

## SE Motor & AB7 Driver Data Sheets

The SE motor family expands Nanomotion’s motor product line, capable of addressing the next generation of motion requirements in semiconductor, metrology, and microscopy applications. Based on a more efficient piezo core and enhanced motor structure, the SE motor doubles the velocity of conventional piezo motors, provides the same force, while consuming half the power. The SE motor design provides three times the stiffness, optimizing settling time, extending operating life and increasing duty cycles.

The AB7 is a new motor driver supporting all SE motor configurations and can be adapted to support the current HR motor family. The AB7 driver has user selectable modes of operation to function in the traditional drive mode (AB1A), in a linear mode (AB5) where the voltage to velocity profile has no dead-zone, and in the DC mode (AB2) facilitating 1nm stability and manipulation. The resolution of the motor voltage has been increased by a factor of 10, over previous drives, supporting slow speed constant velocity and high resolution applications.

The SE motors & AB7 drivers are supporting a host of new OEM stage designs as well as applications for customer integrated motor/driver components.



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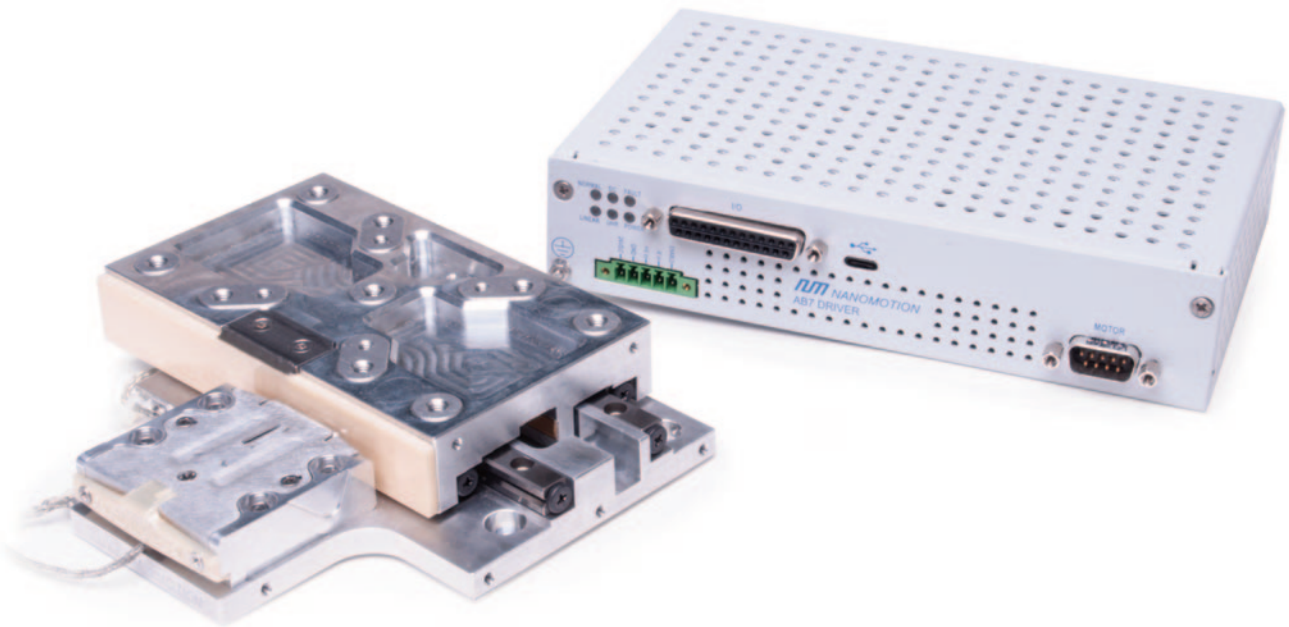
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# SE Motors & AB7 Driver

The SE motor product line utilizes a new motor material (higher efficiency) and structure to support applications with operation up to 500mm/sec. Additionally, the internal structure provides an increase in stiffness, in the direction of motion, that is 3 times greater than the HR motor generation. As a result, the motor is capable of significantly higher duty cycles in vacuum applications. Additionally, with higher stiffness, the settling time is much less, resulting in higher throughput and less wear.

## The SE motor provides

- High stiffness and efficiency to support a significant increase in duty cycle and position stability
- Unlimited linear and rotary motion
- Wide dynamic velocity range
- Zero backlash and high stiffness
- Position stability with zero power consumption
- Silent operation
- Standard and vacuum versions
- Supports multiple motors for E16, E24, and E32 configurations



# SE8-1-X-3

## SE8 Motor

### ORDERING INFORMATION

**Part Numbers:**

- SE8-1-S-3 Standard Motor
- SE8-1-V-3 Vacuum Motor
- SE8-1-VN-3 Vac/Non-magnetic Motor

### RELATED PRODUCTS

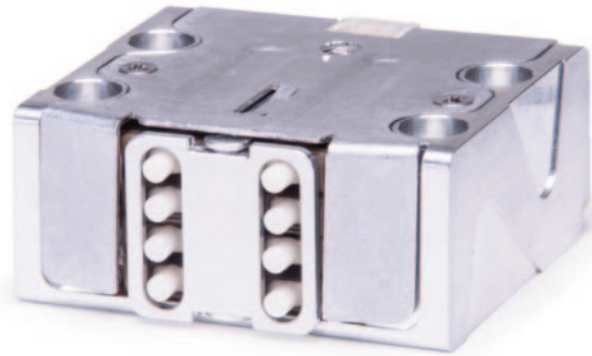
**Part Number:**

- AB07-SE-EXX Driver for SE
- XCD-SE-EXX Driver/Control Board

### Application Recommendations

The SE8 motor provides a maximum force of 32N and a maximum velocity of 500mm/sec. To support applications with higher moving mass, Nanomotion can support applications with 2, 3, or 4, SE8 motors in parallel on one axis. The SE8 has a non-energized stiffness of 8.5N/μm to support faster settling times and position stability at the nm level. SE motor is well suited for:

- High force, high speed applications
- High Vacuum applications
- Sub-nm positioning accuracy
- High throughput



### Product Description

The SE8 motor can easily adapt to numerous bearing structures to provide a high resolution motion control for a wide range of applications. The high stiffness and efficiency of the SE motor family is supporting increased duty cycle operation and estimated life of 20k hours under normal operating conditions.

**SE8 Motor Features:**

- Wide Dynamic velocity range
- Zero Backlash and high stiffness
- Holds position at power off
- Increased duty cycle, particularly for vacuum applications
- Negligible EMI

# SE8-1-X-3

# SE8 Motor

## TECHNICAL SPECIFICATIONS

Mechanical  
Weight/Mass: 185g

## DYNAMIC

Driving Force (max): 32N  
Velocity (max): 500mm/sec

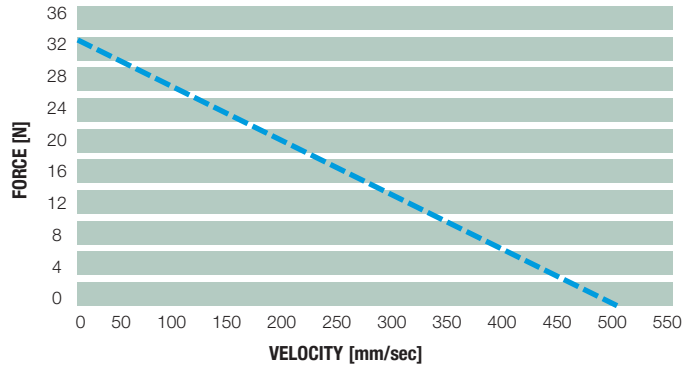
## ENVIRONMENTAL

Operation Temperature:  
0°C - 50°C

## ELECTRICAL

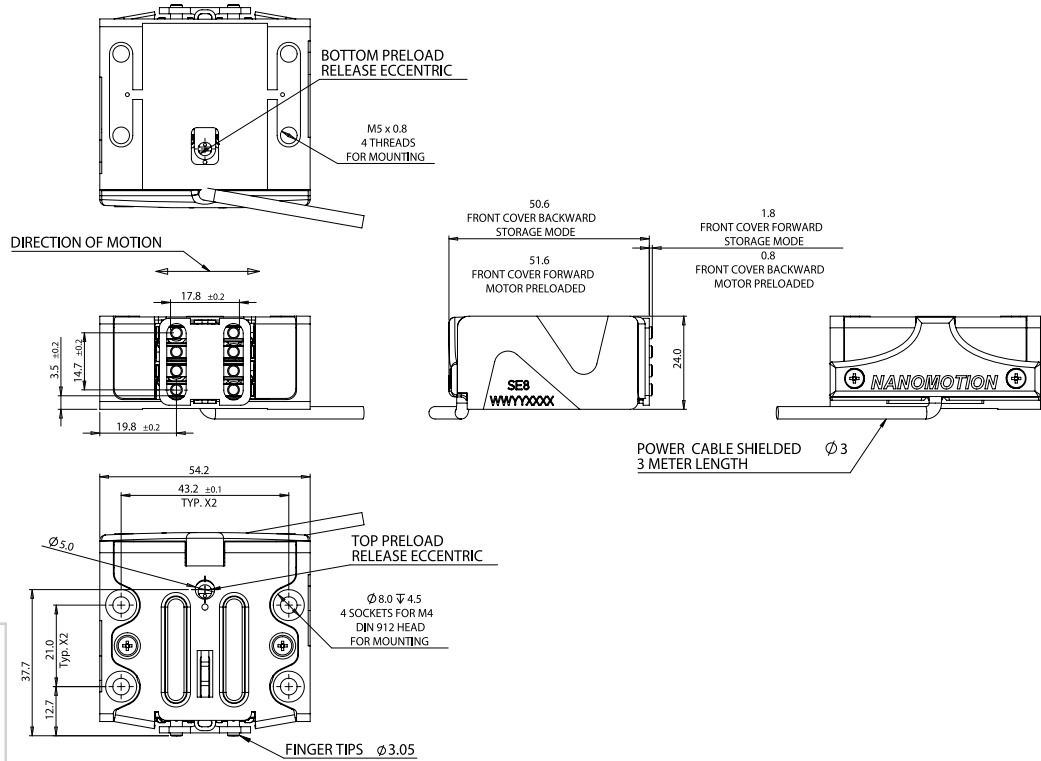
Motor Voltage (RMS): 280V  
Motor Power (max): 40W

## FORCE/VELOCITY CHARACTERISTICS

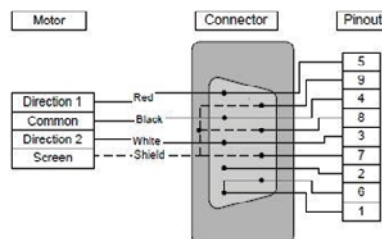


## MECHANICAL DRAWINGS AND INTERFACE

All Dimensions are Shown in Metric



## ELECTRICAL INTERFACE



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# SE4-1-X-3

## SE4 Motor

### ORDERING INFORMATION

**Part Numbers:**

- SE4-1-S-3 Standard Motor
- SE4-1-V-3 Vacuum Motor
- SE4-1-VN-3 Vac/Non-magnetic Motor

### RELATED PRODUCTS

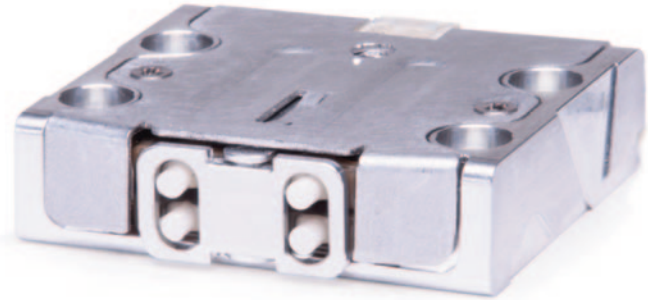
**Part Number:**

- AB07-SE-EXX Driver for SE
- XCD-SE-EXX Driver/Control Board

### Application Recommendations

The SE4 motor provides a maximum force of 16N and a maximum velocity of 500mm/sec. To support applications with higher moving mass, Nanomotion can support applications with 2 or 4 SE4 motors in parallel on one axis. The SE4 has a non-energized stiffness of 4.5N/ $\mu$ m to support faster settling times and position stability at the 1nm level. SE motor is well suited for:

- High force, high speed applications
- High Vacuum applications
- Sub-nm positioning accuracy
- High throughput



### Product Description

The SE4 motor can easily adapt to numerous bearing structures to provide a high resolution motion control for a wide range of applications. The high stiffness and efficiency of the SE motor family is supporting increased duty cycle operation and estimated life of 20k hours under normal operating conditions.

#### SE4 Motor Features:

- Wide Dynamic velocity range
- Zero Backlash and high stiffness
- Holds position at power off
- Increased duty cycle, particularly for vacuum applications
- Negligible EMI

# SE4-1-X-3

# SE4 Motor

## TECHNICAL SPECIFICATIONS

Mechanical  
Weight/Mass: 123g

## DYNAMIC

Driving Force (max): 16N  
Velocity (max): 500mm/sec

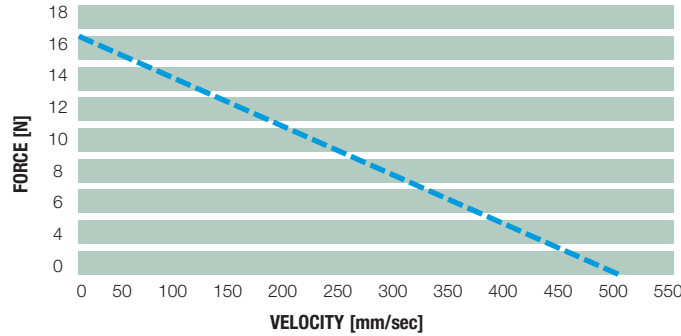
## ENVIRONMENTAL

Operation Temperature:  
0°C - 50°C

## ELECTRICAL

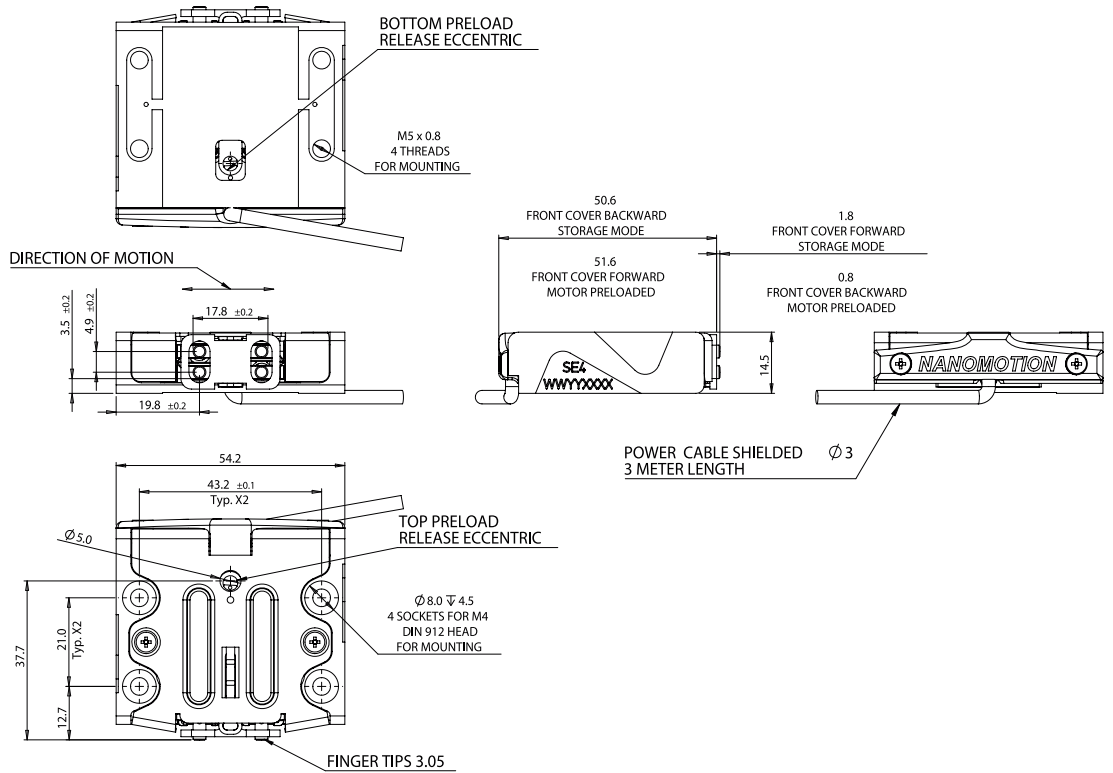
Motor Voltage (RMS): 280V  
Motor Power (max): 20W

## FORCE/VELOCITY CHARACTERISTICS



## MECHANICAL DRAWINGS AND INTERFACE

All Dimensions are Shown in Metric



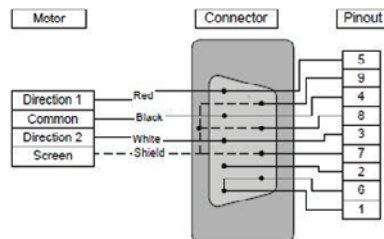
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## ELECTRICAL INTERFACE

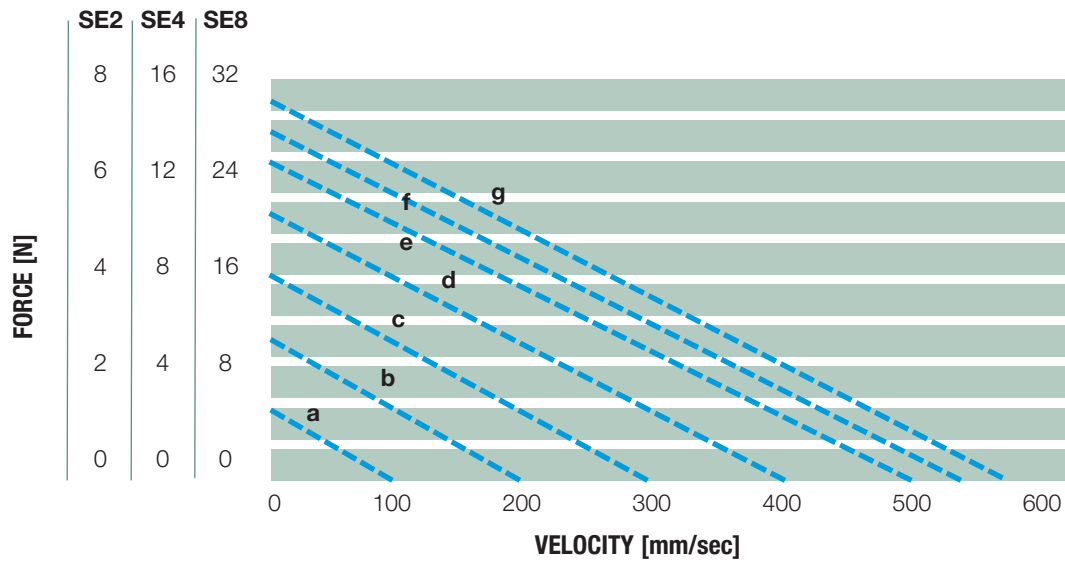


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# SE Motor Envelope of Performance

The graph depicts the motor force vs velocity at various work regimes, do be defined by the application requirements. The chart defines the maximum duty cycle and continuous based on the specific curve defined by the application requirements.

## FORCE/VELOCITY CHARACTERISTICS



Curve	Air 25°C		Air 50°C		Vacuum	
	Duty Cycle (%)	Maximal Continuous Operation Time (sec.)	Duty Cycle (%)	Maximal Continuous Operation Time (sec.)	Duty Cycle (%)	Maximal Continuous Operation Time (sec.)
a	100	∞	100	∞	100	∞
b	100	∞	100	∞	44	184
c	100	∞	92	137	26	107
d	100	∞	62	93	17	72
e	78	87	47	70	13	55
f	56	62	33	50	9	39
g	50	56	30	45	8	35



## AB7 Motor Amplifier

Nanomotion's AB7 driver is a single axis amplifier box to support up to 32 motor elements in parallel (4 x SE8). Each driver has an internal personality board based on the motor type and number of motor elements.

The AB7 has been developed to support the new family of SE motors as well as HR motors, combining a range of operations that were previously supported by different drivers. Included in the driver is a user selectable operation for AC mode (AB1A), DC mode (AB2), Linear Mode (AB5) and UHR Mode (used in both AB1A & AB5). These modes are combined with a motor voltage resolution of 1/8000 noise at full command, which is a 10x improvement over previous drivers, supporting slow speed, constant velocity and high precision applications.





# AB7 Motor Amplifier

## TECHNICAL SPECIFICATIONS

Input Power:  
24V±5%

### Maximum Current: (at full command)

**E2:** 1 amp  
**E4:** 1.5 amps  
**E8:** 3 amps  
**E16:** 6 amps  
**E32:** 12 amps

### INPUT SIGNAL

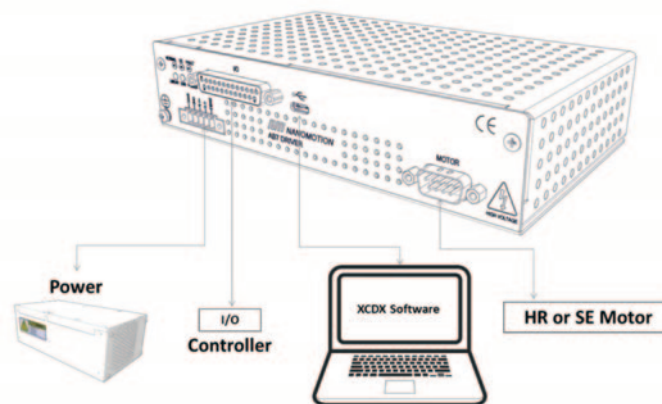
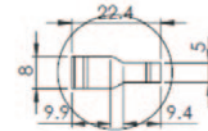
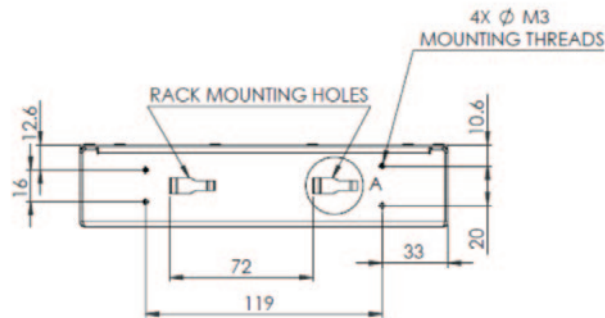
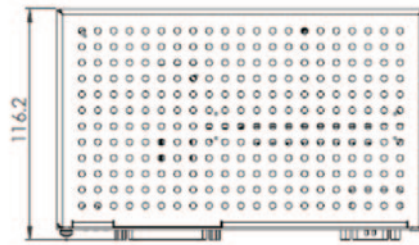
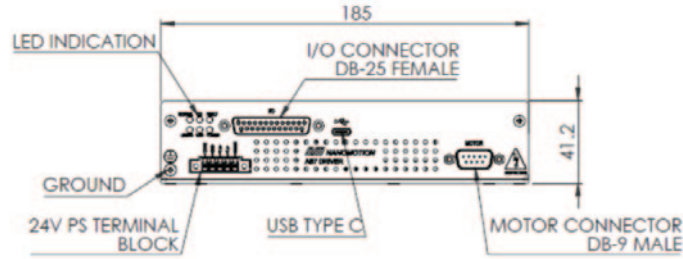
±10V  
14 bit Command Resolution

### OPERATING TEMPERATURE

0°C to 50°C

## MECHANICAL DRAWINGS AND INTERFACE

All Dimensions are Shown in Metric



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