



Z3TM+ COMBINED MODULE

ASME-NNNN-05-0012-0004-1

with AccurET VHP

Data sheet

Version 1.0

ETEL

AXIS DESIGNATION				
Number of controlled axes	5			
Axes name	Fine Z	Tip-Tilt	Theta	Coarse Z
Thrust transmitter: DD (direct drive) or ID (indirect drive)	DD	DD	DD	DD

TESTING CONDITIONS		UNIT				
Position controller	-		VHP 48 (5/10A)		VHP 100 (7/15A)	
Motion controller	-		ULTIMET			
Rated payload (1)	kg		2		0,25	
Rated inertia (1)	kg.m ²		-	-	0,018	-
Rated input voltage	VDC		48		96	
Tool point position	mm		20 mm above chuck interface			
Ambient temperature	°C		22 ± 1			
Isolation system	-		QUIET			

DIMENSIONAL DATA		UNIT				
Width	mm		284			
Length	mm		308			
Height	mm		90			
Total stroke	mm or °		±2	±0.08°	364°	12
Moving mass (without payload)	kg		5	-	3	0,6
Total mass (without payload)	kg		10			
Rotor inertia (without payload)	kg.m ²		-	-	0,004	-

FORCE / TORQUE CAPABILITIES (2)		UNIT				
Peak force / torque	N or Nm		65,3	-	7,36	34,4
Continuous force / torque	N or Nm		15,7	-	0,831	11,3
Standstill torque	Nm		-	-	0,669	-
Max. detent force / torque (average to peak)	N or Nm		-	-	0	-
Static friction (maximal value)	N or Nm		-	-	0,2	5
Dynamic friction (maximal value)	N/(m/s) or Nm/(rad/s)		-	-	0,2	3

LOAD CAPACITIES		UNIT				
Maximum axial load (payload)	N		-	-	25	4

DYNAMIC PERFORMANCE		UNIT				
Duty cycle	%		-	-	6	70
Maximum speed	m/s or rad/s		0,1	-	10	0,25
Maximum acceleration	m/s ² or rad/s ²		3	-	180	8
Typical position stability at 1 kHz	nm or arcsec		±3	-	±0.025	±50

ACCURACY		UNIT				
Unidirectional repeatability	µm		-	-	-	±10 ⁽³⁾ / ±5 ⁽⁴⁾
Bidirectional repeatability	µm or arcsec		±0.03	-	±2	±15 ⁽³⁾ / ±7.5 ⁽⁴⁾
Radial runout	µm		-	-	±3.5	-
Total axial error at 0 [mm] radius	µm		-	-	±3	-
XY displacement while moving in Z (5)	µm		±0.1	-	-	±15

ENCODER CHARACTERISTICS		UNIT			
Encoder and signal type	-		Optical incremental	Optical incremental	Optical absolute
Output signal	-		1 Vpp	1 Vpp	EnDat 2.2
Signal period or line count	µm or period/turn		4	18'000	10
Reference mark	-		One centered in Z	One	Absolute
Power supply	V		5	5	5

WORKING ENVIRONMENT

Clean room compatibility (6)	-	ISO1		
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ELECTRICAL SPECIFICATIONS (1)

	UNIT	Fine Z	Tip-tilt	Theta	Coarse Z
Motor type	-	Electro-Magnet		Ironless	Electro-Magnet
Motor model	-	EMF-14.5-058-1NA-219		SLICE0109-015	EMG012.-075
Number of phases	-	3 x single-phase		3	1
Kt Force constant	Nm/Arms or N/A _{DC}	19,6		0,646	10,7
Ku Back EMF constant (7)	V _{rms} /(rad/s) or V _{DC} /(m/s)	19,6		0,372	10,9
Km Motor constant	N/√W or Nm/√W	8,34		0,309	6,11
R20 Electrical resistance at 20°C (7)	Ohm	5,5		2,92	3,06
L1 Electrical inductance (7)	mH	13,5		5,52	8,97
I_p Peak current	Arms or A _{DC}	3,38		11,8	3,49
I_c Continuous current	Arms or A _{DC}	0,8		1,33	1,05
I_s Standstill current	Arms or A _{DC}	-		1,01	-
U_m Max. input voltage	VDC	48		100	100
P_c Max. cont. power dissipation	W	3,88		8,75	3,93
2p Number of poles	-	-		32	-

VACUUM CHARACTERISTICS (8)

	UNIT			
Vacuum supply for wafer chuck				
Vacuum at interface output	bar	-0,6		
Vacuum supply for axis cleanliness				
Vacuum flow	l/min	-	-	5

TYPICAL MOVE AND SETTLE TIMES

	UNIT			
Move 1: 100 µm within ±50 nm	ms	60	-	-
Move 2: 1 mm within ±50 nm	ms	100	-	-
Move 1: 10 mm within ±500 nm	ms	-	-	180
Move 1: 1° within ±40 µdeg	ms	-	-	70
Move 2: 90° within ±40 µdeg	ms	-	-	260
Move 3: 180° within ±40 µdeg	ms	-	-	450
Move 4: 360° within ±40 µdeg	ms	-	-	750

GUIDING ELEMENTS

Type	-	Flexures	Ball bearing	Ball bearing
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MATERIAL AND FINISH

Baseplate	-	Anodized aluminum	-	Stainless steel
Carriage	-	Anodized aluminum	Stainless steel	Stainless steel

OPTIONS / ACCESSORIES / FEATURES

	UNIT			
Gravity compensation	N	Yes	-	Yes

According to the Machinery Directive 2006/42/EC, the system presently described falls into the "partly completed machinery" category and fully complies with it as long as the system is operated according to the working conditions described in the corresponding manual. Customer is responsible for setting safeties/limitations that will keep the motor in its safe operating area. ETEL cannot be held responsible if the system is used in an improper way.

Notes: The specifications given may be mutually exclusive. Unless stated otherwise, all measurements are made within the testing conditions.

- (1) Payload can be assimilated to a cylinder of diameter 270 mm, 19 mm thick, weighting 2 kg. Inertia is expressed with respect to the center of gravity of the payload, Z being the axis of rotation.
- (2) Tolerances on electrical parameters are available on request.
- (3) Measured at a radius of 150 mm over full stroke.
- (4) Measured at a radius of 150 mm over a limited stroke of 0 to + 3 mm.
- (5) Maximum displacement measured over a 100 µm sliding window, wherever the position on the fine Z stroke.
- (6) Measured at the chuck interface level under horizontal laminar flow at 0.4 m/s without activating the Theta hard-stop (no homing).
- (7) Terminal to terminal.
- (8) Clean dry air : maximum size of particule 1 µm, maximum condensing point +3 °C, maximum concentration of oil 0.1 mg/m3.