



STANDARD FEATURES	
Stage	Hybrid Hexapod
Travel	6 Degrees of Freedom (X, Y, Z, Pitch, Roll, and Yaw)
XY Travel	100 - 300+ mm
Z Travel	6 - 206 mm
Angular Travel	+/- 3 to +/- 18 degrees (Pitch and Roll) 360 degrees continuous (Yaw)
Max Payload	2.0 - 20.0+ kg
Motor	Ironless Core Linear Motor and Frameless Torque Motor
Feedback	Non-Contact Optical Encoder
Scale	Gold Tape Scale and Stainless Steel Ring Optional: Near Zero CTE ZeroMet
Linear Resolution	~5 nm
Angular Resolution	< 0.04 arc-sec
Sensors	Integrated Home and End of Travel Limits
Bearings	High Precision Crossed Roller Bearings
Counterbalance	Frictionless Pneumatic Cylinder Optional: Non-Contact Magnetic Spring
Cables	High Flex, 10M Cycle, 3m Length
Structure	Anodized Aluminum 6061-T6 Optional: Stainless Steel
Environment	Standard Optional: Vacuum 10-5 Torr, Vacuum 10-7 Torr
Temperature	0°C to 50°C
Humidity	10% to 80% Non-Condensing
Precision	6-D Nano Precision™ Test Methods

XY TRAVEL	Z TRAVEL	PITCH & ROLL TRAVEL	R DIAMETER	OPTION	LENGTH	WIDTH	HEIGHT (at home)	HEIGHT (at mid-stroke)	A (inch)	B (inch)	C	D	E	F	G	H	I	J	K	L	M
100	6	+/- 3 degrees	56	--	244	244	220.5	223.5	6	6	175	125	170	70	52	30	22.5#	235	M6 or 1/4-20	M6	M3
100	6	+/- 3 degrees	56	CM	200	184	200.5	203.5	6	4	125	100	120	70	52	30	22.5#	235	M6 or 1/4-20	M5 (6X)	M3
100	24	+/- 11 degrees	56	--	244	244	233.8	245.8	6	6	175	125	170	70	52	30	22.5#	235	M6 or 1/4-20	M6	M3
100	24	+/- 10 degrees	56	CM, MS	262.5	246	218.8	230.8	6	4	125	100	120	70	52	30	22.5#	235	M6 or 1/4-20	M5 (6X)	M3
100	24	+/- 10 degrees	56	MS	262.5	246	238.8	250.8	6	6	175	125	170	70	52	30	22.5#	235	M6 or 1/4-20	M6	M3
150	40	+/- 16 degrees	56	--	331.6	304	306.5	328.5	6	6	175	125	170	70	52	30	22.5#	235	M6 or 1/4-20	M6	M3
150	40	+/- 11 degrees	104	--	399	350	308.9	330.9	6	6	175	125	170	70	52	80	32.5	200	M6 or 1/4-20	M6	M4
200	40	+/- 11 degrees	104	--	399	359	318.9	340.9	7	5	225	200	225	100	65	80	32.5	235	M8 or 5/16-18	M6	M4
250	55	+/- 15 degrees	104	--	403.1	400	397.4	425.4	12	8	350	250	275x300	100	96	80	32.5	300	M8 or 5/16-18	M8 (6X)	M4
300	106	+/- 18 degrees	104	--	504.2	500	519.9	573.9	12	8	350	250	275	100	96	80	32.5	325	M8 or 5/16-18	M8 (6X)	M4
300	106	+/- 18 degrees	154 (RA)	--	504.2	500	519.9	519.9	12	8	350	250	275	100	96	100	40	325	M8 or 5/16-18	M8 (6X)	M5
300	206	+/- 18 degrees	154 (RA)	--	504.2	500	660.0	762.0	12	8	350	250	275	100	96	100	40	325	M8 or 5/16-18	M8 (6X)	M5

* 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.
 * See specification sheet and contact ALIO technical sales for assistance in model selection.
 # M5 dowel pins on the mount surface are rotated 90 degrees relative to dowel pins shown on this datasheet.

ALIO INDUSTRIES PROPRIETARY DOCUMENT
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NOTE: MODEL AI-6D-250XY-55Z-104R SHOWN.

PATENT PENDING

DRAWN	05/12/2012	NBROWN			
CHECKED	01/18/2018	NBROWN			
Tolerances: Surface Roughness: x.x ± 0.5 mm x.xx ± 0.13 mm x.xxx ± 0.05 mm ANGLES ± 0.5° MATERIAL			TITLE HYBRID HEXAPOD® MODEL: AI-HH-(XY TRAVEL)XY-(Z TRAVEL)Z -(R DIAMETER)R-(OPTION)		
FINISH SEE NOTES			SIZE	DWG NO	REV
			B	0010-08007	005
SCALE			ALIO STD TEMPLATE - REV 013	SHEET 1	OF 3

MODEL	UNITS	AI-HH-100XY-6Z-56R	AI-HH-100XY-6Z-56R-CM	AI-HH-100XY-24Z-56R	AI-HH-100XY-24Z-56R-CM_MS	AI-HH-100XY-24Z-56R-MS	AI-HH-150XY-40Z-56R	AI-HH-150XY-40Z-104R	AI-HH-200XY-40Z-104R	AI-HH-250XY-55Z-104R	AI-HH-300XY-106Z-104R	AI-HH-300XY-106Z-154R	AI-HH-300XY-206Z-154R
OPTION	--	--	"CM"=LOW FORCE XY	--	CM=LOW FORCE XY MS=MAGNETIC SPRING	MS=MAGNETIC SPRING	--	--	--	--	--	--	--
XY MOTOR INFORMATION													
MOTOR TYPE	--	LINEAR BRUSHLESS AC SERVO MOTOR											
MOTOR MODEL	--	AI-LM-144BSN-D	AI-CM-144ASP-D	AI-LM-144BSN-D	AI-CM-144ASP-D	AI-LM-144BSN-D	AI-LM-144BSN-D	AI-LM-144BSN-D	AI-LM-256BSN-D	AI-LM-256CSN-D	AI-LM-256CSN-D	AI-LM-256CSN-D	AI-LM-256CSN-D
MAGNETIC PITCH (N-N)	mm	30.48	30.48	30.48	30.48	30.48	30.48	30.48	30.48	30.48	30.48	30.48	30.48
MAX VOLTAGE (LINE TO LINE) [4]	V	500	500	500	500	500	500	500	500	500	500	500	500
ELECTRICAL TIME CONSTANT	msec	0.19	0.20	0.19	0.20	0.19	0.19	0.19	0.20	0.20	0.20	0.20	0.20
MAX MOTOR TEMP	°C	130	130	130	130	130	130	130	130	130	130	130	130
MOTOR CONNECTION	--	DELTA	DELTA	DELTA	DELTA	DELTA	DELTA	DELTA	DELTA	DELTA	DELTA	DELTA	DELTA
FORCE CONSTANT	N/Apk	16.3	3.5	16.3	3.5	16.3	16.3	16.3	28.7	43.0	43.0	43.0	43.0
PHASE RESISTANCE (@25° C) [5]	Ohm	11.6	2.9	11.6	2.9	11.6	11.6	11.6	11.7	17.6	17.6	17.6	17.6
PHASE RESISTANCE (@130° C) [5]	Ohm	16.4	4.2	16.4	4.2	16.4	16.4	16.4	16.6	24.9	24.9	24.9	24.9
INDUCTANCE	mH	2.1	0.6	2.1	0.6	2.1	2.1	2.1	2.3	3.5	3.5	3.5	3.5
CONTINUOUS FORCE [6]	N	47	10.0	47	10.0	47	47	47	93	140	140	140	140
CONTINUOUS CURRENT [6]	Apk	2.9	2.8	2.9	2.8	2.9	2.9	2.9	3.2	3.2	3.2	3.2	3.2
PEAK FORCE [7]	N	151	21	151	21	151	151	151	295	442	442	442	442
PEAK CURRENT [7]	Apk	9.2	6.0	9.2	6.0	9.2	9.2	9.2	10.3	10.3	10.3	10.3	10.3
BACK EMF CONSTANT	V/m/s	16.3	3.5	16.3	3.5	16.3	16.3	16.3	28.7	43.0	43.0	43.0	43.0
TRIPOD MOTOR INFORMATION													
MOTOR TYPE	--	LINEAR BRUSHLESS AC SERVO MOTOR											
MOTOR MODEL	--	AI-CM-144ASP-D	AI-CM-144ASP-D	AI-LM-256ZSN-D	AI-LM-256ZSN-D	AI-LM-256ZSN-D	AI-LM-256ASN-D	AI-LM-256ASN-D	AI-LM-256ASN-D	AI-LM-256ASN-D	AI-LM-256ASN-D	AI-LM-256BSN-D	AI-LM-256BSN-D
MAGNETIC PITCH (N-N)	mm	30.48	30.48	30.48	30.48	30.48	30.48	30.48	30.48	30.48	30.48	30.48	30.48
MAX VOLTAGE (LINE TO LINE) [4]	V	500	500	500	500	500	500	500	500	500	500	500	500
ELECTRICAL TIME CONSTANT	msec	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
MAX MOTOR TEMP	°C	130	130	130	130	130	130	130	130	130	130	130	130
MOTOR CONNECTION	--	DELTA	DELTA	DELTA	DELTA	DELTA	DELTA	DELTA	DELTA	DELTA	DELTA	DELTA	DELTA
FORCE CONSTANT	N/Apk	3.5	7.2	7.2	7.2	7.2	14.3	14.3	14.3	14.3	28.7	28.7	28.7
PHASE RESISTANCE (@25° C) [5]	Ohm	2.9	2.9	2.9	2.9	2.9	5.9	5.9	5.9	5.9	11.7	11.7	11.7
PHASE RESISTANCE (@130° C) [5]	Ohm	4.2	4.2	4.2	4.2	4.2	8.3	8.3	8.3	8.3	16.6	16.6	16.6
INDUCTANCE	mH	0.6	0.6	0.6	0.6	0.6	1.2	1.2	1.2	1.2	2.3	2.3	2.3
CONTINUOUS FORCE [6]	N	10.0	10.0	15	15	15	47	47	47	47	93	93	93
CONTINUOUS CURRENT [6]	Apk	2.8	2.8	2.1	2.1	2.1	3.2	3.2	3.2	3.2	3.2	3.2	3.2
PEAK FORCE [7]	N	21	21	74	74	74	148	148	148	148	295	295	295
PEAK CURRENT [7]	Apk	6.0	6.0	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3
BACK EMF CONSTANT	V/m/s	3.5	3.5	7.2	7.2	7.2	14.3	14.3	14.3	14.3	28.7	28.7	28.7
ROTARY MOTOR INFORMATION													
MOTOR TYPE	--	FRAMELESS TORQUE AC SERVO MOTOR											
MOTOR MODEL	--	AI-TM-044AE-W	AI-TM-044AE-W	AI-TM-044AE-W	AI-TM-044AE-W	AI-TM-044AE-W	AI-TM-044AE-W	AI-TM-089B9-W	AI-TM-089B9-W	AI-TM-089B9-W	AI-TM-089B9-W	AI-TM-133CN	AI-TM-133CN
MAGNETIC PITCH (N-N)	deg	120	120	120	120	120	120	60	60	60	60	25.714	25.714
MAX VOLTAGE (LINE TO LINE) [4]	VDC	340	340	340	340	340	340	340	340	340	340	230	230
MAX MOTOR TEMP	°C	155	155	155	155	155	155	155	155	155	155	110	110
MOTOR CONNECTION	--	WYE	WYE	WYE	WYE	WYE	WYE	WYE	WYE	WYE	WYE	WYE	WYE
TORQUE CONSTANT	Nm/Arms	0.091	0.091	0.091	0.091	0.091	0.091	0.680	0.680	0.680	0.680	210.000	210.000
PHASE RESISTANCE (@25° C) [5]	Ohm	4.5	4.5	4.5	4.5	4.5	4.5	3.9	3.9	3.9	3.9	4.2	4.2
INDUCTANCE	mH	3.2	3.2	3.2	3.2	3.2	3.2	8.9	8.9	8.9	8.9	11.5	11.5
CONTINUOUS TORQUE [6]	Nm	0.21	0.21	0.21	0.21	0.21	0.21	2.60	2.60	2.60	2.60	10.00	10.00
CONTINUOUS CURRENT [6]	Arms	2.3	2.3	2.3	2.3	2.3	2.3	3.8	3.8	3.8	3.8	4.7	4.7
PEAK TORQUE [7]	Nm	0.66	0.66	0.66	0.66	0.66	0.66	8.20	8.20	8.20	8.20	20.60	20.60
PEAK CURRENT [7]	Arms	7.3	7.3	7.3	7.3	7.3	7.3	12.0	12.0	12.0	12.0	13.3	13.3
BACK EMF CONSTANT	Vrms/krpm	5.5	5.5	5.5	5.5	5.5	5.5	41.0	41.0	41.0	41.0	126.0	126.0

- Notes:
- Specifications measured on stage centerline, 50mm above mounting surface. ALIO provides NIST traceable proof for all options/specs per quote.
 - Flatness specifications dependent on system base. Contact ALIO for more information.
 - Stage limitation at no load. Does not account for drive or resolution limitations.
 - Back EMF plus IR drop must not exceed maximum line to line bus voltage.
 - Resistance values do not include cable resistance. Cable resistance adds 0.22 ohm/m for Delta connection and 0.66 ohm/m for Wye Connection.
 - 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 should be in line with the yaw rotation axis (centered on mounting surface). Offset payload must be within specified range and may influence performance.
 - Pneumatic counterbalance supply pressure specified is the estimated pressure required at the max payload.

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TITLE
HYBRID HEXAPOD
MODEL: AI-HH-(XY TRAVEL)XY-(Z TRAVEL)Z
-(R DIAMETER)R-(OPTION)

DRAWN	NBROWN	05/12/2012
CHECKED	NBROWN	01/19/2018
Tolerances:	Surface Roughness:	
x.x ± 0.5 mm		
x.xx ± 0.13 mm		
x.xxx ± 0.05 mm	✓ RMS MAX.	
ANGLES ± 0.5°		
MATERIAL		
FINISH	SEE NOTES	

SIZE	DWG NO	REV
B	0010-08007	005
SCALE	ALIO STD TEMPLATE - REV 013	SHEET 3 OF 3