MOTION SOLUTIONS
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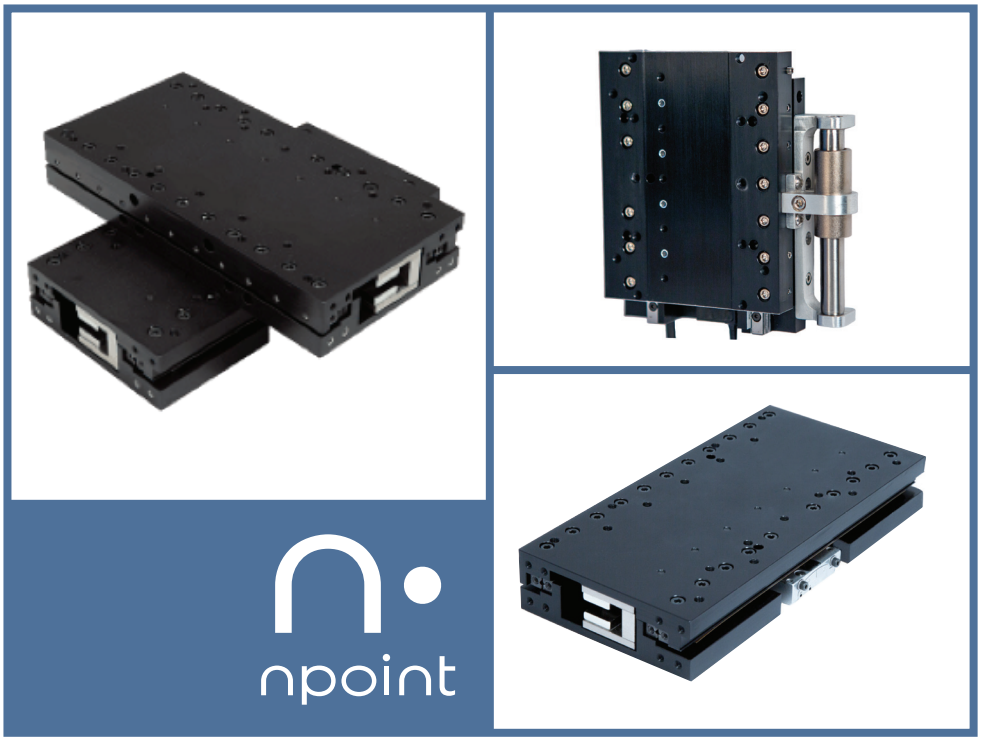
npoint

nPL70 Linear Motor Stages

A MOTION SOLUTIONS•NPOINT PRODUCT



COMPACT, HIGH EFFICENCY POSITIONING STAGES OPTIMIZED FOR DEMANDING APPLICATIONS THAT REQUIRE HIGH SPEED SAMPLE POSITIONING AND SCANNING

- Horizontal, vertical, & multiaxis configurations
- Ironless linear motor for smooth motion & minimal velocity error
- Patented coil design for maximum force density
- Ultralow 25-mm profile
- Cross-roller bearings & precision preloads for maximum stiffness & low motion error
- High bandwidth for fast response, low settling times, & high system stability

nPL70 Linear Motor Stages

OVERVIEW

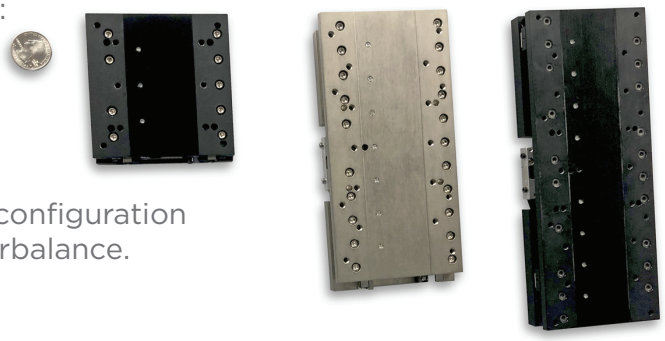
The nPL70 stages feature a high-precision, compact design that enables seamless stacked configurations. These high-efficiency stages are excellent for scanning applications that require fast acceleration and velocity control.

Multiple motor and resolution configurations, combined with a low 25mm profile, provide optimum motion control for precision scanning applications ranging from Semiconductor Fabrication to Life Sciences.

The ironless linear motor, coupled with unique windings, eliminates cogging while maintaining high force density and smooth motion. High precision anti-creep cross-roller bearings maximize stiffness and minimize off-axis and angular errors.

The stages are available in three different base-lengths:

- **84 mm (nPL70S)**
- **168 mm (nPL70M)**
- **210 mm (nPL70L)**



The 84mm base-length model is available in a vertical configuration **(nPL70Z)** with external magnetic or pneumatic counterbalance. This enables fine-tuned performance for each project.

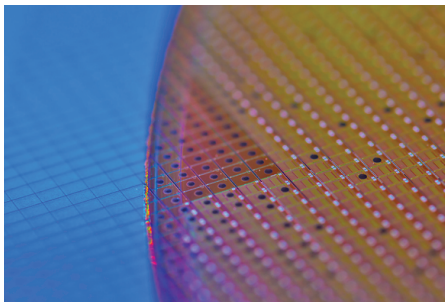
- **Magnetic counterbalance forces as high as 7 N**
- **Pneumatic counterbalance forces as high as 42 N**

Four motor choices provide speed and acceleration flexibility as required by the specific application. **Three digital encoder choices** allow fine-tuning the accuracy and repeatability of each stage.

Some applications impose specific requirements on the motion assemblies. At Motion Solutions, we have the equipment and expertise to customize our nPL70 offerings in a variety of ways:

- **Clean-room**
- **ESD safe options**
- **Anticorrosion treatments**
- **Special connectors and cable terminations**
- **Mechanical elements such as brackets**

Analytical Instrumentation



Semiconductor Fabrication

Diagnostic Equipment

TAILORED TO THE APPLICATION

nPL70 stages are highly configurable. Users have a choice of stroke length, motor size, and encoder options. Standard models are designed for horizontal and vertical orientations. Multiple stages can be stacked in multi-axis configurations without the need for interface plates. The elimination of interface plates reduces the overall size of the stack, making the stages an excellent fit for space-constrained applications.

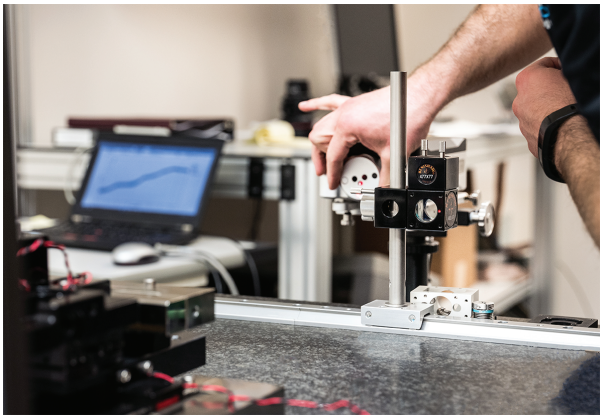
- **Sub-micron repeatability**
- **Multiple analog and digital encoder options**
- **Maximum travel of 150 mm**
- **High bandwidth**
- **Fast response**
- **Rapid settling time**
- **Compact profile (25 mm high)**
- **10Kg payload capacity**
- **Stackable without interface plates**
- **Multiple motor choices**
- **Fully integrated limit sensors**
- **No moving cables**
- **Cleanroom preparations**
- **Anticorrosion treatments**

QUALITY

These products are built with precision ground surfaces.

Motion Solutions has developed procedures, tools, and testing protocols that guarantee the high-performance and reliability of these mechanical assemblies.

The stages can be further customized for specific applications and volume production.



PERFORMANCE SPECIFICATIONS

Straightness & Flatness (µm)			
nPL70S/Z	4		
nPL70M	6		
nPL70L	8		
Pitch & Yaw (µrad)			
nPL70S/Z	50		
nPL70M	75		
nPL70L	120		
Position Accuracy (µm)			
Encoder Resolution	0.01 µm	0.1 µm	1.0 µm
nPL70S/Z	4	6	10
nPL70M	6	8	12
nPL70L	8	10	14
Bi-Directional Repeatability (µm)			
Encoder Resolution	0.01 µm	0.1 µm	1.0 µm
nPL70S/Z	±0.4	±0.5	±2.0
nPL70M	±0.4	±0.5	±2.0
nPL70L	±0.4	±0.5	±2.0

STAGE SPECIFICATIONS

MOTOR SIZE:	1M	2M	3M	4M
Model (Travel) (mm)	nPL70S/Z(45)	nPL70S/Z(25)	nPL70M(85)	nPL70M(65)
	nPL70M(100)	nPL70M(100)	nPL70L(130)	nPL70L(110)
	nPL70L(150)	nPL70L(150)		
Normal Load Capacity (kg(lb))	10(22)			
Peak Force (N)	11.9	23.8	35.7	47.6
Continuous Force (N)	3	6	8.9	11.9
Duty Cycle (%)	100	100	100	100
Unit Mass (g)				
nPL70S/Z	563	588	–	–
nPL70M	1036	1061	1086	1111
nPL70L	1301	1326	1351	1376
Carriage Mass (g)				
nPL70S/Z	327			
nPL70M	634			
nPL70L	806			
Maximum Velocity (m/sec)				
nPL7S/Z	1.30	1.37	–	–
nPL70M	1.34	1.92	2.23	2.27
nPL70L	1.45	2.09	2.40	2.55
Maximum Velocity Due to Encoder Frequency (m/sec)				
1 µm	2.55			
0.1 µm	1.35			
0.01 µm	0.135			

MOTOR CONTROL SPECIFICATIONS

	1M	2M	3M	4M
Motor Constant (N/√ W)	1.67	2.42	2.98	3.46
Continuous Power (W)	3.20	6.10	9.00	11.80
Peak Power (W)	50.90	97.10	143.30	189.60
Electrical Cycle (mm)	21.00			
Max Bus Voltage (V)	60.00			
Max Coil Temperature (°C)	125.00			
Thermal Dissipation Constant (W/°C)	0.04	0.08	0.12	0.16
Continuous Current (Arms)	1.70			
Peak Current (Arms)	6.80			
Force Constant (N/Arms)	1.75	3.50	5.25	7.00
Back EMF Constant (Vpeak/(m/s))	1.40	2.90	4.30	5.70
Inductance (mH)	0.11	0.22	0.31	0.41
Thermal resistance @25°C (Ohms)	1.10	2.10	3.10	4.10
Electrical Time Constant (ms)	0.10			

ELECTRICAL WIRING

Hall Sensor Cable	
Description	Color
HA	Grey
HB	Yellow
HC	Blue
+5VDC	Red
0VDC	Black

Hall Sensor Cable	
Cable Diameter (mm)	3.8
Min. Bend Radius (mm)	38

Motor Power Cable	
Description	Color
Phase U	Brown
Phase V	White
Phase W	Green
Shield	Cable Shield

Motor Power Cable	
Cable Diameter (mm)	4.1
Min. Bend Radius (mm)	41

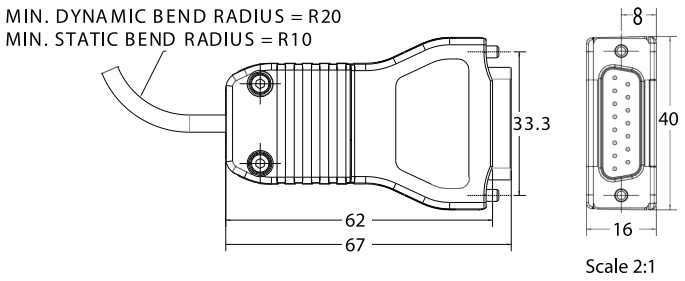
ENCODER PINOUTS

Digital Output

Function	Signal		Pin
Power	5 VDC		7, 8
	0 VDC		2, 9
Incremental	A	+	14
		-	6
	B	+	13
		-	5
Reference Mark	Z	+	12
		-	4
Limits	P*		11
	Q		10
Set-up	X		1
Alarm	E	+	-
		-	3

Analog Output

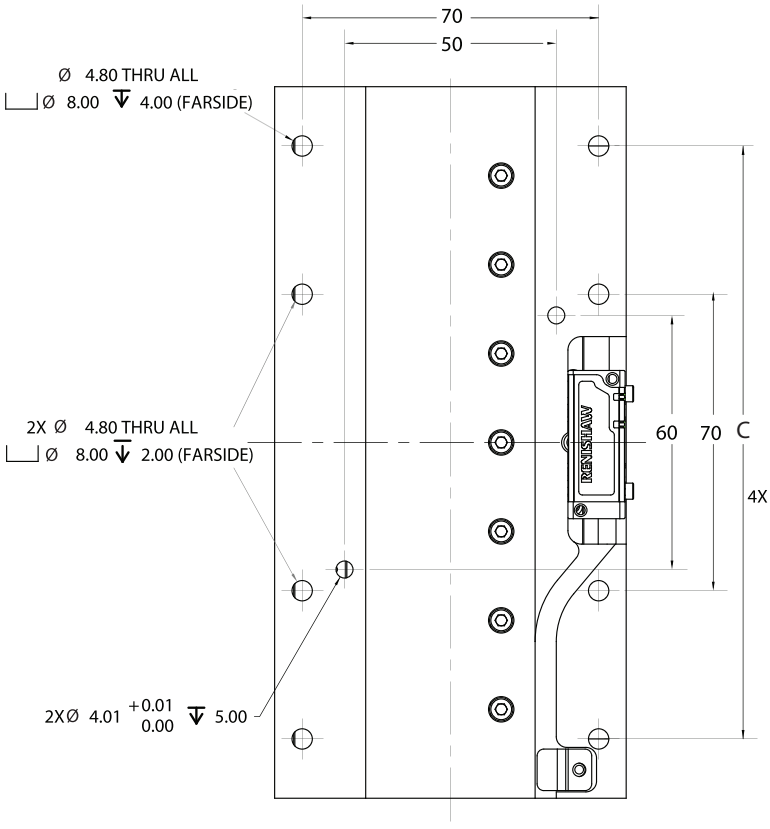
Function	Signal		Pin
Power	5 V		4, 5
	0 V		12, 13
Incremental	Cosine	+	9
		-	1
	Sine	+	10
		-	2
Reference Mark	V_0	+	3
		-	11
Limits	P*		7
	Q		8
Set-up	V_X		6
Alarm	Cal		14



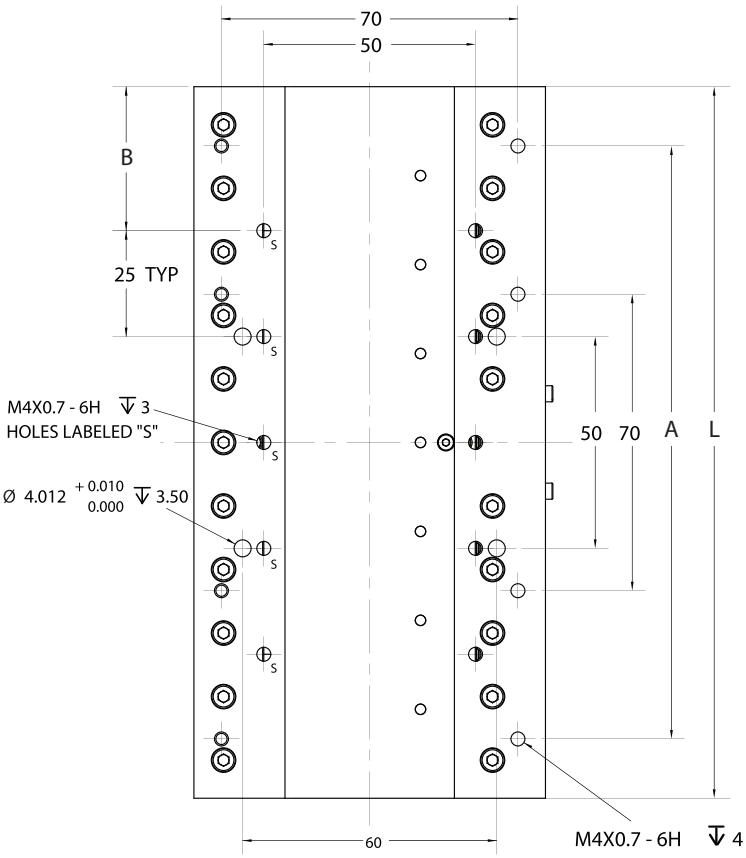
MOUNTING SPECIFICATIONS

	L: Overall Length (mm)	A: Outer Mounting Pattern Spacing (mm)	B: Inner Mounting Pattern - Hole to Edge Distance (mm)	C: Stage Mounting Hole Spacing (mm)
nPL70S/Z	84	-	17	-
nPL70M	168	140	34	140
nPL70L	210	200	30	200

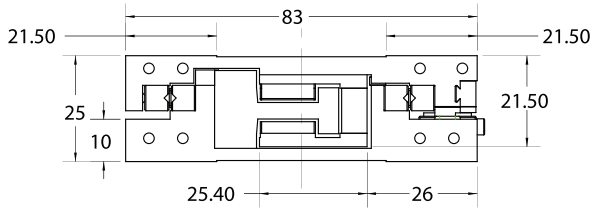
BOTTOM VIEW



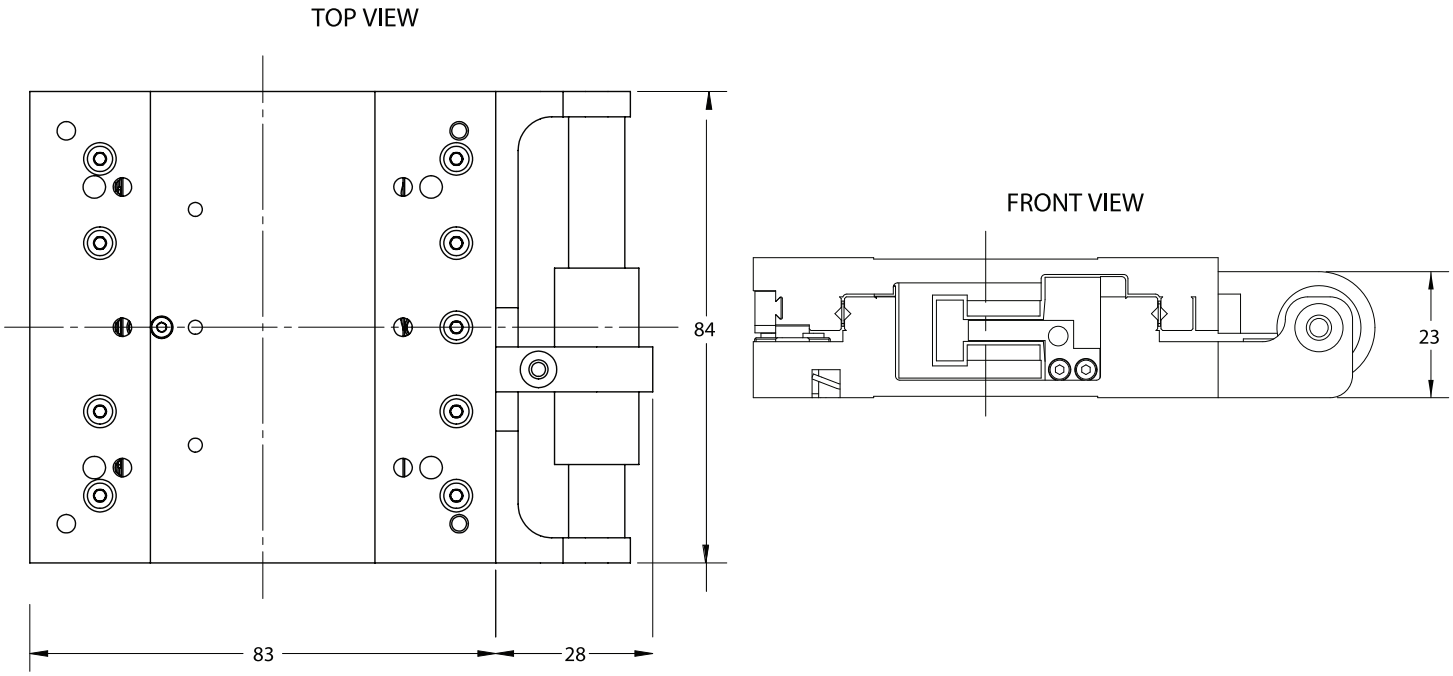
TOP VIEW



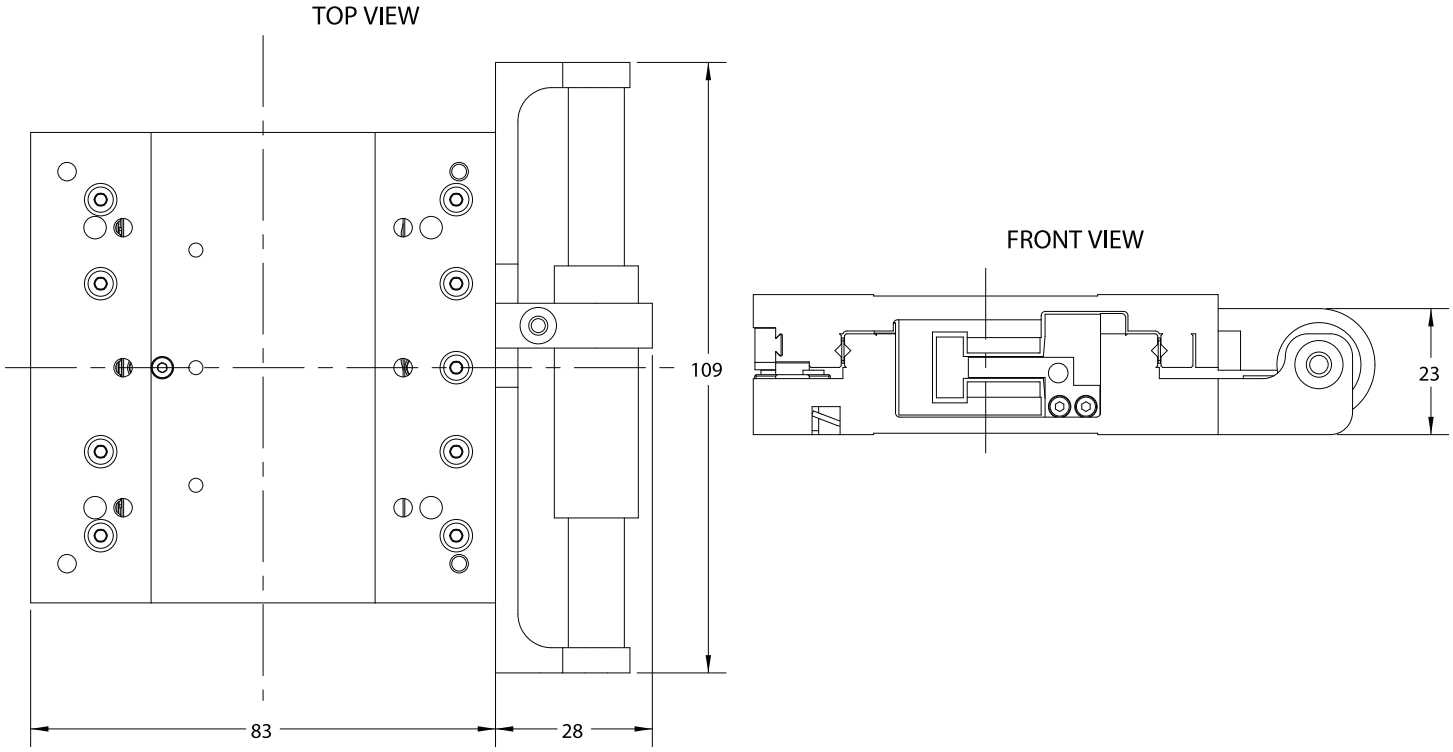
FRONT VIEW



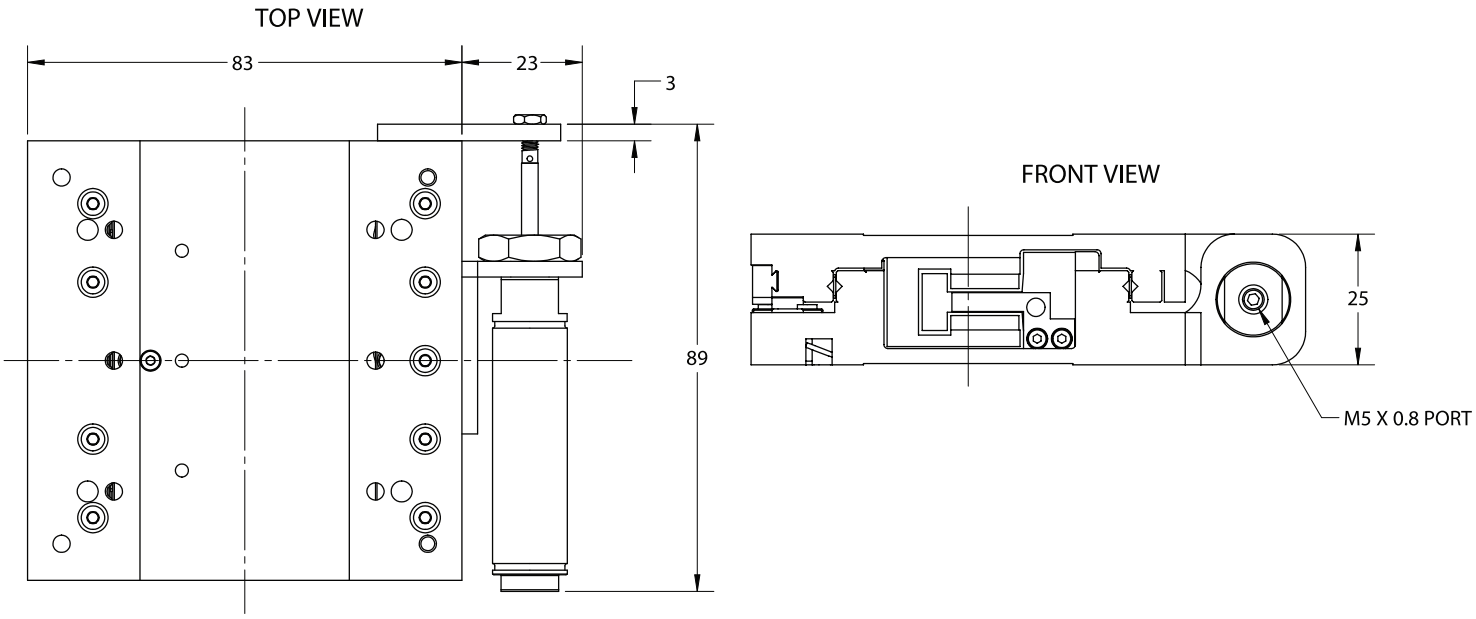
nPL70Z Magnetic Counterbalance – 20MM Travel



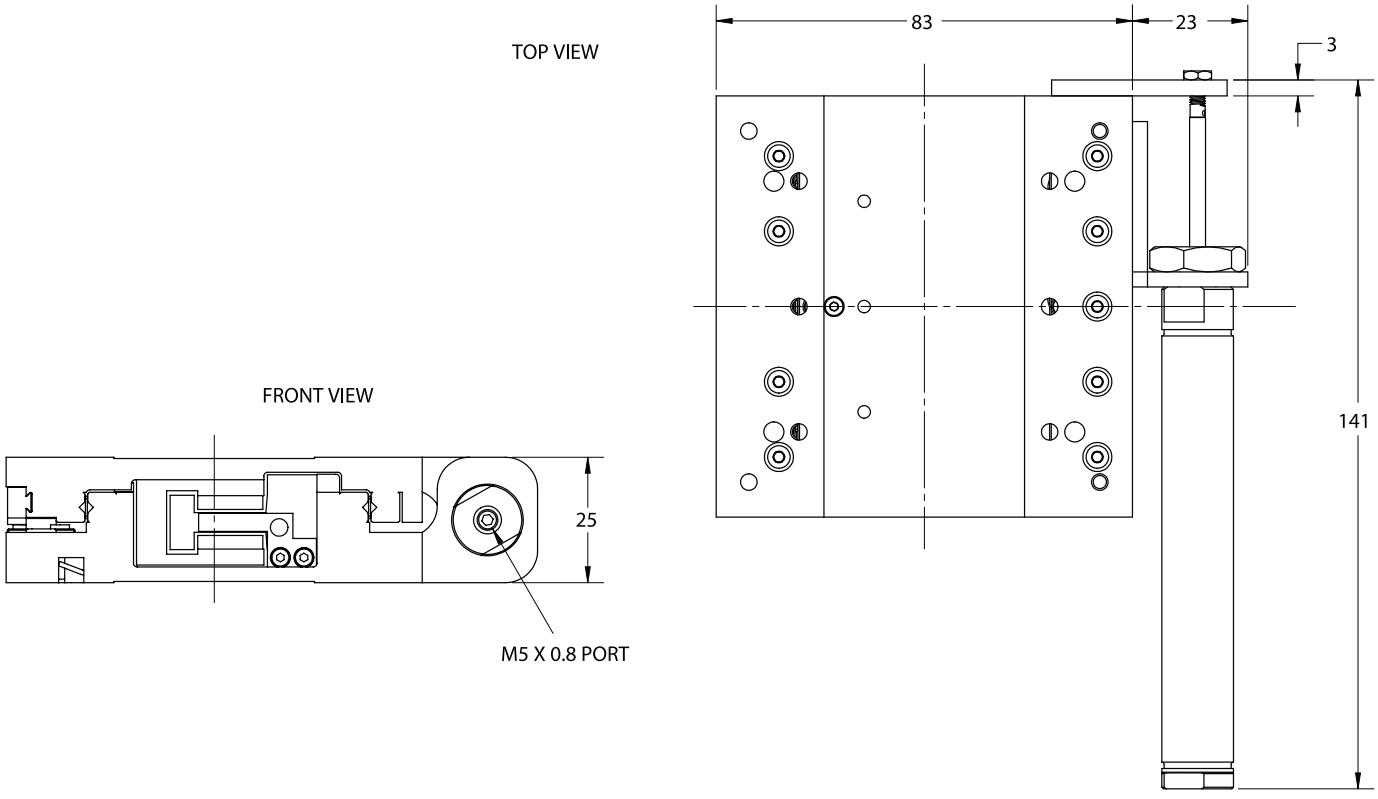
nPL70Z Magnetic Counterbalance – 25MM Travel



nPL70Z Pneumatic Counterbalance – 10MM Travel



nPL70Z Pneumatic Counterbalance – 45MM Travel



PART NUMBER CREATION

The **nPL70** linear motor stages can be configured with different motors and encoders. The **nPL70Z** is offered with vertical counterbalance choices to better optimize its performance. All stages can be prepared for ambient or clean room environment and are offered with or without a drive.

nPL70 S – 1M 045 – 010 SP 00 – PV 10

- Stage Model
- Motor Size
- Maximum Travel
- Encoder Resolution
- Precision/Environment
- Drive
- Vertical CB Type
- CB Travel

nPL70
Model
S, M, L, Z

1M
Motor Size
1M
2M
3M
4M

045		
Maximum Travel (mm)		
nPL70S/Z	nPL70M	nPL70L
45	100	150
25	100	150
N/A	85	130
N/A	65	110

010
Encoder (Resolution) (µm)
000 (analog)
010 (0.01)
100 (0.1)
1.0 (1.0)

PV	10	
Vertical Counterbalance		
Type	Force (N)	Travel (mm)
None (00)		
Magnetic (MV)	3	20/25
Magnetic (HV)	7	20/25
Pneumatic (PV)	Up to 45	10/20/25/45

SP
Precision
Standard (SP)
Clean Room (CR)

00
Drive
None (00)
Accelnet BEL-090-06 (D3)

Configure your **nPL70** stage using the part number example and tables shown.
Don't see exactly what you need? Give us a call and let us configure the system for you.

Southern California
27 Argonaut
Aliso Viejo, CA 92656
Tel: (949) 586-7442

Northern California
47517 Seabridge Drive
Fremont, CA 94538
Tel: (925) 243-8700

Wisconsin
3030 Laura Ln, Ste 100
Middleton, WI 53562
Tel: (608) 573-5183

Email:
sales@motionsolutions.com
sales@npoint.com