

# High-Performance Mid-Range Travel Linear Motor Stages

## ILS-LM SERIES



The ILS-LM series linear motor stages are designed for self-supporting applications with travel ranges from 100 mm to 300 mm. The stages feature a robust design with high performance but with low cost, making them cost-effective solutions for precision industrial applications such as semiconductor wafer inspection, micro-electronics test and assembly, pick and place, DNA sequencing, or laser machining.

Based on industry proven technology of the ILS, the ILS-LM series utilizes an FEM-optimized extruded aluminum body that is extremely stiff, while minimizing the bending effect caused by the different thermal expansion coefficients of the aluminum body and the steel rails. The rails' position relative to the profile's neutral fiber minimize the effect due to bi-metal thermal expansion. The body's rigidity minimizes the deflection under load.

Unlike screw driven stages, the ILS-LM employs a centered, high efficiency 3-phase, synchronous ironless, linear motor as the driving element. This drive system is absolutely noise-free and has the advantage of higher speed, high acceleration and high system responsiveness without wear associated with motor brushes or drive screws. And because of the fully integrated linear motor, the ILS-LM is more than 150 mm shorter than a comparable screw driven stage. Thus, the ILS-LM is the optimum solution for space constrained applications that require high-throughput, high reliability, and ultra-quiet operation.

Recirculating ball bearing slides provide excellent payload capabilities and long life. The movement is smooth with low noise.



- High speed, high acceleration, and high responsiveness with minimum wear
- 150 mm shorter than screw driven stage, making it more compact and space efficient
- Efficient and reliable linear motor provides high torque and smooth motion
- FEM-optimized aluminum body results in high stiffness and minimizes thermal expansion and bi-metal bending effects
- Non-contact linear encoder provides 10 nm MIM

## DESIGN DETAILS

Base Material	Extruded Aluminum
Bearings	Recirculating bearings
Drive System	3-phase synchronous ironless linear motor (without Hall effect sensors)
Motor Initialization	Has to be done by the controller. The XPS controller uses an initialization routine to limit the stochastic motions of stages.
Motor Commutation	Done by the controller on encoder feedback
Feedback	Linear steel scale, 20 $\mu$ m signal period, 1 VPP
Limit	Switches Optical
Home Switch	Optical, on encoder's fiducial track, located at center of travel
Controller Compatibility	ESP
Cable	5 m long cables included
MTBF	20,000 hours

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Precision position feedback is supplied by a very repeatable linear scale mounted in the stage. The encoder signals are interpolated by Newport's XPS motion controller with nanometer resolution for outstanding position sensitivity, repeatability, and stability. A home position is incorporated on the same scale, avoiding the use of additional electronics or mechanics for improved reliability and accuracy .

## SPECIFICATIONS

Travel Range (mm)	100, 200 and 300	
Minimum Incremental Motion ( $\mu\text{m}$ )	0.01	
Uni-directional Repeatability, Typical (Guaranteed) <sup>(1)</sup> ( $\mu\text{m}$ )	0.4	
Bi-directional Repeatability, Typical (Guaranteed) <sup>(1)</sup> ( $\mu\text{m}$ )	$\pm 0.12$ ( $\pm 0.30$ )	
Accuracy, Typical (Guaranteed) <sup>(1)(2)</sup> ( $\mu\text{m}$ )	ILS100:	$\pm 0.5$ ( $\pm 1.5$ )
	ILS200:	$\pm 1.0$ ( $\pm 2.0$ )
	ILS300:	$\pm 1.2$ ( $\pm 2.5$ )
Maximum Speed (mm/s) [See chapters 3.3 to 3.6]	500 <sup>(3)</sup>	
Maximum Acceleration, No Load ( $\text{m/s}^2$ ) [See chapters 3.3 to 3.6]	20	
Max. Force (Cont.) (N)	15	
Max Force (Peak) 4 s (N)	30	
Pitch, Typical (Guaranteed) <sup>(1)(2)(4)</sup> ( $\mu\text{rad}$ )	ILS100:	$\pm 20$ ( $\pm 100$ )
	ILS200:	$\pm 40$ ( $\pm 135$ )
	ILS300:	$\pm 40$ ( $\pm 150$ )
Yaw, Typical (Guaranteed) <sup>(1)(2)(4)</sup> ( $\mu\text{rad}$ )	ILS100:	$\pm 15$ ( $\pm 110$ )
	ILS200:	$\pm 25$ ( $\pm 125$ )
	ILS300:	$\pm 25$ ( $\pm 75$ )
Load Capacity (N)	250	

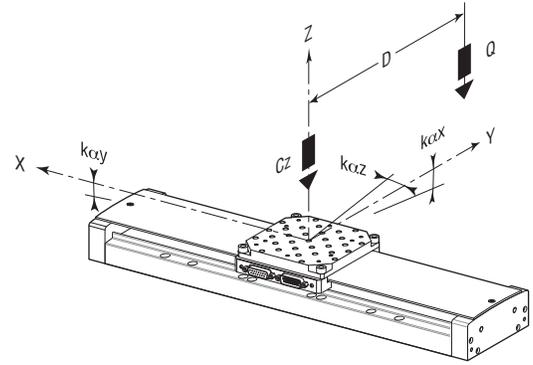
<sup>1)</sup> Shown are peak to peak, guaranteed specifications or  $\pm$ half the value as sometimes shown. For the definition of typical specifications which are about 2X better than the guaranteed values, visit [www.newport.com](http://www.newport.com) for the Motion Control Metrology Primer.

<sup>2)</sup> For a travel of 300 mm.

<sup>3)</sup> With a 44 V driver (such as the XPS-DRV02 board of the XPS controller).

<sup>4)</sup> To obtain arcsec units, divide  $\mu\text{rad}$  value by 4.8.

## LOAD CHARACTERISTICS AND STIFFNESS

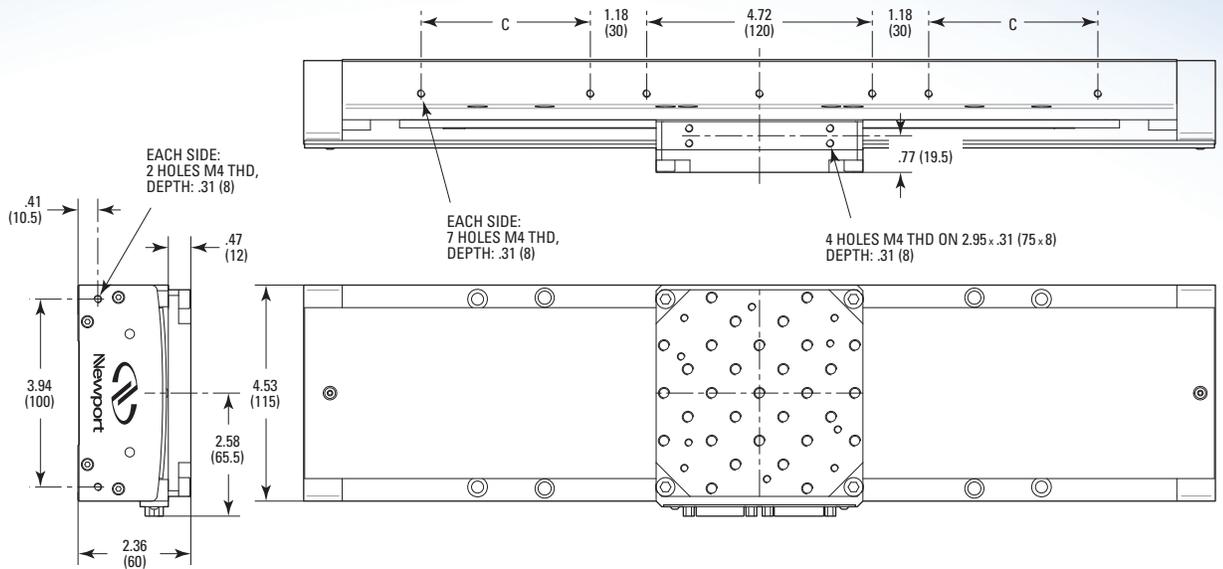


$C_z$ , Normal centered load capacity	250 N
$k_{\alpha x}$ , Compliance in roll	15 $\mu\text{rad}/\text{Nm}$
$k_{\alpha y}$ , Compliance in pitch	10 $\mu\text{rad}/\text{Nm}$
$k_{\alpha z}$ , Compliance in yaw	10 $\mu\text{rad}/\text{Nm}$
Q, Off-center load (N)	$Q \leq C_z \div (1 + D/60)$
Where D = Cantilever distance (mm)	

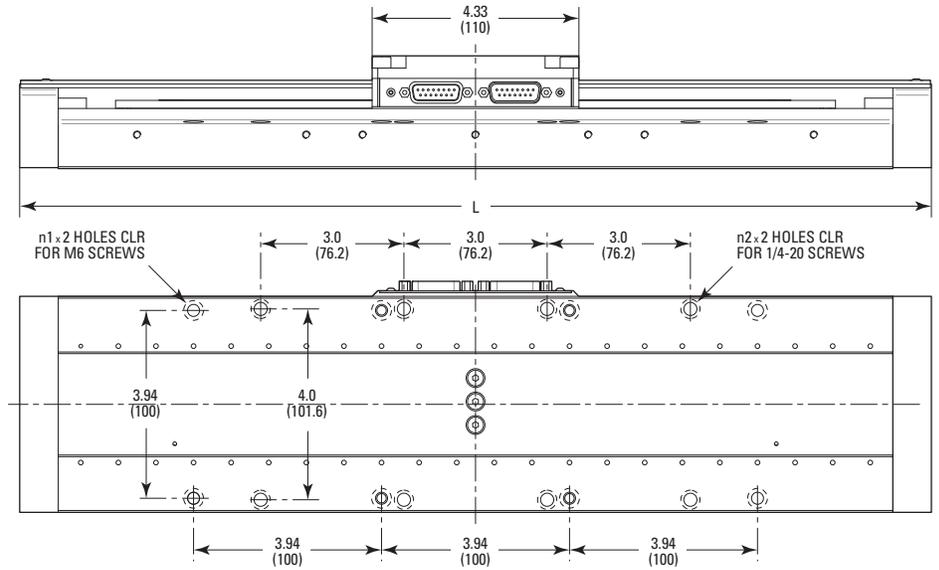
## RECOMMENDED CONTROLLER/DRIVERS

<b>XPS-Q2</b>	2-axis Universal Controller/Driver, ethernet
<b>XPS-DRV02</b>	PWM drive module for brushless motors, 5 A/44 Vpp max.
<b>XPS-RL2</b>	2-axis Universal Controller/Driver, ethernet, Basic GPIO and PCO

## DIMENSIONS



**MODEL SHOWN: ILS300LM**  
DIMENSIONS IN INCHES (AND MILLIMETERS)

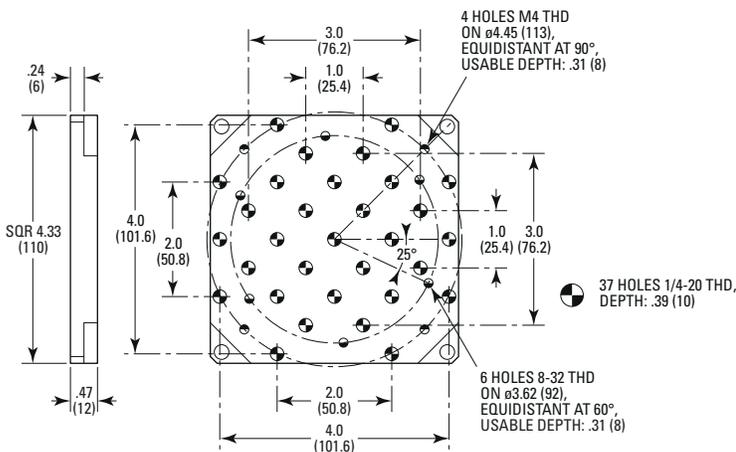


### (M-)ILS-LM Stages

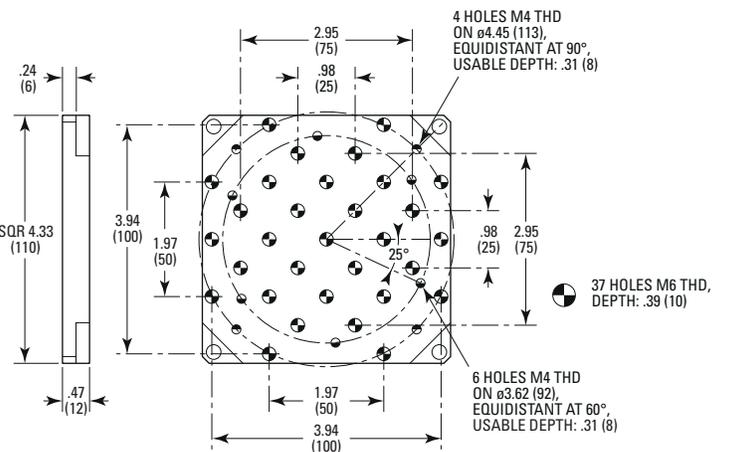
MODEL (METRIC)	n1	n2	C	TRAVEL	L
(M-)ILS100LM	2	2	1.08 (27.5)	3.94 (100)	11.22 (285)
(M-)ILS200LM	4	4	2.76 (70)	7.87 (200)	15.16 (385)
(M-)ILS300LM	4	4	3.54 (90)	11.8 (300)	19.09 (485)

### Top Plate Interfaces

**MODEL SHOWN: ILS & ILS-LM INTERFACE**  
DIMENSIONS IN INCHES (AND MILLIMETERS)



**MODEL SHOWN: M-ILS & M-ILS-LM INTERFACE**  
DIMENSIONS IN INCHES (AND MILLIMETERS)



## ORDERING INFORMATION

Model	Description
ILS100-LM	High performance linear stage, 100 mm travel, linear motor
M-ILS100-LM	High performance linear stage, 100 mm travel, linear motor, metric version
ILS200-LM	High performance linear stage, 200 mm travel, linear motor
M-ILS200-LM	High performance linear stage, 200 mm travel, linear motor, metric version
ILS300-LM	High performance linear stage, 300 mm travel, linear motor
M-ILS300-LM	High performance linear stage, 300 mm travel, linear motor, metric version



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