



# **XYZ3T STACKED SYSTEM**

**ASME-NNNN-07-0475-0410xx**

**CHARON2HD XYZ3TM<sup>+</sup> with AccurET VHP**

Data sheet

Version 1.0

***ETEL***

AXIS DESIGNATION						
Number of controlled axes	7					
Axes name	X (bottom axis)	Y (top axis)	Fine Z	Tip-Tilt	Coarse Z	Theta
Thrust transmitter: DD (direct drive) or ID (indirect drive)	DD	DD	DD	DD	DD	DD

TESTING CONDITIONS			UNIT			
Position controller	-	VHP100 (10/30A)		VHP48 (5/10A)		VHP100 (7/15A)
Motion controller	-	UltimET				
Rated payload	kg	-	-	-	0,15	2
Rated inertia	kg.m <sup>2</sup>	-	-	-	-	0,018
Rated input voltage	VDC	96		48		96
Tool point position	mm	270 above bottom surface				
Ambient temperature	°C	22 ± 1				
Isolation system	-	QuiET				

DIMENSIONAL DATA		UNIT					
Width	mm	797					
Length	mm	965					
Height	mm	250					
Total stroke	mm or °	475	410	±2	±0.08	12	364°
Moving mass (without payload)	kg	36,6	16,4	5	-	0,6	3
Total mass (without payload)	kg	65					
Rotor inertia (without payload)	kg.m <sup>2</sup>	-	-	-	-	-	0,004

FORCE / TORQUE CAPABILITIES (1)		UNIT					
Peak force / torque	N or Nm	991	681	65,3	-	34,4	7,36
Continuous force / torque	N or Nm	360	193	15,7	-	11,3	0,831
Standstill force / torque	N or Nm	272	145	-	-	-	0,669
Max. detent force / torque (average to peak)	N or Nm	26	16	-	-	-	0
Static friction (maximal value)	N or Nm	25	25	-	-	5	0,2
Dynamic friction (maximal value)	N/(m/s) or Nm/(rad/s)	25	25	-	-	3	0,2

LOAD CAPACITIES		UNIT				
Maximum payload	kg	2				

DYNAMIC PERFORMANCE		UNIT					
Duty cycle	%	20	35	-	-	70	6
Maximum speed	m/s or rad/s	1,25	1,25	0,1	-	0,25	10
Maximum acceleration	m/s <sup>2</sup> or rad/s <sup>2</sup>	20	20	3	-	8	180
Typical position stability at 2 kHz	nm or arcsec	±2	±2	±3	-	±100	±0.025

ACCURACY		UNIT					
Positioning accuracy (without mapping)	µm	±20		-	-	-	-
Positioning accuracy (with mapping)	µm	±1		-	-	-	-
Unidirectional repeatability	µm	-	-	-	-	±10 <sup>(2)</sup> / ±5 <sup>(3)</sup>	-
Bidirectional repeatability	µm or arcsec	±0.4		±0.03	-	±15 <sup>(2)</sup> / ±7.5 <sup>(3)</sup>	±2
Horizontal straightness / radial runout	µm	±3	±3.5	-	-	-	±3.5
Vertical straightness / total axial error at tool point	µm	±2.5	±5	-	-	-	±3
XY displacement while moving in Z (4)	µm	-	-	±0.1	-	±15	-
Orthogonality	arcsec	±15		-	-	-	-
Roll	arcsec	±5	±10	-	-	-	-
Pitch	arcsec	±5	±25	-	-	-	-
Yaw	arcsec	±10	±10	-	-	-	-

ELECTRICAL SPECIFICATIONS (1)		UNIT	X (bottom axis)	Y (top axis)	Fine Z	Tip-Tilt	Coarse Z	Theta
Motor type	-		Ironcore	Ironcore	Electro-Magnet		Electro-Magnet	Ironless
Motor model	-		LMS15-050-3TC	LMG10-050-3TB	EMF-14.5-058-1NA-219		EMG012-.075	SLICE0109-015
Number of phases	-		3	3	3 x single-phase		1	3
<b>Kt</b> Force constant	N/Arms or Nm/Arms		45,4	26,8	19,6		10,7	0,646
<b>Ku</b> Back EMF constant (5)	Vrms/(m/s) or Vrms/(rad/s)		27,1	16,3	19,6		10,9	0,372
<b>Km</b> Motor constant	Nm/ $\sqrt{W}$		45,5	28,2	8,34		6,11	0,309
<b>R20</b> Electrical resistance at 20°C (5)	Ohm		0,663	0,605	5,5		3,06	2,92
<b>L1</b> Electrical inductance (5)	mH		6,74	3,77	13,5		8,97	5,52
<b>Ip</b> Peak current	Arms		30	30	3,38		3,49	11,8
<b>Ic</b> Continuous current	Arms		8,14	7,33	0,8		1,05	1,33
<b>Is</b> Standstill current	Arms		6,17	5,55	-		-	1,01
<b>ns</b> Standstill speed	mm/s or rad/s		0,15	0,16	-		-	-
<b>Um</b> Max. input voltage	VDC		100	100	48		100	100
<b>Pc</b> Max. cont. power dissipation	W		74	56,3	3,88		3,93	8,75
<b>2<math>\tau</math>p</b> Magnetic period	mm		32	32	-		-	-
<b>2p</b> Number of poles	-		-	-	-		-	32

VACUUM CHARACTERISTICS		UNIT						
<b>Vacuum supply for wafer chuck</b>								
Vacuum at interface output	bar		-0,6					
<b>Vacuum supply for axis cleanliness</b>								
Vacuum flow	l/min		10	6	-	5	5	

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

WORKING ENVIRONMENT		UNIT						
Clean room compatibility (6)	-		ISO 2					

TYPICAL MOVE AND SETTLE TIMES		UNIT						
Move 1: 10 $\mu$ m within $\pm$ 100 nm window	ms		40	-	-	-	-	
Move 2: 25 mm within $\pm$ 100 nm window	ms		135	-	-	-	-	
Move 3: 80 mm within $\pm$ 100 nm window	ms		190	-	-	-	-	
Move 4: 100 $\mu$ m within $\pm$ 30 nm window	ms		-	-	60	-	-	
Move 5: 1 mm within $\pm$ 30 nm window	ms		-	-	100	-	-	
Move 6: 1 deg within $\pm$ 40 $\mu$ deg	ms		-	-	-	-	70	
Move 7: 180 deg within $\pm$ 40 $\mu$ deg	ms		-	-	-	-	450	
Move 8: 10 mm within $\pm$ 500 nm	ms		-	-	-	-	180	

GUIDING ELEMENTS		UNIT						
Type	-		Ball bearing	Ball bearing	Flexures	Ball bearing	Ball bearing	

MATERIAL AND FINISH		UNIT						
Baseplate	-		Anodized aluminum	Aluminium & silicon alloy	Anodized aluminum	-	Stainless steel	
Carriage	-		Aluminium & silicon alloy	Anodized aluminum	Anodized aluminum	Stainless steel	Stainless steel	

OPTIONS / ACCESSORIES / FEATURES		UNIT						
Temperature sensors	-		Yes	No	No	No	No	No
Gravity compensation	-		-	-	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) Tolerances on electrical parameters are available on request.
- (2) Measured at a radius of 150 mm.
- (3) Measured at a radius of 150 mm other a limited stroke of 0 to + 3 mm.
- (4) Maximum displacement measured over a 100  $\mu$ m sliding window, wherever the position on the fine Z stroke.
- (5) Terminal to terminal.
- (6) Under vertical laminar flow conditions at 0.5 m/s. Measured at tool point level. Contact ETEL for more details.

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