

# ILS Series High-Performance Mid-Range Travel Linear Stages



- Stiff, FEM optimized extruded aluminum body avoids thermal bending effects
- Preloaded, backlash-free ballscrew drive allows rapid movements with short step and settling time
- Precision recirculating ball bearing slides provide accurate linear motion without ball cage migration
- Rigid cover with flexible side bands protect the internal drive mechanism

The ILS Series linear stage offers 50–250 mm travel range and combines fast, sub-micron resolution motion with highly stiff and robust package designs. Its extruded aluminum body has been optimized to avoid bending effects caused by the different thermal expansion coefficients of the aluminum body and steel rails. The special U-profile also provides stiffness to the structure while keeping the mass low.

A preloaded, backlash-free ballscrew provides rapid movements with fast step and settling times. The screw is accurately profiled to reduce heating factors to a minimum and extend the lifetime of the stage. Recirculating ball bearings slides ensure accurate linear motion and avoid ball cage migration found on linear ball bearings or crossed roller bearings.

Position measurements are read on a 4000 pts/rev. encoder located directly on the screw to avoid additional screw/motor coupling errors. For more demanding precision positioning requirements, the CCHA versions feature an integrated linear scale providing 0.1 μm resolution feedback. An added tachometer provides superior speed stability for slow speed scanning applications and also prevents spontaneous sub-micron position changes which may be caused by glitches from the commutating brushes of the DC motor.

An upper rigid cover with flexible side straps prevents damage to the drive train and protects from dust, debris and other pollutants. ILS Series stages also feature a center mounted origin for repeatable initialization, limit switches to prevent over travel, and elastomeric end-of-run dampers for smooth emergency braking.

## Design Details

Base Material	Extruded Aluminum
Bearings	Recirculating ball bearings
Drive Mechanism	Backlash-free ball screw
Drive Screw Pitch (mm)	2
Feedback	CC, PP: Screw mounted rotary encoder, 4,000 pts/rev, index pulse CCHA: Linear steel scale, 20 μm signal period, 0.1 μm resolution
Limit Switches	Optical
Origin	Optical, at center of travel
Motor	CC, CCL: DC servo motor UE404S2 CCHA: DC servo motor with tachometer UE404S2-T PP: 2-phase stepper motor UE41UP, 1 Full step = 20 Encoder pulses
Cable	3 m long cable included
Protection	Rigid cover and flexible side bands
MTBF (h)	20,000
Weight	see page 854

### Motion Controller Options

For optimum performance and seamless compatibility, we recommend using one of the following Motion Controllers/Drivers:

Model	
XPS (page 1009)	
ESP300 (page 1018)	
SMC100CC (page 1020)	CCL

### Accessories



An EQ120 Series Bracket (see page 964) can mount another ILS or RV (see page 972) stage in a vertical configuration.



Two IMS stages (see page 942), one ILS stage, and one EQ120 (see page 964) in an XYZ configuration.



An RV80 (see page 972) mounted in a vertical configuration with an EQ120 (see page 964) to an ILS stage.

TECHNICAL REFERENCE

MANUAL LINEAR STAGES

MANUAL ROTATION STAGES

MANUAL ACTUATORS

MOTORIZED LINEAR STAGES

MOTORIZED ROTATION STAGES

MOTORIZED ACTUATORS

CONTROLLERS AND AMPLIFIERS

SYSTEMS

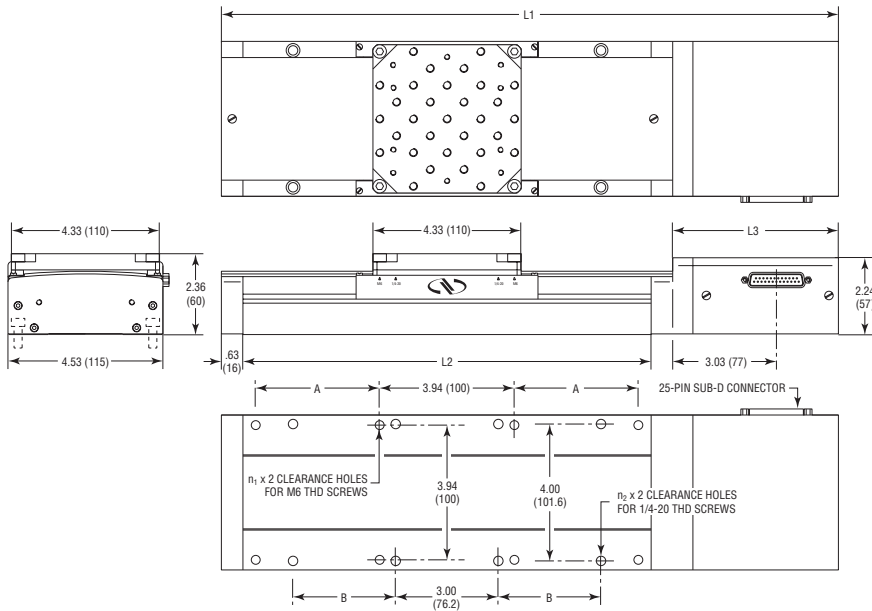
# Specifications

	ILS (M-ILS)					
	PP		CC,CCL <sup>(2)</sup>		CCHA	
	Typical	Guaranteed	Typical	Guaranteed	Typical	Guaranteed
Travel Range (mm)	50, 100, 150, 200, 250					
Resolution (µm)	0.5					
Uni-directional Repeatability (µm)	0.7	1.5	0.7	1.5	0.2	0.4
Reversal Value (Hysteresis) (µm)	0.4	1	0.4	1	0.1	0.3
On Axis Accuracy <sup>(1)</sup> (µm)	2.5	5	2.5	5	2	4
Maximum Speed (mm/s)	50		100 <sup>(3)</sup>		100	
Yaw <sup>(1)</sup> (µrad)	65	100	65	100	65	100
Pitch <sup>(1)</sup> (µrad)	50	100	50	100	50	100

- 1) For 100 mm travel
- 2) Select ILSCL only for use with the SMC100CC controller.
- 3) 50mm/s with ILSCL

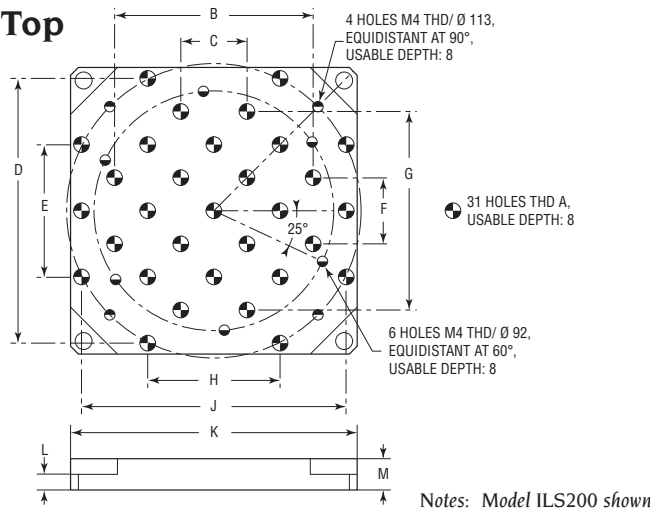
See the Metrology Tutorial section (see page 845) for more information on typical and guaranteed specifications

# Dimensions



# (M-)ILS Stages Top

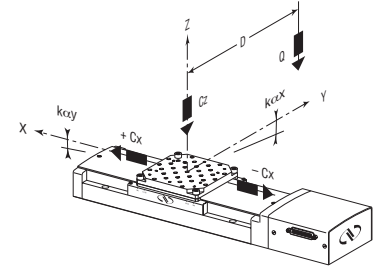
# Plate Interface



Thread	Dimension [in. (mm)]												
	Model (Metric)	A	B	C	D	E	F	G	H	J	K	L	M
ILS (M-ILS)	1/4-20 (M6)	3.00 (75)	1.00 (25)	4.00 (100)	2.00 (50)	1.00 (25)	3.00 (75)	2.00 (50)	4.00 (100)	4.33 (110)	0.24 (6)	0.47 (12)	

# Load Characteristics

Cz	250 N
-Cx, +Cx	<40 N
kαx	15 µrad/N.m
kαy	10 µrad/N.m
kαz	10 µrad/N.m



Q	Off-center load, $Q \leq Cz / (1 + D/60)$
D	Cantilever distance in mm
Cz	Normal center load capacity on bearings
+Cx	Direct load capacity on X axis
-Cx	Inverse load capacity on X axis
kαx	Angular stiffness (Roll)
kαy	Angular stiffness (Pitch)
kαz	Angular stiffness (Yaw)

Model (Metric)	Dimension (mm)			
	A	n <sub>1</sub>	B	n <sub>2</sub>
ILS50 (M-ILS50)		2		2
ILS100 (M-ILS100)		2		2
ILS150 (M-ILS150)		2	3 in.	4
ILS200 (M-ILS200)	100	4	3 in.	4
ILS250 (M-ILS250)	100	4	3 in.	4

Model (Metric)	Travel	Dimension [in. (mm)] for CC and PP		
		L1	L2	L3
ILS50 (M-ILS50)	50 mm	14 (358)	8 (203)	4.8 (123)
ILS100 (M-ILS100)	100 mm	16 (408)	10 (253)	4.8 (123)
ILS150 (M-ILS150)	150 mm	18 (458)	12 (303)	4.8 (123)
ILS200 (M-ILS200)	200 mm	20 (508)	14 (353)	4.8 (123)
ILS250 (M-ILS250)	250 mm	22 (558)	16 (403)	4.8 (123)

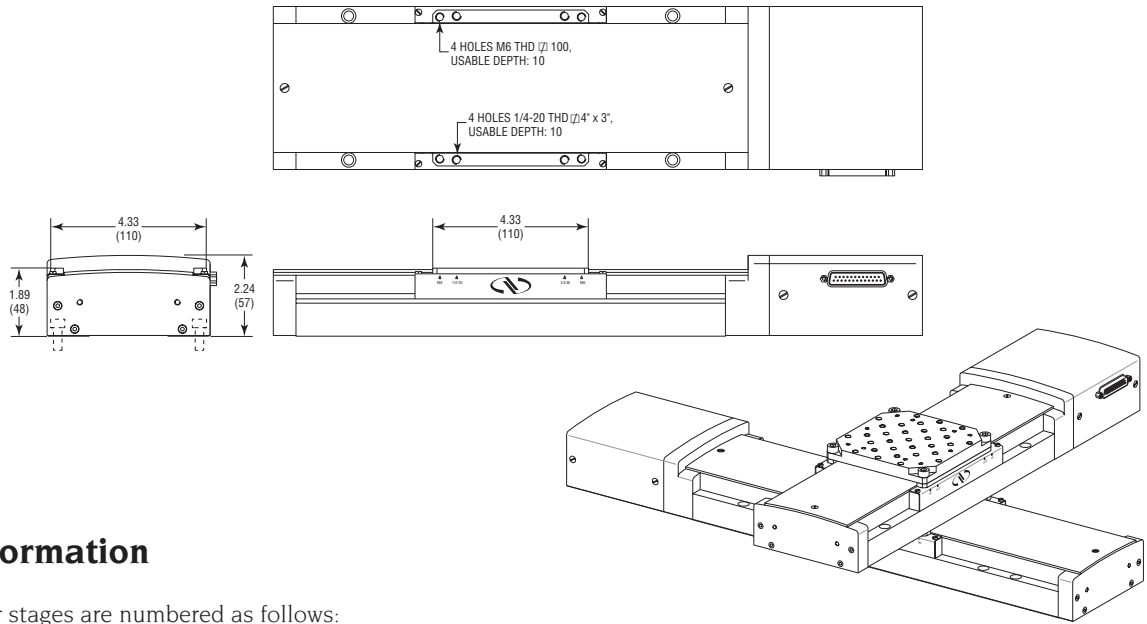
Model (Metric)	Travel	Dimension [in. (mm)] for CCHA		
		L1	L2	L3
ILS50 (M-ILS50)	50 mm	15.5 (394)	8 (203)	6.3 (159)
ILS100 (M-ILS100)	100 mm	17.5 (444)	10 (253)	6.3 (159)
ILS150 (M-ILS150)	150 mm	19.4 (494)	12 (303)	6.3 (159)
ILS200 (M-ILS200)	200 mm	21.4 (544)	14 (353)	6.3 (159)
ILS250 (M-ILS250)	250 mm	23.4 (594)	16 (403)	6.3 (159)

### ILS (M-ILS) Stages Top Plate Interface

ILS (M-ILS) interfaces with	Mounting holes on stage	Interface & Screws
M-MFA	4 holes Ø 7.5 on 75.8 x 25.4	Base Plate— 1/4-20 x 12 (M6 x 12)
UZM80 (M-UZM80)	4 holes Ø 7.5 on 101 x 50.4	Base Plate— 1/4-20 x 12 (M6 x 12)
BGM80 (M-BGM80)	4 holes Ø 7.5 on 101 x 50.4	Base Plate— 1/4-20 x 12 (M6 x 12)
BGM50 (M-BGM50)	4 holes Ø 7.5 on 75.8 x 25.4	Base Plate— 1/4-20 x 12 (M6 x 12)
URM80 (M-URM80)	4 holes Ø 7.5 on 101 x 50.4	Base Plate—UNC 1/4-20 x 12 (M6 x 12)
URM100 (M-URM100)	4 holes M4 at 90° on Ø 113	Without Base Plate—M-BR41 bridles
RV80	6 holes Ø 4.5 at 60° on Ø 92	UNC 8-32 x 16 (M4 x 16)

### Assembly Pattern

To make an XY assembly it is necessary to remove the top plate. Unscrew the 4 ChC M6 x 12 / 100 screws at the 4 corners of the plate with the wrench supplied with the stage. Both ILS and M-ILS stages will then have the same following interfaces:



### Ordering Information

The ILS Series linear stages are numbered as follows:

Model	Series	Travel (mm)	Drive
M-	ILS	50	PP CC CCHA CCL
		100	
		150	
		200	
		250	

**Example**  
**M-ILS200CC** is an ILS linear stage, metric version, with 200 mm travel range and DC motor drive (0.5 µm resolution).

M-: Metric version    PP: Micro-step    CC: DC & rotary encoder    CCHA: DC & linear scale

Model (Metric)	Metric Model	Description
ILS100CC (M-ILS100CC)	M-ILS100CC	Translation stage with DC drive
ILS100CCHA (M-ILS100CCHA)	M-ILS100CCHA	
ILS100PP (M-ILS100PP)	M-ILS100PP	Translation stage with micro-step drive
ILS150CC (M-ILS150CC)	M-ILS150CC	Translation stage with DC drive
ILS150CCHA (M-ILS150CCHA)	M-ILS150CCHA	
ILS150PP (M-ILS150PP)	M-ILS150PP	Translation stage with micro-step drive
ILS200CC (M-ILS200CC)	M-ILS200CC	Translation stage with DC drive
ILS200CCHA (M-ILS200CCHA)	M-ILS200CCHA	
ILS200PP (M-ILS200PP)	M-ILS200PP	Translation stage with micro-step drive
ILS250CC (M-ILS250CC)	M-ILS250CC	Translation stage with DC drive
ILS250PP (M-ILS250PP)	M-ILS250PP	Translation stage with micro-step drive
ILS50CC (M-ILS50CC)	M-ILS50CC	Translation stage with DC drive
ILS50CCHA (M-ILS50CCHA)	M-ILS50CCHA	
ILS50PP (M-ILS50PP)	M-ILS50PP	Translation stage with micro-step drive

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