

# I-Force Ironless

ML18 Linear Motor



Introducing:

## The Newest (and Smallest) Member to the I-Force Ironless Linear Motor Family

The ML18 is the newest addition to Parker's family of Ironless Linear Motors. At a height of 35 mm and width of 18 mm, the ML18 offers a more compact solution for your application needs. Three coil lengths are available providing a peak force up to 50.1 N, and are optimized to run on 24 to 80 volts DC.



The ML18 incorporates the I-Force I-beam shape with overlapping windings allowing for high power density, improved heat removal, and added structural stiffness.

In addition, the ironless linear motor design has no attractive forces allowing for zero cogging, rapid accelerations, and easy installation.

## Ironless Advantages

- No attractive force between forcer and magnets make it safe and easy to install
- Ironless forcer produces zero cogging for smooth operation
- Ironless forcer means light weight and high rates of acceleration
- Air gap between forcer and magnets is forgiving allowing for easy installation

Parker 核心代理商

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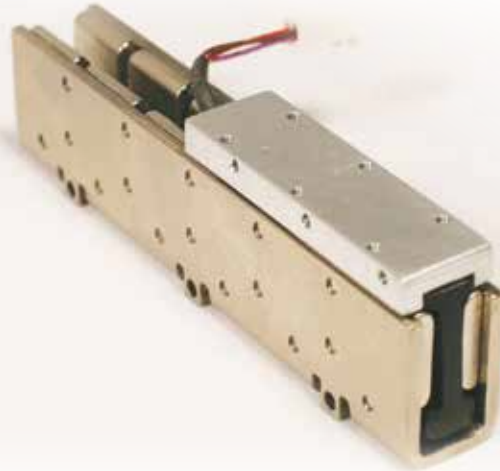


ENGINEERING YOUR SUCCESS.

# ML18 I-Force Linear Motors

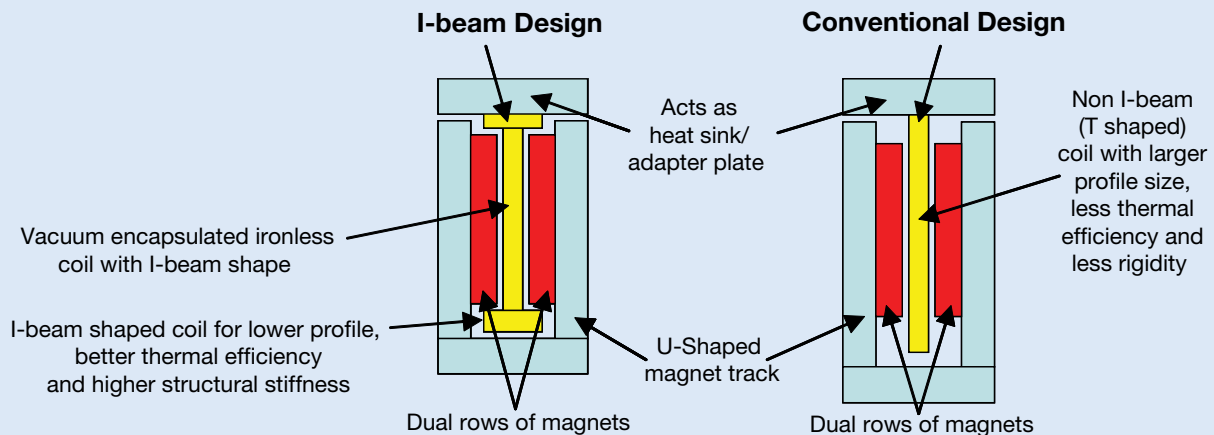
## ML18 Features

- Smallest ironless motor available— saves valuable space
- Extremely efficient overlapping winding design for maximum force density
- Optimized for operation between 24 to 80 VDC
- Internal hall effects and thermal protection decreases carriage length
- Low profile, compact design — cross-section just 35 mm x 18 mm
- Peak forces to 50 N
- Single-piece, ultra-compact folded magnet track eliminates all unnecessary material
- Highly efficient mounting tabs for hassle-free mounting
- Two lengths of modular track provide unlimited travel, maximum flexibility
- CE and RoHS Compliance



## ML18 I-Beam Design Advantage

Parker's I-beam shape provides very high forces in a compact package. In addition, the design is more thermally efficient than tradition ironless motor designs.



## Performance

|                                       | Units | ML18 Models Sizes |        |        |
|---------------------------------------|-------|-------------------|--------|--------|
|                                       |       | ML18-2            | ML18-3 | ML18-5 |
| <b>Peak Force</b> <sup>1)</sup>       | N     | 20.3              | 33.2   | 50.1   |
| <b>Continuous Force</b> <sup>2)</sup> | N     | 6.8               | 11.1   | 16.7   |
| <b>Peak Power</b>                     | W     | 400               | 660    | 1000   |
| <b>Continuous Power</b>               | W     | 20                | 33     | 50     |

## Electrical Performance

| Model   | Units         | ML18-2 | ML18-3 | ML18-5 |
|---|---------------|--------|--------|--------|
| <b>Number of Poles</b>                                |               | 2      | 3      | 5      |
| <b>Peak Current</b> <sup>3) 4) 5)</sup>               | Amps          | 4.7    | 5.0    | 9.3    |
| <b>Continuous Current</b> <sup>2)</sup>               | Amps RMS      | 1.11   | 1.17   | 2.18   |
| <b>Force Constant (Peak)</b> <sup>4)</sup>            | N/Amps        | 4.33   | 6.67   | 5.41   |
| <b>Back EMF</b> <sup>6) 7)</sup>                      | V/m/s         | 5      | 7.7    | 6.3    |
| <b>Resistance @25C (Phase to Phase)</b> <sup>6)</sup> | Ohms          | 4.4    | 6.3    | 2.82   |
| <b>Inductance (Phase to Phase)</b> <sup>3)</sup>      | mH            | 0.75   | 1      | 0.38   |
| <b>Electrical Time Constant</b>                       | milliseconds  | 0.17   | 0.16   | 0.13   |
| <b>Motor Constant</b>                                 | N/sqrt (watt) | 2.38   | 3.07   | 3.72   |
| <b>Maximum Bus Voltage</b>                            | VDC           | 80     | 80     | 80     |

## Thermal\*

| Model                              | Units | ML18-2 | ML18-3 | ML18-5 |
|------------------------------------|-------|--------|--------|--------|
| <b>Thermal Resistance Wind-Amb</b> | °C/W  | 8.9    | 5.53   | 3.57   |
| <b>Thermal Time Constant (Min)</b> |       | 8      | 15     | 10     |
| <b>Maximum Winding Temperature</b> | °C    | 125    | 125    | 125    |

\* Use Parker's MotionSizer software for the most accurate estimate of coil temperature for a particular motion profile.

## Mechanical

| Model  | Units   | ML18-2      | ML18-3      | ML18-5     |
|--|---------|-------------|-------------|------------|
| <b>Coil Weight</b>                           | kg (lb) | 0.04 (0.09) | 0.07 (0.15) | 0.1 (0.22) |
| <b>Coil Length</b>                           | mm (in) | 63 (2.48)   | 83 (3.27)   | 123 (4.84) |
| <b>Attractive Force</b> <sup>8)</sup>        | N (lbf) | 0           | 0           | 0          |
| <b>Electrical Cycle Length</b> <sup>9)</sup> | mm (in) | 40 (1.57)   | 40 (1.57)   | 40 (1.57)  |

<sup>1)</sup> Initial winding temperature must be 60°C or less before Peak Current is applied

<sup>2)</sup> @ 25°C ambient, 125°C winding temperature

<sup>3)</sup> ±30%, Line-to-Line, inductance bridge measurement @1 KHz

<sup>4)</sup> Total motor torque per peak of the sinusoidal amps measured in any phase, ±10%

<sup>5)</sup> The distance from the leading edge of a north pole to the leading edge of the next north pole

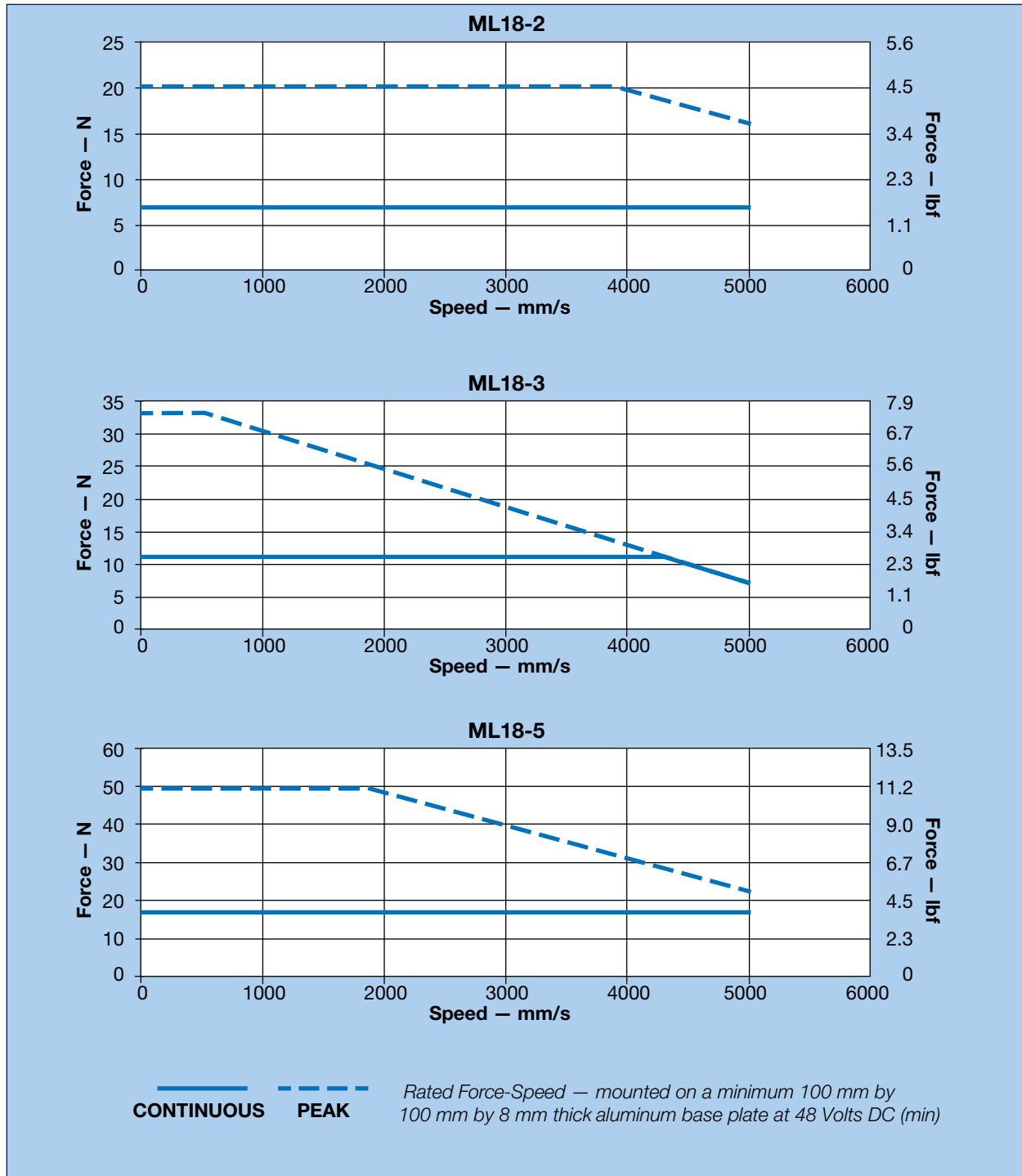
<sup>6)</sup> Measured Line-to-Line, ±10%

<sup>7)</sup> Value is measured peak of sine wave

<sup>8)</sup> Measured with a 0.76 mm gap

# ML18 I-Force Linear Motors

## Speed-Force Performance

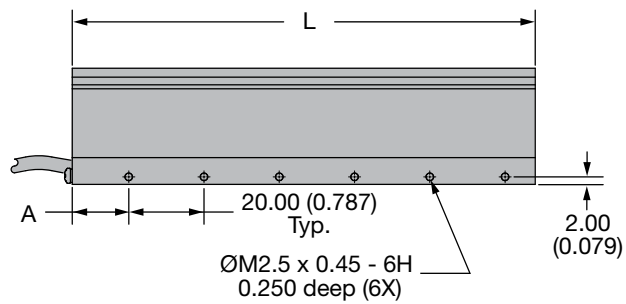
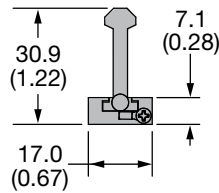


# Motor Phase and Hall Leads

| Wire Color   | Function Name |
|--------------|---------------|
| Red          | U Phase       |
| Brown        | V Phase       |
| Orange       | W Phase       |
| Green/Yellow | PE Ground     |
| Black        | Hall +5 V     |
| White        | Hall Gnd      |
| Yellow       | Hall 1 signal |
| Blue         | Hall 2 Signal |
| Green        | Hall 3 Signal |

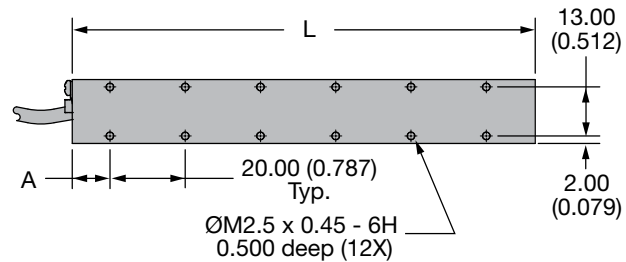
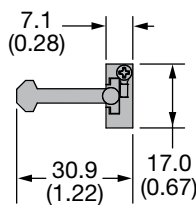
## Coil Dimensions — mm (in)

### Side Mounting



| Coil Size | Dimensions mm (in) |              |            |
|-----------|--------------------|--------------|------------|
|           | L                  | A            | # of Holes |
| 18-2      | 63 (2.48)          | 11.5 (0.453) | 3          |
| 18-3      | 83 (3.27)          | 10.0 (0.394) | 4          |
| 18-5      | 123 (4.84)         | 10.0 (0.394) | 6          |

### Top Mounting

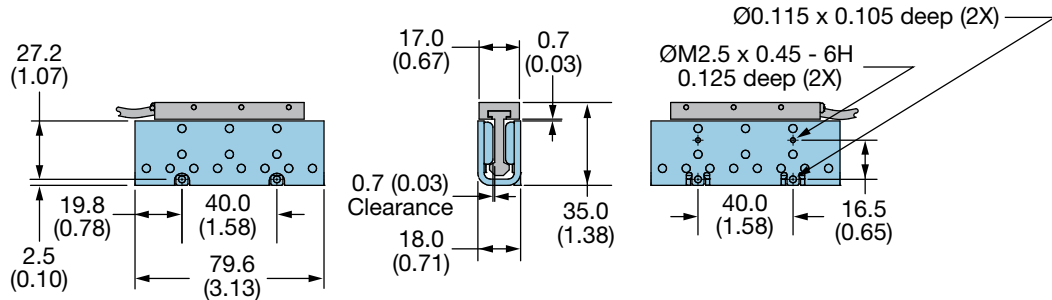


| Coil Size | Dimensions mm (in) |              |                 |
|-----------|--------------------|--------------|-----------------|
|           | L                  | A            | # of Hole Pairs |
| 18-2      | 63 (2.48)          | 16.5 (0.650) | 3               |
| 18-3      | 83 (3.27)          | 15.0 (0.591) | 4               |
| 18-5      | 123 (4.84)         | 15.0 (0.591) | 6               |

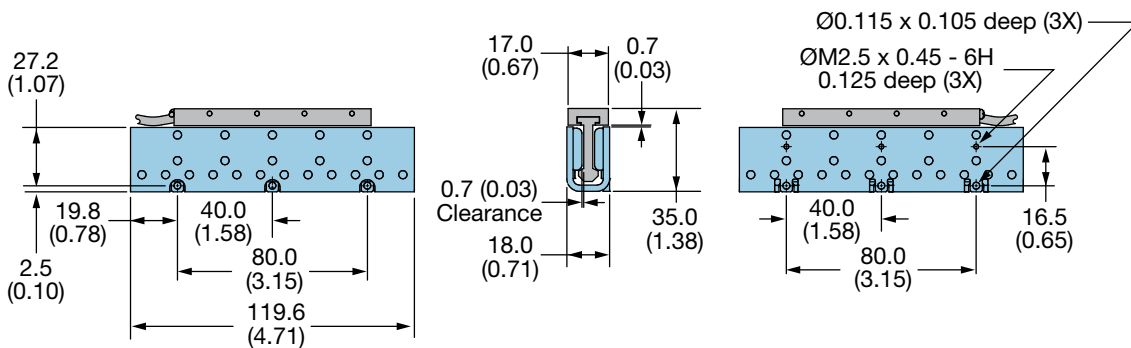
# ML18 I-Force Linear Motors

Magnet Track with Coil Dimensions — mm (in)

## ML18080



## ML18120



## ML18 Ordering Information

Select options from each numbered field to create a complete model order code including motor coil and magnet track.

### Motor Coil

①      ②      ③      ④      ⑤      ⑥      ⑦

Order Example: **ML18 - 1 E - NC - N1 S - 3**

- ① **Series**  
**ML18** Mini Linear Motor
- ② **Coil Size**  
**2** 2 Pole  
**3** 3 Pole  
**5** 5 Pole
- ③ **Mounting**  
**E** Standard
- ④ **Cooling**  
**NC** No Cooling

- ⑤ **Module Ready**  
**N1** No Module, Internal Halls
- ⑥ **Winding**  
**S** Series  
**P** Parallel
- ⑦ **Cable**  
**1** 1 Meter  
**3** 3 Meter

### Magnet Track

①      ②      ③      ④

Order Example: **ML18 - 120 M - N**

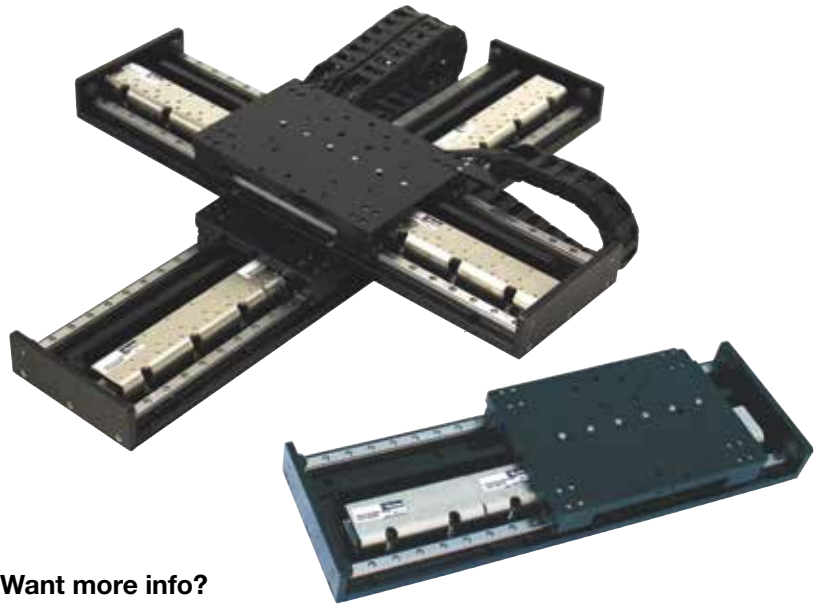
- ① **Series**  
**ML18** Mini Linear Motor
- ② **Track Length**  
**080** 80 mm  
**120** 120 mm
- ③ **Modular**  
**M** Standard
- ④ **Magnet Coating**  
**N** Nickel Coating

# Looking for a Super Small Submicron Linear Positioner?

**The new Parker mSR100 Series Positioners are driven by ML18 Linear Motors**

The new Parker mSR100 miniature positioner incorporates ML18 linear motors into single and multi-axis systems that provide the ideal solution for instrument builders and other applications requiring extremely smooth, submicron positioning capabilities, in a compact package.

The mSR100 has a 100 mm wide profile and is available with stroke lengths from 25 to 500 mm. Maximum load capability is 12 kg (26.5 lb). The mSR100 offers selectable levels of linear encoder technology configured to the application need, including a BiSS-C absolute encoder for installations requiring continuous positional information.



## Want more info?

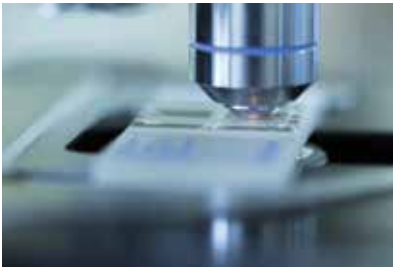
For complete mSR100 features, benefits and specifications, go to: [parkermotion.com/msr](http://parkermotion.com/msr)

## Electronics Manufacturing



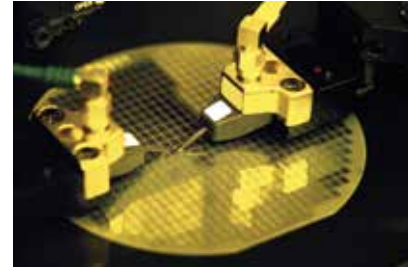
The mSR is an ideal positioning system for high throughput electronics manufacturing equipment, as its design combines high performance linear motor technology with a variety of high resolution feedback devices for quick, precise placement of miniature components. The mSR also provides an extremely robust solution for electronics inspection systems, as its direct drive linear motor technology has been designed to stand the test of time.

## Life Sciences - Digital Pathology



Miniature packaging, high precision performance, and quick settling times make the mSR an optimum solution for imaging instruments used in digital pathology. With limited wear components the mSR is a durable stage that will minimize the risk of machine downtime.

## Semiconductor Handling and Meteorology



Given the combination of its superior geometric performance and miniature packaging, the mSR series positioner is ideal for semiconductor handling and metrology applications. Regardless of whether you are examining features on the micro or nano-scale – the mSR can be adapted to meet the need with its wide array of encoder options. The mSR also offers a stroke scalable mechanical solution with standard designs up to 500 mm.



ML18 Series:  
Made in the USA

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