



Z3™ COMBINED MODULE

ASME-NNNN-04-0000-0004-1

Data sheet

Version 1.1

ETEL

AXIS DESIGNATION

Number of controlled axes	4		
Axes name	Fine Z	Tip-Tilt	Theta
Thrust transmitter: DD (direct drive) or ID (indirect drive)	DD	DD	DD

TESTING CONDITIONS

	UNIT			
Position controller	-	VHP48 (5/10A)	VHP48 (5/10A)	Modular300 (4/7.5A)
Motion controller	-	UltimET		
Rated payload (1)	kg	2		
Rated inertia (1)	kg.m ²	-	-	0.018
Rated input voltage	VDC	48		96
Tool point position	mm	21 mm above Z3TM chuck interface		
Ambient temperature	°C	22 ± 1		
Isolation system	-	QuiET		

DIMENSIONAL DATA

	UNIT			
Width	mm	312.7		
Length	mm	329.6		
Height	mm	70		
Total stroke	mm	±2	±0.08°	infinite
Moving mass (without payload)	kg	4.2	-	2.1
Total mass (without payload)	kg	8.4		
Rotor inertia (without payload)	kg.m ²	-	-	0.004

FORCE / TORQUE CAPABILITIES (2)

	UNIT			
Peak force / torque	N or Nm	65.3	-	7.87
Continuous force / torque	N or Nm	15.7	-	1.74
Standstill torque	Nm	-	-	1.32
Static friction (maximal value)	Nm	-	-	1
Dynamic friction (maximal value)	Nm/(rad/s)	-	-	0.03

LOAD CAPACITIES

	UNIT			
Maximum axial load	N	-	-	300
Maximum payload	kg	-	-	2.5

DYNAMIC PERFORMANCE

	UNIT			
Duty cycle	%	-	-	10
Maximum speed	m/s or rad/s	0.1	-	30
Maximum acceleration	m/s ² or rad/s ²	3	-	180
Typical position stability at 1kHz	nm or arcsec	±3	-	±0.08

ACCURACY

	UNIT			
Bidirectional repeatability	µm or arcsec	±0.03	-	±2
Horizontal straightness / radial runout	µm	-	-	±3.5
Vertical straightness / total axial error	µm	-	-	±3
XY displacement while moving in Z	µm	±0.1	-	-

WORKING ENVIRONMENT

Clean room compatibility (3)	ISO2		
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ENCODER CHARACTERISTICS

	UNIT		
Encoder and signal type	-	Optical Incremental	Optical Incremental
Output signal	-	1 Vpp	1 Vpp
Signal period or line count	µm or period/turn	4	18'000
Reference mark	-	one centered in Z	one
Power supply	V	5	5

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ELECTRICAL SPECIFICATIONS (2)		UNIT	Fine Z	Tip-Tilt	Theta
Motor type	-		Electro-Magnet		Toothless
Motor model	-		EMF-14.5-058-1NA-219		TTB0126-030-3NA
Number of phases	-		3 x single-phase		3
Kt Force constant	Nm/Arms or N/A _{DC}		19.6		1.23
Ku Back EMF constant (4)	V _{rms} /(rad/s) or V _{DC} /(m/s)		19.6		0.71
Km Motor constant	N/√W or Nm/√W		8.34		-
R20 Electrical resistance at 20°C (4)	Ohm		5.5		10.5
L1 Electrical inductance (4)	mH		13.5		2.65
I_p Peak current	Arms or A _{DC}		3.38		6.90
I_c Continuous current	Arms or A _{DC}		0.8		1.47
I_s Standstill current	Arms or A _{DC}		-		1.11
n_s Standstill speed	m/s or rad/s		-		0.0016
U_m Max. input voltage	VDC		48		100
P_c Max. cont. power dissipation	W		3.88		41.9
2p Number of poles	-		-		28

VACUUM CHARACTERISTICS		UNIT			
Vacuum supply for wafer chuck					
Vacuum at interface output	bar		-0.6		
Vacuum supply for axis cleanliness					
Vacuum flow	l/min		-	-	5.0

TYPICAL MOVE AND SETTLE TIMES		UNIT			
Move 1: 100µm within ±30 nm	ms		60	-	-
Move 2: 1mm within ±30 nm	ms		100	-	-
Move 1: 90° within ±40 µdeg	ms		-	-	360
Move 2: 180° within ±40 µdeg	ms		-	-	525
Move 3: 360° within ±40 µdeg	ms		-	-	850

GUIDING ELEMENTS				
Type		Flexures	Flexures	Cross roller bearing

MATERIAL AND FINISH				
Baseplate		Anodized aluminum		-
Carriage		Anodized aluminum		Stainless steel

OPTIONS / ACCESSORIES / FEATURES		UNIT			
Limit switch	-		No	No	No
Temperature sensors	-		No	No	No
Gravity compensation	N		-	Variable	-

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 the chuck interface level under horizontal laminar flow at 0.25m/s
- (4) Terminal to terminal.