MODELS XTA3804-3810
SERVOTUBE ACTUATOR

Force
» Peak: 744 - 1860 N
» Continuous: 120 - 276N

Maximum Velocity
» Up to 5.3 m/s

Feedback
» Built-in position sensor
» 1V pk-pk sin/cos
» 20 micron repeatability

Range of motion
» 33~318 mm

Dimensions
» W x H: 70 x 122mm
» Rod diameter: 38mm

Applications
» Packaging
» Material Handling
» Automated Assembly
» Bio-medical

The OEM advantage
» Reliable and cost-effective
» Flexible position control
» High speed and acceleration
» Clean, quiet operation
» No maintenance or adjustment

The ServoTube Actuator is an optimal solution for industrial position control. Faster than a ballscrew with the clean reliability of a linear forcer, ServoTube is a cost-effective alternative to air cylinders in applications requiring greater flexibility and control.

The ServoTube Actuator incorporates an IP67 rated forcer and a sealed stainless steel thrust rod enclosing rare-earth magnets. Four models deliver a continuous force range of 120~276 N (31~62 lb) with peak forces up to 1860 N (418 lb). Nine stroke lengths are available from 33~318 mm.

The patented magnetic design of ServoTube generates 20 micron (0.79 mil) repeatability and 400 micron (16 mil) accuracy from a non-contact, integral position sensor. No external encoder is required. Position output is industry standard 1V pk-pk sin/cos signals.

An internal dry bearing provides clean, quiet, maintenance-free performance. Life expectancy far exceeds typical ballscrew solutions.

The ServoTube Actuator is ideal for push/pull/lift material handling, packaging and automated assembly applications. ServoTube accepts a range of industry standard accesories for simple mechanical integration.

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ELECTRICAL SPECIFICATIONS

FORCER TYPE	3804		3806		3808		3810		units
	S(1)	P(1)	S(1)	P(1)	S(1)	P(1)	S(1)	P(1)	
Peak force @ 25°C ambient for 1 sec	744	372	1116	558	1488	744	1860	930	N
Peak current @ 25°C ambient for 1 sec	20		20		20		20		Apk
With 25 x 25 x2.5cm heatsink plate									
Continuous stall force @ 25°C ambient (2)	137.3		186.9		232.1		276.2		N
Continuous stall current @ 25°C ambient	2.61	5.23	2.37	4.74	2.20	4.41	2.10	4.20	Arms
	3.69	7.39	3.35	6.71	3.12	6.23	2.97	5.94	Apk
Without heatsink plate									
Continuous stall force @ 25°C ambient (2)	120.1		168.2		212.7		255.0		N
Continuous stall current @ 25°C ambient	2.28	4.57	2.13	4.27	2.02	4.04	1.94	3.88	Arms
	3.23	6.46	3.01	6.03	2.86	5.72	2.74	5.49	Apk
Force constant (sine commutation)	52.6	26.3	78.9	39.4	105.2	52.6	131.5	65.7	N/Arms
	37.2	18.6	55.8	27.9	74.4	37.2	93.0	46.5	N/Apk
Back EMF constant (phase to phase)	43.0	21.5	64.4	32.2	85.9	42.9	107.4	53.7	Vpk/m/s
Fundamental forcer constant	14.54		17.80		20.56		22.99		N/√W
Eddy current loss	3.7		3.7		3.7		3.7		N/m/s
Sleeve cogging force	7.3		4.2		8.3		5.6		+/-N
Resistance @ 25°C (phase to phase)	6.77	1.69	10.16	2.54	13.54	3.38	16.93	4.23	Ohm
Resistance @ 100°C (phase to phase)	8.73	2.18	13.10	3.27	17.45	4.36	21.82	5.45	Ohm
Inductance @ 1kHz (phase to phase)	8.52	2.13	12.78	3.19	17.04	4.26	21.30	5.32	mH
Electrical time constant	1.26		1.26		1.26		1.26		ms
Maximum working voltage	380		380		380		380		V d.c.
Pole pitch (one electrical cycle)	71.2		71.2		71.2		71.2		mm
Peak acceleration (3)	250	125	313	156	357	179	391	196	m/s^2
Maximum speed (4)	4.7	4.9	3.8	5.3	3.1	4.9	2.6	4.4	m/s

Notes:

(1) S=series forcer phases, P=parallel forcer phases
(2) Reduce continuous stall force to 89% at 40°C ambient
(3) Based on a moving thrust rod with 33mm stroke and no payload
(4) Based on a moving thrust rod with triangular move over maximum stroke and no payload

THERMAL SPECIFICATIONS

FORCER TYPE	3804	3806	3808	3810	units
Maximum phase temperature	100	100	100	100	°C
Thermal resistance $Rth_{phase\text{-}housing}$	0.23	0.16	0.13	0.11	°C/Watt
With 25 x 25 x2.5cm heatsink plate					
Power dissipation @ 25°C ambient	89.3	110.3	127.1	144.2	Watt
Thermal resistance $Rth_{housing\text{-}ambient}$	0.61	0.52	0.46	0.41	°C/Watt
Without heatsink plate					
Power dissipation @ 25°C ambient	68.2	89.3	107.0	123.0	Watt
Thermal resistance $Rth_{housing\text{-}ambient}$	0.87	0.68	0.57	0.50	°C/Watt
Thermal time constant	1677	1798	1924	2056	s

MECHANICAL SPECIFICATIONS

FORCER TYPE	3804	3806	3808	3810	units
Maximum stroke	318	318	318	318	mm
Forcer mass (excluding thrust rod and cable)	2.75	3.75	4.75	5.75	kg
Thrust rod mass/metre	8.3	8.3	8.3	8.3	kg/m

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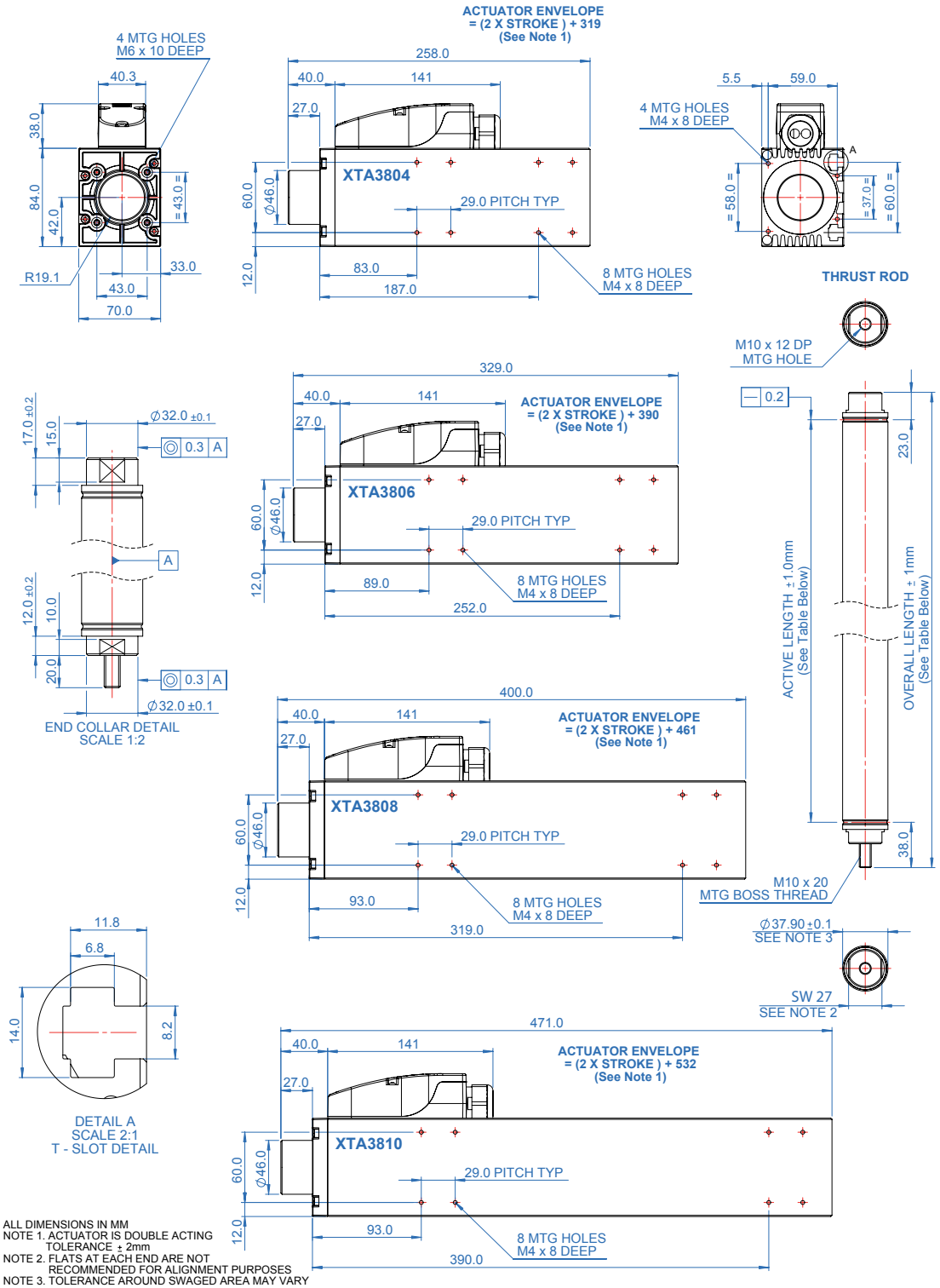
OUTLINE DRAWINGS



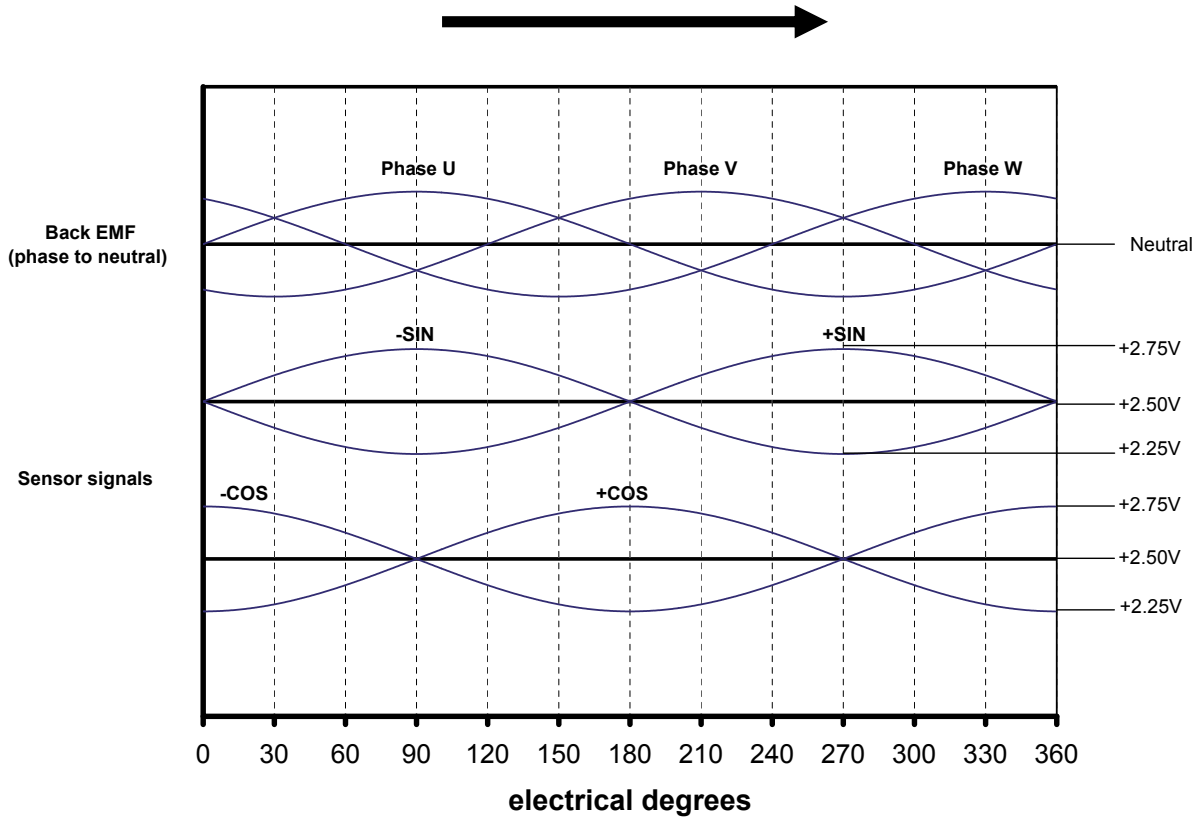
ALL DIMENSIONS IN MM
NOTE 1. ACTUATOR IS DOUBLE ACTING
TOLERANCE ± 2mm
NOTE 2. FLATS AT EACH END ARE NOT
RECOMMENDED FOR ALIGNMENT PURPOSES
NOTE 3. TOLERANCE AROUND SWAGED AREA MAY VARY

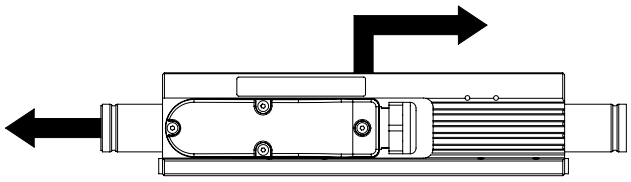
Stroke (mm)	3804	3806	3808	3810
33	350	421	493	564
69	386	457	528	599
104	421	493	564	635
140	457	528	599	671
176	493	564	635	706
211	528	599	671	742
247	564	635	706	778
282	599	671	742	813
318	635	706	778	849

Longer strokes are possible depending on the application

POSITION SENSOR

The position sensor outputs analogue, differential sine and cosine signals for providing position feedback. Shown below are the relationships between forcer phase back EMF and position sensor outputs for one direction of motion (as shown by arrows). It should be noted that +SIN or -SIN is always in phase with forcer phase U. For the motion shown, -SIN is in phase with forcer phase U. For motion in the opposing direction +SIN is in phase with forcer phase U.





SPECIFICATION	VALUE	units
Output signal period	71.2	mm
Signal amplitude (between +/- signals)	1	Vpk-pk
Output current	± 10	mA
Supply voltage	5 ± 0.25	Vd.c.
Supply current (output current=0)	15 ± 5	mA
Resolution(1)	20	micron
Position repeatability(2)	± 20	micron
Absolute accuracy(3)	± 400	micron

Notes:

(1) Dependent on amplifier (indication with 12 bit resolution)

(2) Dependent on amplifier. Under constant operating conditions. Self-heating of the forcer will cause expansion in the thrust rod during the initial warm up period. In high duty applications (corresponding to an internal forcer temperature of 80°C) a 1 metre thrust rod will expand typically by 250 microns.

(3) Maximum error over 1 metre under constant operating conditions.

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FORCER OVER TEMPERATURE SENSOR

It is strongly recommended that the forcer over-temperature sensor is connected to the drive amplifier or servo controller **at all times** in order to reduce the risk of damage to the forcer due to excessive temperatures.

Protection is provided by three positive temperature coefficient (PTC) thermistors embedded in the forcer phases. As the forcer phase temperature approaches 100°C, the PTC thermistors exhibits a sharp increase in electrical resistance. This change in resistance can be detected by circuitry within the drive amplifier or servo controller and used to reduce or disable the output of the drive amplifier in order to protect the forcer.

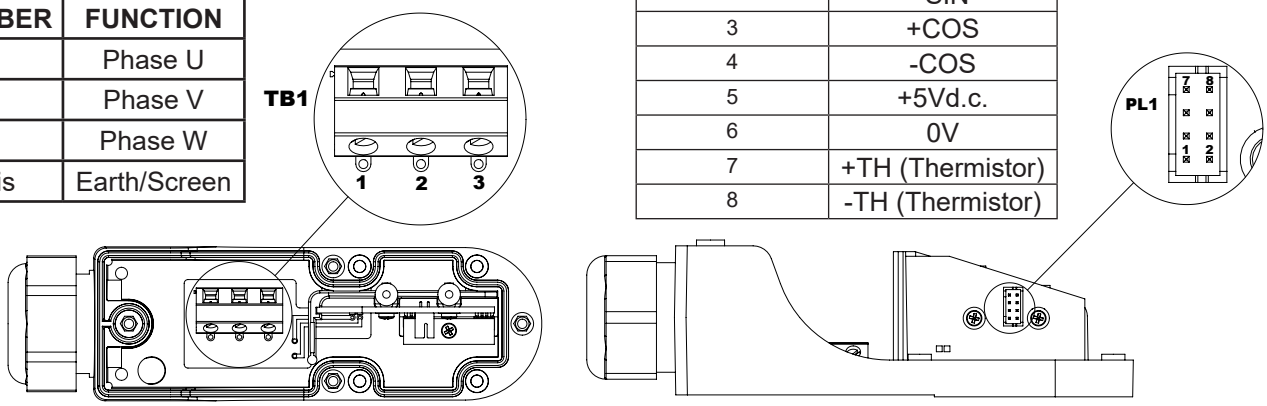
SPECIFICATION	VALUE	units
Resistance in the temperature range -20°C to + 70°C	60 to 750	Ohms
Resistance at 85°C	≤1650	Ohms
Resistance at 95°C	≥3990	Ohms
Resistance at 105°C	≥12000	Ohms
Maximum continuous voltage	30	Vd.c.

FORCER ELECTRICAL CONNECTIONS

Connections are made within the termination box.

PIN NUMBER	FUNCTION
1	Phase U
2	Phase V
3	Phase W
Chassis	Earth/Screen

PIN NUMBER	FUNCTION
1	+SIN
2	-SIN
3	+COS
4	-COS
5	+5Vd.c.
6	0V
7	+TH (Thermistor)
8	-TH (Thermistor)



CABLE TYPE

The XTA has two separate cables providing connections for forcer power and position sensor. Available are 3 metre, 5 metre or 10 m cable lengths.

Cables are suitable for continuous flex or drag chain applications.

	POWER	SENSOR
Overall diameter (nominal)	8.0mm	5.8mm
Outer jacket material	PUR	PUR
Number of conductors	4	4 x twisted pair
Size of conductors	1.5mm² (16 AWG)	0.14mm² (26AWG)
Screened / Unscreened	Screened	Screened
Minimum bending radius - flexible routing	42mm	42mm
Operating temperature - flexible routing	-15°C to +80°C	-15°C to +80°C
Operating temperature - fixed routing	-30°C to +80°C	-30°C to +80°C

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CABLE TERMINATION

The XTA cable is available with three termination options. **Option F** has the wire ends stripped and solder tinned ready for termination. All other options are terminated with connectors that plug directly into the desired amplifier. The connections for all options are shown below: -

SENSOR FUNCTION	D - (XTL-S)	N - (ESR-Pollmeier)	F - (Flying leads)
+SIN	14	6	Blue
-SIN	13	7	Red
+COS	12	11	White
-COS	11	12	Brown
+5Vd.c.	4	10	Yellow
0V	5	15	Green
+TH (Thermistor)	10	5	Pink
-TH (Thermistor)	15	15	Grey
SCREEN	1+ shell	Shell	SCREEN
Connector type	15-way high density D	15-way high density D	-
Amplifier connection	J8	X6.2	-
POWER FUNCTION			
Forcer phase U	4	U	Black 1
Forcer phase V	3	V	Black 2
Forcer phase W	2	W	Black 3
Earth (forcer body)	1	PE	Green/Yellow
SCREEN	1	Shell	SCREEN
Connector type	4-way 5mm pluggable terminal	4-way pluggable terminal	-
Amplifier connection	J2	X3	-

ENVIRONMENT

The XTA is intended for use in an environment within the following conditions:

SPECIFICATION	VALUE
Operating temperature	0°C to +40°C
Storage temperature	-25°C to +70°C
Ingress protection	IP67
Altitude (above mean sea level)	1000m
Overvoltage category	II
Pollution degree	2
EMC	light industrial

In addition, the XTA is available with two environmental coating options. The forcer body is coated as standard with a 25 micron layer of black anodise that is suitable for general use. **Option H** has the forcer body coated with a 90 micron layer of hard natural anodise that is suitable for harsher environments. This option is available at a minimum quantity of 25 pieces per year.

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ORDER CODES

Actuator

XTA38□□□-□□□-□-□□□□

Forcer
04, 06, 08, 10

Winding
S - Series
P - Parallel

Stroke
033, 069, 104, 140, 176,
211, 247, 282, 318
Stroke in mm

Environment
S - Standard
H - Harsh (on request)

Cable Termination
D - Xenus (XTL-S)
F - Flying leads
N - ESR Pollmeier

Cable Length
03 - 3 m
05 - 5 m
10 - 10 m

Cable Type
R - Robotic

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