatability (µm):	1.0 standard; (0.1µm optional)
Maximum Velocity (mm/sec):	250
Straightness & Flatness (µm):	+/- 5
Pitch & Yaw (µrad):	+/- 60
Load Capacity (horizontal) (kg):	3
Load Capacity (vertical lift) (kg):	1.0
Dynamic Stall Force (N):	32
Motor Stiffness (N/µ):	3.0







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FBV075100-10008 Linear Piezo Vacuum Stage

ORDERING INFORMATION

Part Number:	FBV075100-10008 Vacuum Stage up to 10 ⁻⁷ Torr
Part Number:	FBU075100-10008 UHV Stage up to 10 ⁻¹⁰ Torr

Product Features

- Travel Range up to 100mm
- Motor: HR8
- Velocity up to 250mm/sec
- Load capacity up to 3kg
- Encoder resolution 0.1µm (optional to 10nm).
 Mounted on axis center



Product Description

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FBV075100-10008

TECHNICAL SPECIFICATIONS

	 Mechanical Design Characteristics 			Performance Specifications	
	Stage Plate Structure	: Aluminum		Travel Range (mm): 1	100
	Motor	: Piezo Electric, Ultrasonic Standing Wave		Encoder Resolution (µm): 0	0.1 standard; (10nm optional)
	Linear Bearings	 Precision stainless steel crossed roller with anti-migration device Linear optical scale with 20µm signal period and 0.1µm resolution, with home reference mark 		Bi-directional Repeatability (µm): 1	1.0 standard; (0.1µm optional)
				Maximum Velocity (mm/sec): 2	250
	Encoder:			Straightness & Flatness (µm): +	+/- 5
	Cable Lengths	: 3m		Pitch & Yaw (µrad): ⊣	+/- 60
	MTBF	: 30,000 hours		Load Capacity (horizontal) (kg): 3	3
	Stage Mass (g)	: 1,230		Load Capacity (vertical lift) (kg): 1	1.0
	Moving Mass (g):	: 515	I	Dynamic Stall Force (N): 3	32
				Motor Stiffness (N/µ): 3	3.0

MECHANICAL DRAWINGS

[All drawings are shown in European view]







Outgassing data: <1% TML; <0.1% CVCM

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FBS100100-10008 Linear Piezo Stage

Product Features

ORDERING INFORMATION

Part Number: FBS100100-10008

- Travel Range up to 100mm
- Motor: HR8
- Velocity up to 250mm/sec
- Load capacity up to 3kg
- Encoder resolution 0.1µm (optional to 10nm).
 Mounted on axis center



Product Description

The FB Series of alignment stages are driven by Nanomotion's ultrasonic standing wave piezo motors, providing linear, rotary and vertical motion.

The FB Series of stages provide single and multi-axis motion performance for a wide range of applications in optical alignment, semiconductor, biomedical, and the analytical instrumentation markets. These compact stages are provided in both atmosphere and vacuum configurations and can support clean room operation to Class 10.

The FB Series is a modular design that allows for easy mounting for multi-axis applications. All FB Series stages are designed with precision optical encoders and precision crossed roller bearings, with the linear axes having an anti-migration device.



FBS100100-10008

Linear Piezo Stage

TECHNICAL SPECIFICATIONS

 Mechanical Design Characteristics 		
Stage Plate Structure:	Aluminum	
Motor:	Piezo Electric, Ultrasonic Standing Wave	
Linear Bearings:	Precision crossed roller with anti-migration device	
Encoder:	Linear optical scale with 20µm signal period and 0.1µm resolution, with home reference mark	
Cable Lengths:	3m	
MTBF:	30,000 hours	
Stage Mass (g):	2,145	
Moving Mass (g):	930	

- Performance Specifications

Travel Range (mm):	100
Encoder Resolution (µm):	0.1 standard; (10nm optional)
Bi-directional Repeatability (µm):	1.0 standard; (0.1µm optional)
Maximum Velocity (mm/sec):	250
Straightness & Flatness (µm):	+/- 4
Pitch & Yaw (µrad):	+/- 50
Load Capacity (horizontal) (kg):	3
Load Capacity (vertical lift) (kg):	1.0
Dynamic Stall Force (N):	32
Motor Stiffness (N/u):	3.0

MECHANICAL DRAWINGS

[All drawings are shown in European view]



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160 ± 50mm TRAVEL 164.5 260

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80.0

9x Ø4.2 ∓7 M5.0x0.8-6H ∓6 ∕ Ø5x90°,near side



FBV100100-10008 Linear Piezo Vacuum Stage

Product Features

ORDERING INFORMATION

Part Number:	FBV100100-10008 Vacuum Stage up to 10 ⁻⁷ Torr
Part Number:	FBU100100-10008 UHV Stage up to 10 ⁻¹⁰ Torr

- Travel Range up to 100mm
- Motor: HR8
- Velocity up to 250mm/sec
- Load capacity up to 3kg
- Encoder resolution 0.1µm (optional to 10nm).
 Mounted on axis center



Product Description

The FB Series of alignment stages are driven by Nanomotion's ultrasonic standing wave piezo motors, providing linear, rotary and vertical motion.

The FB Series of stages provide single and multi-axis motion performance for a wide range of applications in optical alignment, semiconductor, biomedical, and the analytical instrumentation markets. These compact stages are provided in both atmosphere and vacuum configurations and can support clean room operation to Class 10.

The FB Series is a modular design that allows for easy mounting for multi-axis applications. All FB Series stages are designed with precision optical encoders and precision crossed roller bearings, with the linear axes having an anti-migration device.



FBV100100-10008 Linear Piezo Vacuum Stage

TECHNICAL SPECIFICATIONS

Mechanical Design Characteristics		
Stage Plate Structure:	Aluminum	
Motor:	Piezo Electric, Ultrasonic Standing Wave	
Linear Bearings:	Precision stainless steel crossed roller with anti-migration device	
Encoder:	Linear optical scale with 20µm signal period and 0.1µm resolution, with home reference mark	
Cable Lengths:	3m	
MTBF:	30,000 hours	
Stage Mass (g):	2.145	

Moving Mass (g): 930

MECHANICAL DRAWINGS

[All drawings are shown in European view]





- Performance Specifications

Travel Range (mm):	100
Encoder Resolution (µm):	0.1 standard; (10nm optional)
Bi-directional Repeatability (µm):	1.0 standard; (0.1µm optional)
Maximum Velocity (mm/sec):	250
Straightness & Flatness (µm):	+/- 4
Pitch & Yaw (µrad):	+/- 50
Load Capacity (horizontal) (kg):	3
Load Capacity (vertical lift) (kg):	1.0
Dynamic Stall Force (N):	32
Motor Stiffness (N/µ):	3.0
Outgassing data	<1% TML; <0.1% CVCM

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FBS150150-10008 Linear Piezo Stage

Product Features

ORDERING INFORMATION

Part Number: FBS150150-10008

- Travel Range up to 150mm
- Motor: HR8
- Velocity up to 250mm/sec
- Load capacity up to 3kg
- Encoder resolution 0.1µm (optional to 10nm).
 Mounted on axis center



Product Description

The FB Series of alignment stages are driven by Nanomotion's ultrasonic standing wave piezo motors, providing linear, rotary and vertical motion.

The FB Series of stages provide single and multi-axis motion performance for a wide range of applications in optical alignment, semiconductor, biomedical, and the analytical instrumentation markets. These compact stages are provided in both atmosphere and vacuum configurations and can support clean room operation to Class 10.

The FB Series is a modular design that allows for easy mounting for multi-axis applications. All FB Series stages are designed with precision optical encoders and precision crossed roller bearings, with the linear axes having an anti-migration device.



FBS150150-10008 Linear Piezo Stage

TECHNICAL SPECIFICATIONS

Mechanical Design Characteristics	Performance Specifications	
Stage Plate Structure: Aluminum	Travel Range (mm): 150	
Motor: Piezo Electric, Ultrasonic Standing Wave	Encoder Resolution (µm): 0.1 standard; (10nm optional)	
Linear Bearings: Precision crossed roller with anti-migration device	Bi-directional Repeatability (µm): 1.0 standard; (0.1µm optional)	
Encoder: Linear optical scale with 20µm signal period and	Maximum Velocity (mm/sec): 250	
0.1µm resolution, with home reference mark	Straightness & Flatness (µm): +/- 4	
Cable Lengths: 3m	Pitch & Yaw (µrad): +/- 50	
MTBF: 30,000 hours	Load Capacity (horizontal) (kg): 3	
Stage Mass (g): 5,095	Load Capacity (vertical lift) (kg): 1.0	
Moving Mass (g): 2,125	Dynamic Stall Force (N): 32	

Motor Stiffness (N/µ): 3.0







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FBV150150-10008 Linear Piezo Vacuum Stage

Product Features

ORDERING INFORMATION

Part Number:	FBV150150-10008 Vacuum Stage up to 10 ⁻⁷ Torr
Part Number:	FBU150150-10008 UHV Stage up to 10 ⁻¹⁰ Torr

- Travel Range up to 100mm
- Motor: HR8
- Velocity up to 250mm/sec
- Load capacity up to 3kg
- Encoder resolution 0.1µm (optional to 10nm).
 Mounted on axis center



Product Description

The FB Series of alignment stages are driven by Nanomotion's ultrasonic standing wave piezo motors, providing linear, rotary and vertical motion.

The FB Series of stages provide single and multi-axis motion performance for a wide range of applications in optical alignment, semiconductor, biomedical, and the analytical instrumentation markets. These compact stages are provided in both atmosphere and vacuum configurations and can support clean room operation to Class 10.

The FB Series is a modular design that allows for easy mounting for multi-axis applications. All FB Series stages are designed with precision optical encoders and precision crossed roller bearings, with the linear axes having an anti-migration device.



FBV150150-10008 Linear Piezo Vacuum Stage

TECHNICAL SPECIFICATIONS

	- Mechanical Design Characteristics		 Performance Specifications 	
	Stage Plate Structure:	Aluminum	Travel Range (mm):	150
	Motor:	Piezo Electric, Ultrasonic Standing Wave	Encoder Resolution (µm):	0.1 standard; (10nm optional)
	Linear Bearings:	Precision stainless steel crossed roller with anti-migration device	Bi-directional Repeatability (µm):	1.0 standard; (0.1µm optional)
			Maximum Velocity (mm/sec):	250
	Encoder:	Linear optical scale with 20µm signal period and 0.1µm resolution, with home reference mark	Straightness & Flatness (µm):	+/- 4
	Cable Lengths:	3m	Pitch & Yaw (µrad):	+/- 50
	MTBF:	30.000 hours	Load Capacity (horizontal) (kg):	3
	Stage Mass (g):	5,095	Load Capacity (vertical lift) (kg):	1.0
	Moving Mass (g):	2,125	Dynamic Stall Force (N):	32
I	6 (6)		Motor Stiffness (N/µ):	3.0

Outgassing data: <1% TML; <0.1% CVCM

MECHANICAL DRAWINGS

[All drawings are shown in European view]





250±75mm TRAVEL 252.5 400

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FBS150200-10008 Linear Piezo Stage

Product Features

ORDERING INFORMATION

Part Number: FBS150200-10008

- Travel Range up to 200mm
- Motor: HR8
- Velocity up to 250mm/sec
- Load capacity up to 3kg
- Encoder resolution 0.1µm (optional to 10nm).
 Mounted on axis center



Product Description

The FB Series of alignment stages are driven by Nanomotion's ultrasonic standing wave piezo motors, providing linear, rotary and vertical motion.

The FB Series of stages provide single and multi-axis motion performance for a wide range of applications in optical alignment, semiconductor, biomedical, and the analytical instrumentation markets. These compact stages are provided in both atmosphere and vacuum configurations and can support clean room operation to Class 10.

The FB Series is a modular design that allows for easy mounting for multi-axis applications. All FB Series stages are designed with precision optical encoders and precision crossed roller bearings, with the linear axes having an anti-migration device.



FBS150200-10008

Linear Piezo Stage

TECHNICAL SPECIFICATIONS

Mechanical Design Characteristics

Stage Plate Structure:	Aluminum
Motor:	Piezo Electric, Ultrasonic Standing Wave
Linear Bearings:	Precision crossed roller with anti-migration device
Encoder:	Linear optical scale with 20µm signal period and 0.1µm resolution, with home reference mark
Cable Lengths:	3m
MTBF:	30,000 hours
Stage Mass (g):	6,275
Moving Mass (g):	2,660

MECHANICAL DRAWINGS

[All drawings are shown

in European view]





 $9x \ 04.2 \ 7$ M5.0x0.8-6H $\ 76$ $\phi 5x90^\circ$, near side

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- Performance Specifications

Travel Range (mm):	200
Encoder Resolution (µm):	0.1 standard; (10nm optional)
Bi-directional Repeatability (µm):	1.0 standard; (0.1µm optional)
Maximum Velocity (mm/sec):	250
Straightness & Flatness (µm):	+/- 5
Pitch & Yaw (µrad):	+/- 50
Load Capacity (horizontal) (kg):	3
Load Capacity (vertical lift) (kg):	1.0
Dynamic Stall Force (N):	32
Motor Stiffness (N/µ):	3.0



FBV150200-10008

Linear Piezo Vacuum Stage

ORDERING INFORMATION

Part Number:	FBV150200-10008 Vacuum Stage up to 10 ⁻⁷ Torr
Part Number:	FBU150200-10008 UHV Stage up to 10 ⁻¹⁰ Torr

Product Features

- Travel Range up to 200mm
- Motor: HR8
- Velocity up to 250mm/sec
- Load capacity up to 3kg
- Encoder resolution 0.1µm (optional to 10nm).
 Mounted on axis center



Product Description

The FB Series of alignment stages are driven by Nanomotion's ultrasonic standing wave piezo motors, providing linear, rotary and vertical motion.

The FB Series of stages provide single and multi-axis motion performance for a wide range of applications in optical alignment, semiconductor, biomedical, and the analytical instrumentation markets. These compact stages are provided in both atmosphere and vacuum configurations and can support clean room operation to Class 10.

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FBV150200-10008

Outgassing data: <1% TML; <0.1% CVCM

TECHNICAL SPECIFICATIONS

	- Mechanical Design Characteristics		Performance Specifications		
	Stage Plate Structure:	Aluminum		Travel Range (mm):	200
	Motor:	Piezo Electric, Ultrasonic Standing Wave		Encoder Resolution (µm):	0.1 standard; (10nm optional
	Linear Bearings: Precision stainless steel crossed roller with anti-migration device Encoder: Linear optical scale with 20µm signal period a 0.1µm resolution, with home reference mark	Precision stainless steel crossed roller with	В	i-directional Repeatability (µm):	1.0 standard; (0.1µm optiona
		anti-migration device		Maximum Velocity (mm/sec):	250
		Linear optical scale with 20µm signal period and 0.1µm resolution, with home reference mark		Straightness & Flatness (µm):	+/- 5
	Cable Lengths:	3m		Pitch & Yaw (µrad):	+/- 50
	MTBF:	30,000 hours		Load Capacity (horizontal) (kg):	3
	Stage Mass (g):	6,275		Load Capacity (vertical lift) (kg):	1.0
	Moving Mass (g):	2.660		Dynamic Stall Force (N):	32
	3			Motor Stiffness (N/µ):	3.0

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[All drawings are shown in European view]



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FBZ075010-10004 Vertical Piezo Stage

Product Features

ORDERING INFORMATION

FBZ075010-10004 Part Number:

- Travel Range up to 10mm
- Motor: HR4
- Velocity up to 50mm/sec
- Load capacity up to 2.5kg
- Encoder resolution 0.1µm (optional to 10nm). Mounted directly to vertical displacement surface



Product Description

The FB Series of alignment stages are driven by Nanomotion's ultrasonic standing wave piezo motors, providing linear, rotary and vertical motion.

The FB Series of stages provide single and multi-axis motion performance for a wide range of applications in optical alignment, semiconductor, biomedical, and the analytical instrumentation markets. These compact stages are

provided in both atmosphere and vacuum configurations and can support clean room operation to Class 10.

The FB Series is a modular design that allows for easy mounting for multi-axis applications. All FB Series stages are designed with precision optical encoders and precision crossed roller bearings, with the linear axes having an anti-migration device.



FBZ075010-10004

Vertical Piezo Stage

TECHNICAL SPECIFICATIONS

Mechanical Design Characteristics

Stage Plate Structure:	Aluminum
Motor:	Piezo Electric, Ultrasonic Standing Wave
Linear Bearings:	Precision crossed roller with anti-migration device
Encoder:	Linear optical scale with 20µm signal period and 0.1µm resolution, with home reference mark
Cable Lengths:	3m
MTBF:	30,000 hours
Stage Mass (g):	1,100

- Performance Specifications

Travel Range (mm): 10
Encoder Resolution (µm): 0.1 standard; (10nm optional)
Bi-directional Repeatability (µm): 1.0 standard; (0.1µm optional)
Maximum Velocity (mm/sec): 50
Straightness & Flatness (µm): +/- 2
Pitch & Yaw (µrad): +/- 30
Load Capacity (kg): 2.5
Dynamic Stall Force (N): 80
Motor Stiffness (N/µ): 2.8

MECHANICAL DRAWINGS

[All drawings are shown in European view]







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FZV075010-10004 Vertical Piezo Vacuum Stage

ORDERING INFORMATION

Part Number:	FZV075010-10004 Vacuum Stage up to 10 ⁻⁷ Torr
Part Number:	FZUV075010-10004 UHV Stage up to 10 ⁻¹⁰ Torr

Product Features

- Travel Range up to 10mm
- Motor: HR4
- Velocity up to 50mm/sec
- Load capacity up to 2.5kg
- Encoder resolution 0.1µm (optional to 10nm). Mounted directly to vertical displacement surface



Product Description

The FB Series of alignment stages are driven by Nanomotion's ultrasonic standing wave piezo motors, providing linear, rotary and vertical motion.

The FB Series of stages provide single and multi-axis motion performance for a wide range of applications in optical alignment, semiconductor, biomedical, and the analytical instrumentation markets. These compact stages are

provided in both atmosphere and vacuum configurations and can support clean room operation to Class 10.

The FB Series is a modular design that allows for easy mounting for multi-axis applications. All FB Series stages are designed with precision optical encoders and precision crossed roller bearings, with the linear axes having an anti-migration device.



FZV075010-10004

Vertical Piezo Vacuum Stage

Performance Specifications

TECHNICAL SPECIFICATIONS

Mechanical Design Characteristics

Stage Plate Structure:	Aluminum
Motor:	Piezo Electric, Ultrasonic Standing Wave
Linear Bearings:	Precision crossed roller with anti-migration device
Encoder:	Linear optical scale with 20µm signal period and 0.1µm resolution, with home reference mark
Cable Lengths:	3m
MTBF:	30,000 hours
Stage Mass (g):	1,100

Travel Range (mm): 10
Encoder Resolution (µm): 0.1 standard; (10nm optional)
Bi-directional Repeatability (µm): 1.0 standard; (0.1µm optional)
Maximum Velocity (mm/sec): 100
Straightness & Flatness (µm): +/- 2
Pitch & Yaw (µrad): +/- 30
Load Capacity (kg): 2.5
Dynamic Stall Force (N): 80
Motor Stiffness (N/µ): 2.8
Outgassing Data: <1% TML; <0.1% CVCM

MECHANICAL DRAWINGS

[All drawings are shown in European view]







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ORDERING INFORMATION

FGS100120-10004

Part Number:

FGS100120-10004 Tilt Stage

Product Features

- Travel Range up to +/-10°
- Motor: HR4
- Velocity up to 40°/sec
- Load capacity up to 1kg
- Encoder resolution
 0.176 arc seconds
- Pivot Axis 101.4mm



Product Description

The FB Series of alignment stages are driven by Nanomotion's ultrasonic standing wave piezo motors, providing linear, rotary and vertical motion.

The FB Series of stages provide single and multi-axis motion performance for a wide range of applications in optical alignment, semiconductor, biomedical, and the analytical instrumentation markets. These compact stages are provided in both atmosphere and vacuum configurations and can support clean room operation to Class 10.

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FGS100120-10004

Tilt Stage

TECHNICAL SPECIFICATIONS

- Mechanical Design Characteristics

Stage Plate Structure:	Aluminum
Motor:	Piezo Electric, Ultrasonic Standing Wave
Linear Bearings:	Precision ball -V guide bearings
Encoder:	Linear optical scale with 20µm signal period and 0.1µm resolution, with home reference mark
Cable Lengths:	3m
MTBF:	30,000 hours
Stage Mass (g):	940
Moving Mass (g):	500

- Performance Specifications

Travel Range (deg):	10
Encoder Resolution (µm):	0.176 arc seconds; 0.0176 arc seconds optional
Bi-directional Repeatability (µm):	2 arc seconds; 0.2 arc seconds optional
Maximum Velocity (deg/sec):	40
Straightness & Radial Runout (µm):	+/- 2
Pitch & Yaw (µrad):	+/- 30
Load Capacity (kg):	1
Dynamic Stall Force (N):	16
Motor Stiffness (N/µ):	2.8

MECHANICAL DRAWINGS

[All drawings are shown in European view]





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FGV100120-10004

Vacuum Tilt Stage

ORDERING INFORMATION

Part Number:	FGV100120-10004 Vacuum Stage up to 10 ⁻⁷ Torr
Part Number:	FGU100120-10004 UHV Stage up to 10 ⁻¹⁰ Torr

Product Features

- Travel Range up to +/-10°
- Motor: HR4
- Velocity up to 40°/sec
- Load capacity up to 1kg
- Encoder resolution0.176 arc seconds
- Pivot Axis 101.4mm



Product Description

The FB Series of alignment stages are driven by Nanomotion's ultrasonic standing wave piezo motors, providing linear, rotary and vertical motion.

The FB Series of stages provide single and multi-axis motion performance for a wide range of applications in optical alignment, semiconductor, biomedical, and the analytical instrumentation markets. These compact stages are provided in both atmosphere and vacuum configurations and can support clean room operation to Class 10.

The FB Series is a modular design that allows for easy mounting for multi-axis applications. All FB Series stages are designed with precision optical encoders and precision crossed roller bearings, with the linear axes having an anti-migration device.



FGV100120-10004

Vacuum Tilt Stage

TECHNICAL SPECIFICATIONS

 Mechanical Desig 	n Characteristics
--------------------------------------	-------------------

Stage Plate Structure:	Aluminum
Motor:	Piezo Electric, Ultrasonic Standing Wave
Linear Bearings:	Precision crossed roller with anti-migration device
Encoder:	Linear optical scale with 20µm signal period and 0.1µm resolution, with home reference mark
Cable Lengths:	3m
MTBF:	30,000 hours
Stage Mass (g):	940
Moving Mass (g):	500

MECHANICAL DRAWINGS

[All drawings are shown in European view]



- Performance Specifications

Travel Range (deg):	10
Encoder Resolution (µm):	0.176 arc seconds; 0.0176 arc seconds optional
Bi-directional Repeatability (µm):	2 arc seconds; 0.2 arc seconds optional
Maximum Velocity (deg/sec):	40
Straightness & Radial Runout (µm):	+/- 2
Pitch & Yaw (µrad):	+/- 30
Load Capacity (kg):	1
Dynamic Stall Force (N):	16
Motor Stiffness (N/µ):	2.8

Outgassing Data: <1% TML; <0.1% CVCM



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FGS100160-10004 Tilt Stage

Product Features

ORDERING INFORMATION

Part Number: FGS100160-10004

- Travel Range up to +/-10°
 Motor: HR4
 - Velocity up to 40°/sec
 - Load capacity up to 1kg
 - Encoder resolution
 0.135 arc seconds
 - Pivot axis 136.4mm



Product Description

The FB Series of alignment stages are driven by Nanomotion's ultrasonic standing wave piezo motors, providing linear, rotary and vertical motion.

The FB Series of stages provide single and multi-axis motion performance for a wide range of applications in optical alignment, semiconductor, biomedical, and the analytical instrumentation markets. These compact stages are provided in both atmosphere and vacuum configurations and can support clean room operation to Class 10.

The FB Series is a modular design that allows for easy mounting for multi-axis applications. All FB Series stages are designed with precision optical encoders and precision crossed roller bearings, with the linear axes having an anti-migration device.



FGS100160-10004

Tilt Stage

TECHNICAL SPECIFICATIONS

- Mechanical Design Characteristics

Stage Plate Structure:	Aluminum
Motor:	Piezo Electric, Ultrasonic Standing Wave
Linear Bearings:	Precision crossed roller with anti-migration device
Encoder:	Linear optical scale with 20µm signal period and 0.1µm resolution, with home reference mark
Cable Lengths:	3m
MTBF:	30,000 hours
Stage Mass (g):	940
Moving Mass (g):	500

Performance Specifications

Travel Range (deg):	10
Encoder Resolution (µm):	0.135 arc seconds; 0.0135 arc seconds optional
Bi-directional Repeatability (µm):	2 arc seconds; 0.2 arc seconds optional
Maximum Velocity (deg/sec):	40
Straightness & Radial Runout (µm):	+/- 2
Pitch & Yaw (µrad):	+/- 30
Load Capacity (kg):	1
Dynamic Stall Force (N):	16
Motor Stiffness (N/µ):	2.8

MECHANICAL DRAWINGS

[All drawings are shown in European view]











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FGV100160-10004

Vacuum Tilt Stage

ORDERING INFORMATION

Part Number:	FGV100160-10004 Vacuum Stage up to 10 ⁻⁷ Torr
Part Number:	FGU100160-10004 UHV Stage up to 10 ⁻¹⁰ Torr

Product Features

- Travel Range up to +/-10°
- Motor: HR4
- Velocity up to 40°/sec
- Load capacity up to 1kg
- Encoder resolution0.135 arc seconds
- Pivot axis 136.6mm



Product Description

The FB Series of alignment stages are driven by Nanomotion's ultrasonic standing wave piezo motors, providing linear, rotary and vertical motion.

The FB Series of stages provide single and multi-axis motion performance for a wide range of applications in optical alignment, semiconductor, biomedical, and the analytical instrumentation markets. These compact stages are provided in both atmosphere and vacuum configurations and can support clean room operation to Class 10.

The FB Series is a modular design that allows for easy mounting for multi-axis applications. All FB Series stages are designed with precision optical encoders and precision crossed roller bearings, with the linear axes having an anti-migration device.



FGV100160-10004

Vacuum Tilt Stage

TECHNICAL SPECIFICATIONS

Mechanical Design Characteristics

Stage Plate Structure:	Aluminum
Motor:	Piezo Electric, Ultrasonic Standing Wave
Linear Bearings:	Precision crossed roller with anti-migration device
Encoder:	Linear optical scale with 20µm signal period and 0.1µm resolution, with home reference mark
Cable Lengths:	3m
MTBF:	30,000 hours
Stage Mass (g):	940
Moving Mass (g):	500

- Performance Specifications

Travel Range (deg):	10
Encoder Resolution (µm):	0.135 arc seconds; 0.0135 arc seconds optional
Bi-directional Repeatability (µm):	2 arc seconds; 0.2 arc seconds optional
Maximum Velocity (deg/sec):	40
Straightness & Radial Runout (µm):	+/- 2
Pitch & Yaw (µrad):	+/- 30
Load Capacity (kg):	1
Dynamic Stall Force (N):	16
Motor Stiffness (N/µ):	2.8

Pivot Axis

Outgassing Data: <1% TML; <0.1% CVCM

MECHANICAL DRAWINGS

[All drawings are shown in European view]











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FRS060360-00504 Rotary Piezo Stage

Product Features

ORDERING INFORMATION

Part Number: FRS060360-00504

- Travel Range 360° continuous
- Motor: (1) HR2 or (2)HR2
- Velocity up to 180°/sec
- Load capacity up to 2kg (at Ring)
- Encoder resolution0.2 arc seconds



Product Description

The FB Series of alignment stages are driven by Nanomotion's ultrasonic standing wave piezo motors, providing linear, rotary and vertical motion.

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FRS060360-00504

Rotary Piezo Stage

TECHNICAL SPECIFICATIONS

 Mechanical Design Characteristics 	
Stage Plate Structure:	Aluminum
Motor:	Piezo Electric, Ultrasonic Standing Wave
Linear Bearings:	Precision rotary crossed roller
Encoder:	Optical scale with metal ring
Cable Lengths:	3m
Stage Mass (g):	820

- Performance Specifications

Travel Range (degrees): 360 - continuous
Encoder Resolution (arc seconds): 5 arc seconds (0.5 arc seconds optional)
Bi-directional Repeatability (arc seconds): 50 arc seconds (5 arc seconds optional)
Maximum Velocity (deg/sec): 180
Flatness (µm): 5
Radial Runout (µm): 5
Load Capacity (horizontal) (kg): 2
Dynamic Stall Torque (N): 0.44 (at Ring)
Motor Stiffness (N/µ): 2.8

MECHANICAL DRAWINGS

[All drawings are shown in European view]



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FRV060360-00504

Rotary Piezo Vacuum Stage

ORDERING INFORMATION

Part Number:	FRV060360-00504 Vacuum Stage up to 10 ⁻⁷ Torr
Part Number:	FRU060360-00504 UHV Stage up to

- Travel Range 360° continuous
- Motor: (1) HR2 or (2)HR2
- Velocity up to 90°/sec

Product Features

- Load capacity up to 2kg (at Ring)
- Encoder resolution
 0.2 arc seconds

Product Description

The FB Series of alignment stages are driven by Nanomotion's ultrasonic standing wave piezo motors, providing linear, rotary and vertical motion.

The FB Series of stages provide single and multi-axis motion performance for a wide range of applications in optical alignment, semiconductor, biomedical, and the analytical instrumentation markets. These compact stages are provided in both atmosphere and vacuum configurations and can support clean room operation to Class 10.

The FB Series is a modular design that allows for easy mounting for multi-axis applications. All FB Series stages are designed with precision optical encoders and precision crossed roller bearings, with the linear axes having an anti-migration device.



TECHNICAL SPECIFICATIONS

 Mechanical Desi 	gn Characteristics
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Stage Plate Structure:	Aluminum
Motor:	Piezo Electric, Ultrasonic Standing Wave
Linear Bearings:	Precision rotary stainless steel crossed roller
Encoder:	Optical scale with metal ring
Cable Lengths:	3m
Stage Mass (g):	820

Performance Specifications

Travel Range (degrees): 360 - continuous
Encoder Resolution (arc seconds): 5 arc seconds (0.5 arc seconds optional)
Bi-directional Repeatability (arc seconds): 50 arc seconds (5 arc seconds optional)
Maximum Velocity (deg/sec): 180
Flatness (µm): 5
Radial Runout (µm): 5
Load Capacity (horizontal) (kg): 2
Dynamic Stall Torque (N): 0.44 (at Ring)
Motor Stiffness (N/µ): 2.8

Outgassing Data: <1% TML; <0.1% CVCM



MECHANICAL DRAWINGS

[All drawings are shown in European view]



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Technical Section

Product Features

- Linear stages for 20mm to 200mm travel.
- Rotary Stage for continues motion
- Z-Wedge stage for 10mm travel
- Nanomotion's direct drive piezo motor with zero backlash and no hysteresis.
- Integrated 100nm (0.1µm) optical encoder.









Product Description

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Motion Accuracy



This illustration depicts the various elements that contribute to error. A given axis has linear errors, in the form of straightness & flatness and angular errors in the form of pitch, yaw & roll.

A linear axis has six degrees of freedom that can create potential errors in motion. There are 3 degrees of linear errors, considering the linear displacement (travel), Straightness of motion, & Flatness of motion. There are 3 degrees of angular error, which consist of Pitch, Yaw, and Roll.

- The movement in the direction of translation, which is the actual motion displacement. This accuracy is governed by the precision of the feedback device and the ability of the motor/servo system to control the displacement of motion.
- 2. Straightness & Flatness are linear errors related to deviations in motion in a vertical plane or left/right plane.

- 3. Pitch & Yaw are angular errors that result in inclination (pitch) or twisting (yaw) of the moving surface, about the direction of travel.
- 4. Roll is an angular error that results in the tilting of the moving surface, off to the side, of the direction of motion.

Nanomotion's FB Linear Series uses precision crossed roller bearings, yielding high stiffness, low friction and minimizing the linear and angular errors. The mounting surfaces for the bearings are precision machined aluminum, designed to reflect the bearing accuracy.





Vacuum & Ultra High Vacuum Compatibility & Cleanliness

Nanomotion's infrastructure includes:

- Cleaning and baking equipment
- Residual Gas Analysis Equipment
- Cleanroom for assembly and testing
- Vacuum chambers for testing
- Particle counting













Nanomotion supports all vacuum/UHV applications with well established infrastructure for RGA analysis and performance testing in vacuum. Our cleanroom supports the assembly and testing of ultra-clean stages.

Nanomotion Motors & Stages are available in: -V version for high vacuum (10⁻⁷ Torr) -U version for Ultra High Vacuum (10⁻¹⁰ Torr)

Linear, rotary, tilt, and Z-wedge stages are configure specifically for vacuum / UHV

Nanomotion's motors and stages are available in vacuum and UHV compatible configurations, leveraging extensive research on materials, adhesives, and lubricants, providing high performance motion control. Motion systems environments, assembled and tested in a cleanroom, then packaged in dry air or nitrogen. Single and multi-axis assemblies are available to meet the most demanding motion requirements.

are specifically designed and manufactured to meet the most stringent performance along with vacuum compatibility and cleanliness.





Move and Settle Motion Profiles & Braking

The ability to step and settle to a stable position is essential to many motion applications. Nanomotion's piezo stages have:

- zero backlash
- zero hysteresis
- no internal motor inertia
- faster response than traditional motor technology

The ability to accelerate an axis with Nanomotion's piezo motor technology is greatly enhanced as the inertia only comes from the moving load. Aside from an ultrasonic standing wave, there are no moving parts internal to the motor. The ability to stop (brake) and hold position with stability is also enhanced by the inherent friction of the ceramic tip working on a ceramic drive surface. These characteristics allow for optimum move and settle, along with the ultimate in position stability.







The ability to make more than 20 moves in 1 second, averaging 50msec, for move and settle, is demonstrated over 25 million cycles.

The motion profile below reflects the position and velocity profile, reaching position stability at the end of the move command, settling to +/- 1 encoder count. The drift (position stability) is measured at <5nm per minute.



Position Repeatability and Accuracy In The Direction of Motion



FB Series



The graph above represents a test, simulating 5 years of operation service, moving 90° , 180° , 270° , 360° and back to home.

Accuracy in our normal servo mode (AC) is to 1µRad

Accuracy in our high resolution mode (DC) is to 0.1µRad

Position repeatability is to +/- 1 µRad





Position Repeatability and Accuracy In The Direction of Motion

There are many design and component factors that impact the ability to achieve position repeatability and accuracy.

All Nanomotion motion systems are closed loop with a position sensor. The position sensors vary in the available resolution and the absolute accuracy. In addition to the position sensors, design considerations that impact the systems stiffness, materials (thermal expansion) and bearing selection are all key factors in determining the precision of motion. Nanomotion has extensive experience is system configurations ranging from 0.5nm resolution to 1µm resolution. Ultimately the position resolution will be a key factor in determining the position repeatability, as most systems will be repeatable to < 5 encoder counts. Actual errors in the position sensor can be factored out based on measurements with a laser interferometer or auto collimator, yielding standard accuracy in the sub-micron level and achievable accuracy in nanometer level.



Nanomotion utilizes metrology tools such as laser interferometry and auto collimators to validate all aspects of motion performance.

The long travel stage to the right and the graph below reflect an absolute position accuracy of 12 microns over 306mm. The position repeatability is 2 microns with a $0.1 \mu m$ resolution encoder.

Increasing the encoder resolution can improve position repeatability.

Laser error mapping can improve position accuracy by adding correction points.





Application Data Sheet

Please use this as a guideline to the stage selection process

Name:	
Company:	
Phone:	Email:
Application Description Describe the application in text	
Operating Environment	
Min/Max Operating Temperature	–[C
Min/Max Storage Temperature	[C
Pressure/Vacuum	
Magnetic: 🗆 Yes 🗆 No	
Cleanliness Class:	
Other Environmental Considerations:	

Multi Axis Configurations

Choose configuration and define which axis is top of each other.	
--	--

Х			
R			
XR			
XY			
XZ			
	Example: Z mounted onto X with		
ZR			
XYZ			
XYR			
XYZ			
XYZR		Z axis	
R1R2		- I free	
Other		Jane Y and sentime	
Numb	er of Interpolated axes	Y axis X axis	<u> </u>
			A Johnson Electric Company

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Sketch If Required To Explain

	Application	n Data Sheet	t	
	Please use this as a	a guideline to the stage se	election process	
Positioning Requirem	ients			
Repeatable The error returning to	the same position			[nm/µ]
Absolute Accuracy The error from	om position zero to a target point			[µm]
Typical Step Size				[nm/µm/mm]
Smallest Incremental Step				[nm/µm]
Encoder Resolution Nanomotio	on to define encoder resolution.			[nm/µm]
Motion Requirements	- Maximum Travel per axis:			
Х	Υ	٢	Z	[mm]
R1 _	R2	2	[Degrees or Continuous]	
Load Requirements Payload Mass Thrust Force Payload directly mounted to Distance from the stage sur	o the stage surface	s 🗆 No ad		[Kg] [N] [mm]
Rotary Application, define m	noment of inertia			[kg.m ²]
Flectrical				
Main Power: 12V	24V 🗆 48V 🗆 Battery		_ 🗆 Other	
Main Power: 12V Controller Nanomotion: Other Brand: Controller Interface-I	24V □ 48V □ Battery	n communication protocol. pack	_ Other kaging or interfacing with other o	levices:
Main Power: 12V Controller Nanomotion: Other Brand: Controller Interface-	24V □ 48V □ Battery	in communication protocol, pack	_ Other kaging or interfacing with other o	levices:
Main Power: 12V Controller Nanomotion: Other Brand: Controller Interface- I Motor Amplifier- Nano	24V □ 48V □ Battery Define specific requirements in motion to determine driver:	in communication protocol, pack	_ Other kaging or interfacing with other o	levices:

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