

STANDARD FEATURES	
Stage	Rotary Stage
Travel	360 Degrees Continuous
Motor	Direct Drive Frameless Torque Motor
Feedback	Non-Contact Incremental Optical Rotary Encoder Optional: Non-Contact Absolute Optical Rotary Encoder
Scale	20um Pitch Stainless Steel Ring Optional: Stainless Steel Absolute Ring
Resolution	1Vp-p Sin-Cos Analog Output Digital AQB options available (reduced speeds may apply)
Sensors	Integrated Optical Latching Home Index
Bearings	High Precision Angular Contact (Duplex Pair)
Cables	High Flex, 10M Cycle, 3m Length from Component (Standard) (some length consumed inside stage), 5mm OD, 20mm Dynamic Bend Radius (Motor and Encoder)
Hard Stops	Not Standard, but Available Upon Request Only
Orientation	Vertical or Horizontal or Inverted
Structure	Black Anodized Aluminum 6061-T6
Maintenance	Stages are Greased for Life in Normal Environment; No Maintenance
Environment	Standard Optional: Clean Room and Vacuum (10 <sup>-6</sup> Torr)
Temperature	Operating: 0°C to 50°C (performance not guaranteed throughout entire range) Storage/Transport: -20°C to 70°C
Humidity	10% to 80% Non-Condensing
Precision	6-D Nano Precision™ Test Methods

DIAMETER	HEIGHT	LENGTH	A (inch)	B (inch)	C	D	E	F	G (degrees)	H	I	J	K	L	M	N
104	80	123	80 mm	90 mm	32	15	50	80	0	67	30	46	32.5	M6 or 1/4-20	M4	M4
154	84	173	5	5	72	15	n/a	100	0	87.5	50	70	40	M6 or 1/4-20	M5	n/a
208	110	228	6	7	75	25	76.2	150	22.5	100	100	0	75	M8 or 5/16-18	M6	M6
240	45	260	7	8	100	25.5	n/a	175	0	100	100	0	75	M8 or 5/16-18	M6	n/a
312	80	332	10	11	75	25	76.2	240	22.5	150	150	0	120	M8 or 5/16-18	M8	M6

\* All units millimeters unless otherwise noted.  
 \* All hole patterns centered on thru hole at center of stage diameter.  
 \* All dimensions and visual representations reflect stage at home position.

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 5335 XENON ST, ARVADA, CO 80002 USA  
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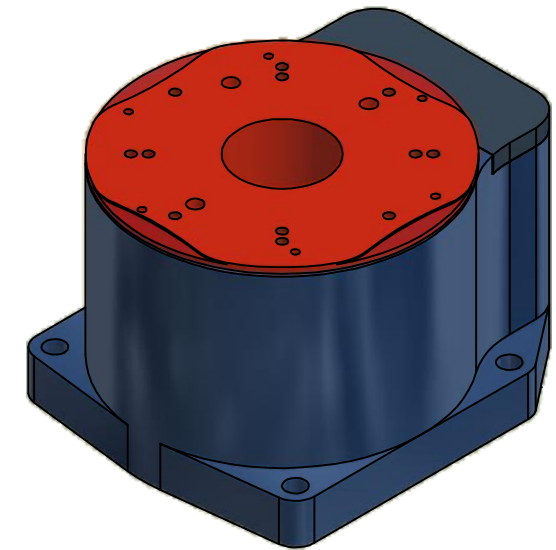


DRAWN	QWOLF	2020-11-16
CHECKED		
		TITLE
Tolerances: Surface Roughness: x.x ± 0.5 mm x.xx ± 0.13 mm x.xxx ± 0.05 mm ANGLES ± 0.5° MATERIAL		AI-TM-(DIAMETER)RA
FINISH	SEE NOTES	SCALE

SIZE	DWG NO	REV
B	0010-8015	008
SCALE	0090-07999-016 ALIO STD TEMPLATE	SHEET 1 OF 2

NOTE: MODEL AI-TM-104RA SHOWN

# ALIO STAGE AND MOTOR SPECIFICATIONS



MODEL	UNITS	AI-TM-104RA-80			AI-TM-154RA-84			AI-TM-208RA-110			AI-TM-240RA-44			AI-TM-312RA-80		
TRAVEL	--	360 degrees continuous														
PERFORMANCE SPECIFICATIONS [1]		(STD)	ULTRA	NANO	(STD)	ULTRA	NANO	(STD)	ULTRA	NANO	(STD)	ULTRA	NANO	(STD)	ULTRA	NANO
ANGULAR ACCURACY	arc-sec	N/A	+/- 3		N/A	+/- 3		N/A	+/- 3		N/A	+/- 3		N/A	+/- 3	
BIDIRECTIONAL ANGULAR REPEATABILITY	arc-sec	+/- 0.5	+/- 0.5	+/- 0.3	+/- 0.5	+/- 0.4	+/- 0.3	+/- 0.5	+/- 0.4	+/- 0.3	+/- 0.5	+/- 0.4	+/- 0.2	+/- 0.5	+/- 0.4	+/- 0.2
HOME INDEX BIDIRECTIONAL REPEATABILITY		< +/- 1 encoder count														
RESOLUTION (ANALOG - STANDARD)	arc-sec	0.02 arc-sec			0.013 arc-sec			0.01 arc-sec			0.009 arc-sec			0.007 arc-sec		
RESOLUTION (DIGITAL - OPTIONAL) [2]	arc-sec	0.005 - 21.0 arc-sec			0.004 - 14.0 arc-sec			0.003 - 10.0 arc-sec			0.003 - 9.0 arc-sec			0.002 - 7.0 arc-sec		
RESOLUTION (ENCODER LINE COUNT)	lines/rev	15744			23600			31488			36000			47200		
AXIAL RUNOUT	um	+/- 5	+/- 3.5	+/- 2	+/- 5	+/- 3.5	+/- 2	+/- 5	+/- 2.5	+/- 1.5	+/- 5	+/- 2.5	+/- 1.5	+/- 5	+/- 2.5	+/- 1.5
RADIAL RUNOUT	um	+/- 5	+/- 3.5	+/- 2	+/- 5	+/- 3.5	+/- 2	+/- 5	+/- 2.5	+/- 1.5	+/- 5	+/- 2.5	+/- 1.5	+/- 5	+/- 2.5	+/- 1.5
WOBBLE	arc-sec	+/- 10	+/- 5	+/- 3	+/- 10	+/- 5	+/- 3	+/- 8	+/- 5	+/- 2.5	+/- 7.5	+/- 5	+/- 2.5	+/- 7.5	+/- 5	+/- 2.5
MOTION PROFILE SPECIFICATIONS																
MAX VELOCITY [3]	deg/sec	> 10000			> 5500			> 5500			> 3600			> 2400		
MAX PEAK ACCELERATION [3]	deg/sec^2	500000			160000			170000			70000			30000		
ASSEMBLY MASS	kg	2.7			4.4			11			10			19		
MAX LOAD (AXIAL)	kg	10.0			20.0			40.0			8.0			50.0		
MAX LOAD (RADIAL)	kg	10.0			20.0			27.0			8.0			33.0		
MOVING MASS	kg	0.9			2.1			3.6			2.7			6.5		
ROTATING MASS MOMENT OF INERTIA	kg*mm^2	900			7000			16000			14500			80000		
MOTOR INFORMATION																
MOTOR TYPE	--	FRAMELESS TORQUE MOTOR														
MOTOR MODEL	--	AI-TM-89B9-W			AI-TM-133CN-W			AI-TM-178BE-W			AI-TM-160BN-W			AI-TM-178BE-W		
MAGNETIC PITCH (N-N)	deg	60			25.714			40			20			40		
MAX VOLTAGE (LINE TO LINE) [4]	VDC	340			300			340			300			340		
MAX MOTOR TEMP	°C	155			100			155			100			155		
MOTOR THERMISTOR (options available)	--	NONE														
MOTOR CONNECTION	--	WYE														
MOTOR CONSTANT	Nm/sqrt(W)	0.35			1.02			1.42			1.03			1.42		
TORQUE CONSTANT	Nm/Arms	0.683			2.09			2.509			1.92			2.509		
PHASE RESISTANCE (@ 25°C) [5]	Ohm	3.9			4.23			3.1			3.47			3.1		
INDUCTANCE @ 1kHz	mH	8.9			11.50			19.1			7.68			19.1		
CONTINUOUS TORQUE [6]	Nm	2.59			10.0			15.16			9.4			15.16		
CONTINUOUS CURRENT [6]	Arms	3.79			4.77			6.06			4.9			6.06		
PEAK TORQUE [7]	Nm	8.23			20.6			48.12			19.6			48.12		
PEAK CURRENT [7]	Arms	11.98			13.3			19.14			13.8			19.14		
BACK EMF CONSTANT	Vrms/krpm	41.282			126			151.672			116			151.672		

- Notes:
- Specifications measured on stage centerline at nominal 20°C, ~30mm above mounting surface with no payload. Standard describes typical values. Ultra and Nano are guaranteed. ALIO provides NIST traceable proof for all options/spec per quote.
  - Reduced speeds may apply. Absolute options also available.
  - Stage limitation at no load. 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. Cable resistance adds 0.177 ohm/m.
  - Continuous operating limits are based on continuous operation at maximum temperature with aluminum heat sink (300mm x 300mm x 25mm).
  - 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.

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