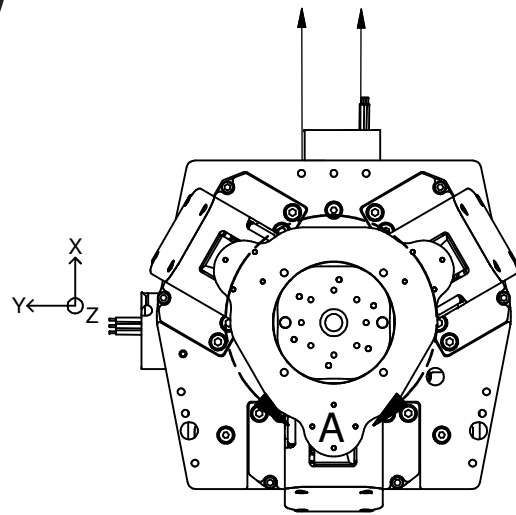


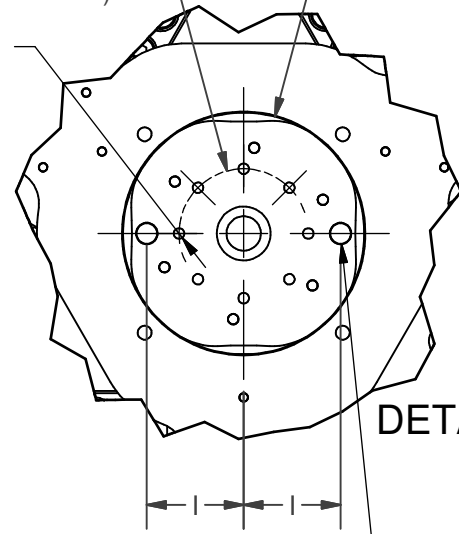


CABLE EXITS
(SPECIFIC DESIGNS VARY BY MODEL)



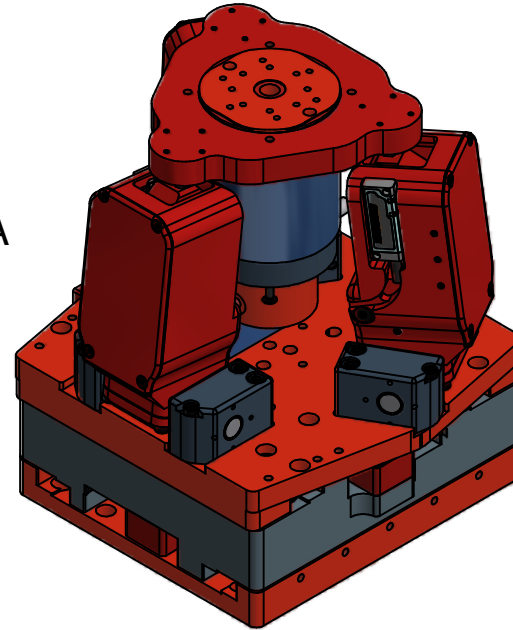
8X "L" (TAP)
(EQUALLY SPACED ON BOLT CIRCLE DIAMETER "H")

ØH (BOLT CIRCLE DIAMETER)
ØR DIAMETER (MOUNTING SURFACE)



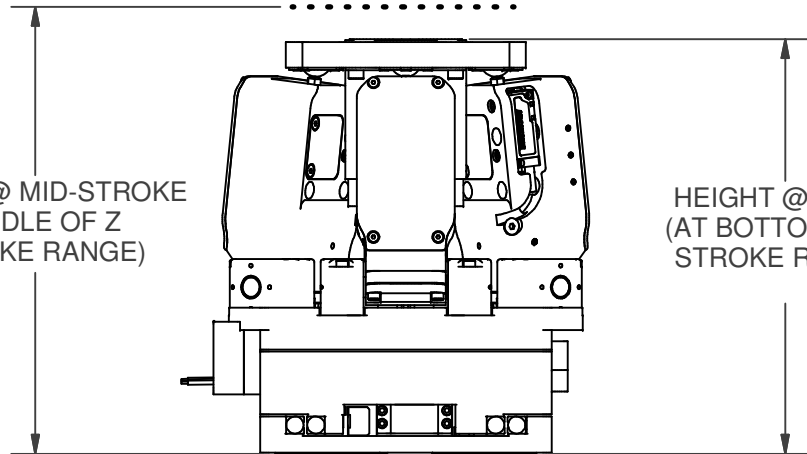
DETAIL A

2X Ø5.0 mm (H9) ∇ 4.5 mm
SLIP FIT FOR M5 DOWEL PIN

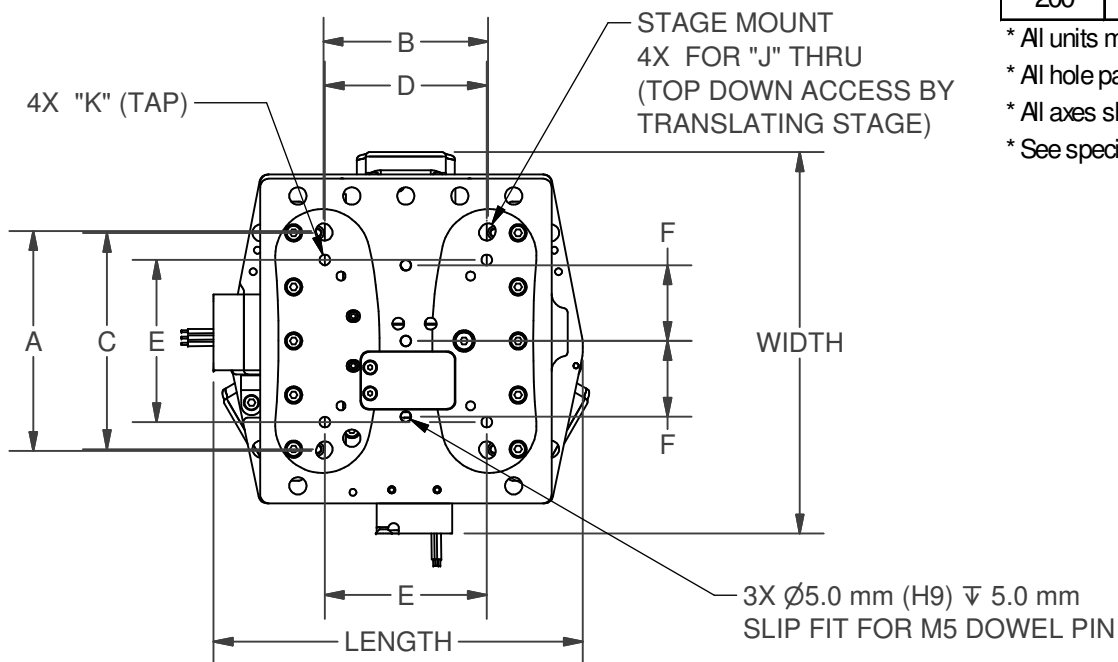


HEIGHT @ MID-STROKE
(MIDDLE OF Z STROKE RANGE)

HEIGHT @ HOME
(AT BOTTOM OF Z STROKE RANGE)



STAGE MOUNT
4X FOR "J" THRU
(TOP DOWN ACCESS BY TRANSLATING STAGE)



3X Ø5.0 mm (H9) ∇ 5.0 mm
SLIP FIT FOR M5 DOWEL PIN

NOTE: MODEL AI-HH-60XY-15Z-56RT SHOWN.

STANDARD FEATURES	
Stage	Mini Hybrid Hexapod
Travel	6 Degrees of Freedom (X, Y, Z, Pitch, Roll, and Yaw)
XY Travel	60 - 200 mm
Z Travel (Tripod)	15 mm
Angular Travel (Tripod)	+/- 10 degrees (Pitch and Roll), 360 degrees continuous (Yaw)
Motor (XY)	Frameless Torque Motor with Precision Ball Screw with Anti-Backlash Nut Optional: Ironless Core Linear Motor
Motor (Tripod)	Frameless Torque Motor with Precision Ball Screw with Anti-Backlash Nut
Motor (Rotary)	Direct Drive Frameless Torque Motor
Feedback (XY + Tripod)	Non-Contact Incremental Optical Linear Encoder (Gold Tape Scale)
Feedback (Rotary)	Non-Contact Incremental Optical Rotary Encoder (Stainless Steel Ring)
Backlash	0 nm or 0 arc-sec (No Backlash on Any Axis)
Resolution	1 Vp-p Sin-Cos Analog Output ~4.88 nm (Linear), < 0.04 arc-sec (Angular) with 4096 Interpolation
Sensors	Integrated Optical Latching Home Index and End of Travel Magnetic NPN Limits
Bearings	High Precision Crossed Roller Bearings (All Axes)
Rotary Brake Option	Optional: Pneumatic Release, Spring Engage Brake (B)
Cables	High Flex, 10M Cycle, 3m Length from Component (Standard) (some length consumed inside stage), -5mm OD, 20mm Dynamic Bend Radius (all Motors and Encoders)
Hard Stops	Integrated Hard Stops on XY and Tripod axes
Orientation	Any (XY Axes must be Horizontal for Linear Motor versions)
Structure	Black Anodized Aluminum 6061-T6
Maintenance	Stages are Greased for Life in Normal Environment; No Maintenance
Environment	Standard
Temperature	Operating: 0°C to 50°C (performance not guaranteed through entire range) Storage/Transport: -20°C to 70°C
Humidity	10% to 80% Non-Condensing
Precision	6-D Nano Precision™ Test Methods

XY TRAVEL	Z TRAVEL	PITCH & ROLL TRAVEL	R DIAMETER	XY MOTOR	LENGTH	WIDTH	HEIGHT @ HOME	HEIGHT @ MID-STROKE	A (inch)	B (inch)	C	D	E	F	H	I	J	K	L
60	15	+/- 10 degrees	56	BSD	171	177	191.7	199.2	4	3	100	75	75	35	30	22.5	M6 or 1/4-20	M6	M3
60	15	+/- 10 degrees	56	LM	165	164	215.2	222.7	5	4	125	75	100	35	30	22.5	M6 or 1/4-20	M6	M3
100	15	+/- 10 degrees	56	LM	296	244	215.2	222.7	6	6	175	125	120	70	30	22.5	M6 or 1/4-20	M5	M3
200	15	+/- 10 degrees	56	CM	336.5	275	195.2	202.7	6	6	175	125	170	70	30	22.5	M6 or 1/4-20	M6	M3

* All units millimeters unless otherwise noted.

* All hole patterns centered on M5 dowel pin at center of XY stage or centered on thru hole of top rotary stage.

* All axes shown at their mid-stroke or home position except tripod which is shown at its lowest position which coincides with Z axis home position.

* See specification sheet and contact ALIO technical sales for assistance in model selection.

ALIO INDUSTRIES PROPRIETARY DOCUMENT
5335 XENON ST, ARVADA, CO 80002 USA
(Tel) 303.339.7500 - WWW.ALIOINDUSTRIES.COM

DRAWN	QWOLF	2021-03-29
CHECKED		
Tolerances:	Surface Roughness:	
x.x ± 0.5 mm		
x.xx ± 0.13 mm		
x.xxx ± 0.05 mm		
ANGLES ± 0.5°		
MATERIAL		
FINISH	SEE NOTES	

TITLE		
AI-HH-(XY TRAVEL)XY- (Z TRAVEL)Z-(R DIAMETER)RT -(XY MOTOR)		
SIZE	DWG NO	REV
B	0010-08045	003
SCALE	0090-07999-016 ALIO STD TEMPLATE	SHEET 1 OF 3

4

3

2

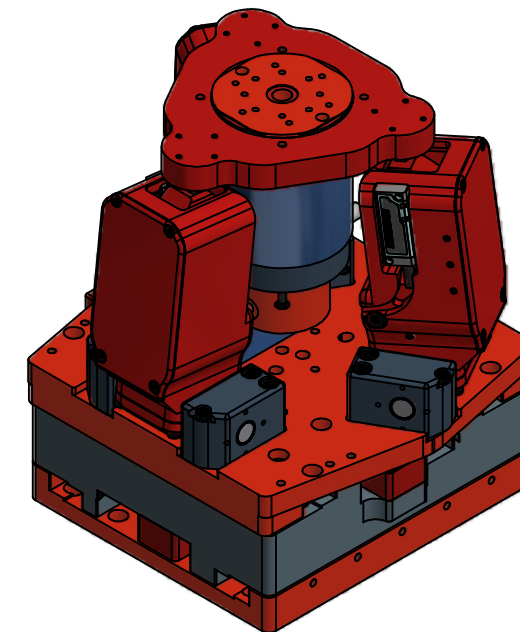
1

MODEL		UNITS	AI-HH-60XY-15Z-56RT- BSD	AI-HH-60XY-15Z-56RT- LM	AI-HH-100XY-15Z-56RT- LM	AI-HH-200XY-15Z-56RT- CM		
NOMINAL XY TRAVEL FROM HOME INDEX		mm	+/- 30	+/- 30	+/- 50	+/- 100		
MAGNETIC LIMIT LOCATIONS (+1/-3mm)		mm	+/- 10	+/- 30	+/- 51	+/- 100		
HARD STOP LOCATIONS (+/- 1mm)		mm	+/- 30.25	+/- 32	+/- 52.5	+/- 102		
NOMINAL Z TRAVEL FROM HOME INDEX		mm	+15/-0	+15/-0	+15/-0	+15/-0		
MAGNETIC LIMIT LOCATIONS (+1/-3mm)		mm	+14/+2	+14/+2	+14/+2	+14/+2		
HARD STOP LOCATIONS (+/- 1mm)		mm	+17/-1	+17/-1	+17/-1	+17/-1		
PITCH AND ROLL TRAVEL [10]		deg	+/- 10	+/- 10	+/- 10	+/- 10		
YAW TRAVEL		deg	360 deg continuous	360 deg continuous	360 deg continuous	360 deg continuous		
PERFORMANCE SPECIFICATIONS [1]			(STD) ULTRA NANO	(STD) ULTRA NANO	(STD) ULTRA NANO	(STD) ULTRA NANO		
BIDIRECTIONAL REPEATABILITY	XY	nanometers	+/- 100	+/- 70	+/- 100	+/- 70		
	Z	nanometers	+/- 100	+/- 70	+/- 100	+/- 70		
	PITCH AND ROLL	arc-sec	+/- 0.6	+/- 0.4	+/- 0.6	+/- 0.4		
	YAW	arc-sec	+/- 0.6	+/- 0.4	+/- 0.6	+/- 0.4		
BACKLASH	XY	nanometers	0 nm / arc-sec		0 nm / arc-sec			
	Z	nanometers	(no backlash on any axis)		(no backlash on any axis)			
	PITCH AND ROLL	arc-sec	0 nm / arc-sec		0 nm / arc-sec			
	YAW	arc-sec	(no backlash on any axis)		(no backlash on any axis)			
MINIMUM INCREMENTAL STEP SIZE	XY	nanometers	< 20		< 20			
	Z	nanometers	< 20		< 20			
	PITCH AND ROLL	arc-sec	< 0.1		< 0.1			
	YAW	arc-sec	< 0.1		< 0.1			
3D ACCURACY [11]	LINEAR ACCURACY	um	CONTACT ALIO TO DISCUSS 3D ACCURACY		CONTACT ALIO TO DISCUSS 3D ACCURACY			
	STRAIGHTNESS	um						
	FLATNESS [2]	um						
	PITCH	arc-sec						
	YAW	arc-sec						
YAW RUNOUT	AXIAL RUNOUT	um	15	12	10	15	12	10
	RADIAL RUNOUT	um	15	12	10	15	12	10
	WOBBLE	arc-sec	25	20	15	25	20	15
	ROLL	arc-sec	25	20	15	25	20	15
RESOLUTION	XY	nanometers	~ 5 nm		~ 5 nm			
	Z	nanometers	~ 5 nm		~ 5 nm			
	PITCH AND ROLL	arc-sec	~ 0.04		~ 0.04			
	YAW	arc-sec	0.04		0.04			
MOTION PROFILE SPECIFICATIONS								
MAX LINEAR VELOCITY [3]	XY	mm/s	100		150			
	Z	mm/s	15		15			
MAX LINEAR ACCELERATION [3]	XY	G	0.3		0.3			
	Z	G	0.3		0.3			
MAX ANGULAR VELOCITY [3]	PITCH AND ROLL	deg/sec	30		30			
	YAW	deg/sec	3000		3000			
MAX ANGULAR ACCELERATION [3]	PITCH AND ROLL	deg/sec^2	>1000		>1000			
	YAW	deg/sec^2	>7200		>7200			
MAX PAYLOAD		kg	5		5			
PAYLOAD CENTER OF GRAVITY [12]	MAX XY OFFSET	mm	100		100			
	MAX Z OFFSET	mm	100		100			
ASSEMBLY MASS		kg	6.0		7.3			
MOVING MASSES	X	kg	5.5		6.4			
	Y	kg	4.0		4.2			
	Z	kg	1.3		1.3			
	YAW	kg	0.32		0.32			
YAW MASS MOMENT OF INERTIA		kg*mm^2	110		110			


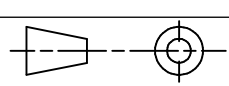

Notes:

- Specifications measured on stage centerline at nominal 20°C, ~50mm above mounting surface with no payload. ALIO provides NIST traceable proof for all options/specs per quote.
- Flatness and Pitch specifications dependent on system base. Contact ALIO for more information.
- Axis limitation at no payload. Based on 100% S-curve profile. Does not account for limitations due to amplifier, resolution, position error, or duty cycle.
- Back EMF plus IR drop must not exceed maximum line to line bus voltage.
- Resistance values do not include cable resistance.
- Continuous operating limits are based on continuous operation at maximum temperature with aluminum heat sink (300mm x 12.5mm x motor length).
- Maximum on time at peak operating limits is 10 seconds.
- All electrical specifications may vary by 12% from listed values.
- Additional motor and travel options are available for each stage for optimized performance as necessary per customer requirements.
- Angular travel is specified when the Z axis is at mid-stroke and all other angles are at zero degrees. Translation from this specified (mid-stroke) position reduces angular travel.
- Three dimensional accuracy is affected by all error sources of all axes as well as the infinite possible process points or tool center points. Thus a single specification is not applicable. ALIO specifies three dimensional accuracy specifications on a case by case basis.
- Payload Cg ideally should be in line with the yaw rotation axis (centered on mounting surface). Offset payload must be within specified range and may influence performance.

ALIO HYBRID HEXAPOD PERFORMANCE SPECIFICATIONS

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(Tel) 303.339.7500 - WWW.ALIOINDUSTRIES.COM

DRAWN	2021-03-29		
QWOLF			
CHECKED		TITLE	
		AI-HH-(XY TRAVEL)XY- (Z TRAVEL)Z-(R DIAMETER)RT -(XY MOTOR)	
Tolerances:	Surface Roughness:	SIZE	DWG NO
x.x ± 0.5 mm	 RMS MAX.	B	0010-08045
x.xx ± 0.13 mm		REV	003
x.xxx ± 0.05 mm		SCALE	0090-07999-016 ALIO STD TEMPLATE SHEET 2 OF 3
ANGLES ± 0.5°			
MATERIAL	FINISH	SEE NOTES	

4

3

2

1

MODEL	UNITS	AI-HH-60XY-15Z-56RT- BSD	AI-HH-60XY-15Z-56RT- LM	AI-HH-100XY-15Z-56RT- LM	AI-HH-200XY-15Z-56RT- CM
XY MOTOR INFORMATION					
MOTOR TYPE	--	FRAMELESS TORQUE	LINEAR BRUSHLESS AC SERVO MOTOR		
MOTOR MODEL	--	AC SERVO MOTOR	AI-LM-144ASN-D	AI-LM-144BSN-D	AI-CM-144BEP-D
MAGNETIC PITCH (N-N)	mm	XY MOTOR IS SAME AS TRIPOD MOTOR IN SECTION BELOW	30.48	30.48	30.48
MAX VOLTAGE (LINE TO LINE) [4]	V		500	500	250
ELECTRICAL TIME CONSTANT	msec		0.22	0.22	0.20
MAX MOTOR TEMP	°C		125	125	130
THERMAL SENSOR	--		NEG. COEFF. THERMISTOR	NEG. COEFF. THERMISTOR	POS. COEFF. THERMISTOR
MOTOR CONNECTION	--		DELTA	DELTA	DELTA
FORCE CONSTANT	N/Apk		8.4	16.8	6.8
PHASE RESISTANCE (@ 25°C) [5]	Ohm		5.79	11.60	5.65
PHASE RESISTANCE (@ MAX°C) [5]	Ohm		8.04	16.07	8.1
INDUCTANCE @ 1kHz	mH		1.3	2.5	1.1
CONTINUOUS FORCE [6]	N	26.7	53.3	20.5	
CONTINUOUS CURRENT [6]	Apk	3.18	3.18	3.00	
PEAK FORCE [7]	N	84	169	41	
PEAK CURRENT [7]	Apk	10.06	10.06	6.00	
BACK EMF CONSTANT	V/m/s	8.4	16.8	6.82	
TRIPOD MOTOR INFORMATION					
MOTOR TYPE	--	FRAMELESS TORQUE MOTOR WITH PRECISION BALL SCREW			
MOTOR MODEL	--	AI-TM-32A8-W	AI-TM-32A8-W	AI-TM-32A8-W	AI-TM-32A8-W
MAGNETIC PITCH (N-N)	deg	180	180	180	180
MAX VOLTAGE (LINE TO LINE) [4]	VDC	340	340	340	340
MAX MOTOR TEMP	°C	155	155	155	155
THERMAL SENSOR	--	NONE	NONE	NONE	NONE
MOTOR CONNECTION	--	WYE	WYE	WYE	WYE
TORQUE CONSTANT	Nm/Arms	0.030	0.030	0.030	0.030
PHASE RESISTANCE (@ 25°C) [5]	Ohm	2.2	2.2	2.2	2.2
INDUCTANCE	mH	1.1	1.1	1.1	1.1
CONTINUOUS TORQUE [6]	Nm	0.08	0.08	0.08	0.08
CONTINUOUS CURRENT [6]	Arms	2.8	2.8	2.8	2.8
PEAK TORQUE [7]	Nm	0.26	0.26	0.26	0.26
PEAK CURRENT [7]	Arms	8.8	8.8	8.8	8.8
BACK EMF CONSTANT	Vrms/krpm	1.8	1.8	1.8	1.8
YAW (ROTARY) MOTOR INFORMATION					
MOTOR TYPE	--	FRAMELESS TORQUE MOTOR			
MOTOR MODEL	--	AI-TM-44B8-W	AI-TM-44B8-W	AI-TM-44B8-W	AI-TM-44B8-W
MAGNETIC PITCH (N-N)	deg	120	120	120	120
MAX VOLTAGE (LINE TO LINE) [4]	VDC	340	340	340	340
MAX MOTOR TEMP	°C	155	155	155	155
THERMAL SENSOR	--	NONE	NONE	NONE	NONE
MOTOR CONNECTION	--	WYE	WYE	WYE	WYE
TORQUE CONSTANT	Nm/Arms	0.11	0.11	0.11	0.11
PHASE RESISTANCE (@ 25°C) [5]	Ohm	2.4	2.4	2.4	2.4
INDUCTANCE	mH	2.5	2.5	2.5	2.5
CONTINUOUS TORQUE [6]	Nm	0.36	0.36	0.36	0.36
CONTINUOUS CURRENT [6]	Arms	3.2	3.2	3.2	3.2
PEAK TORQUE [7]	Nm	1.16	1.16	1.16	1.16
PEAK CURRENT [7]	Arms	10.1	10.1	10.1	10.1
BACK EMF CONSTANT	Vrms/krpm	6.9	6.9	6.9	6.9

ALIO MOTOR SPECIFICATIONS

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DRAWN	QWOLF	2021-03-29		
CHECKED				
			TITLE	
Tolerances: Surface Roughness: x.x ± 0.5 mm x.xx ± 0.13 mm x.xxx ± 0.05 mm ANGLES ± 0.5° MATERIAL			AI-HH-(XY TRAVEL)XY- (Z TRAVEL)Z-(R DIAMETER)RT -(XY MOTOR)	
FINISH			SIZE	REV
SEE NOTES			B	003
SCALE			DWG NO	0010-08045
			0090-07999-016 ALIO STD TEMPLATE	SHEET 3 OF 3