

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 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 accessories for simple mechanical integration.

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

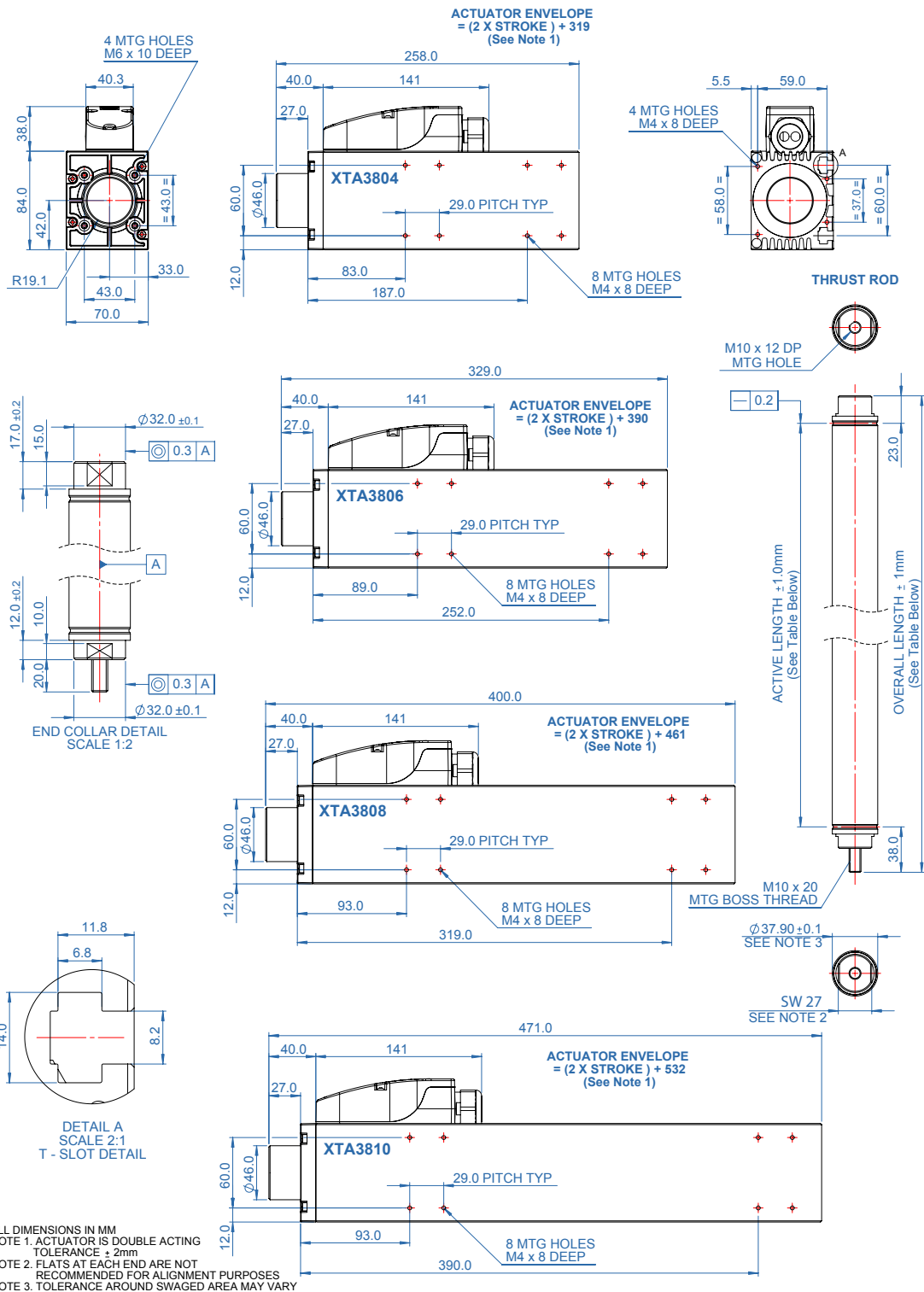
THERMAL SPECIFICATIONS

| FORCER TYPE | 3804 | 3806 | 3808 | 3810 | units |
|---|------|-------|-------|-------|---------|
| Maximum phase temperature | 100 | 100 | 100 | 100 | °C |
| Thermal resistance R _{th} _{phase-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 R _{th} _{housing-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 R _{th} _{housing-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 |

OUTLINE DRAWINGS

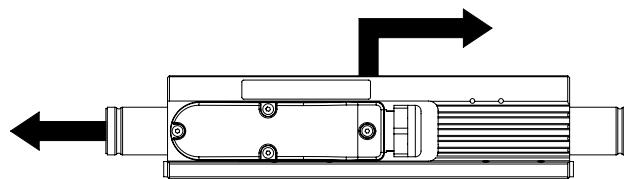
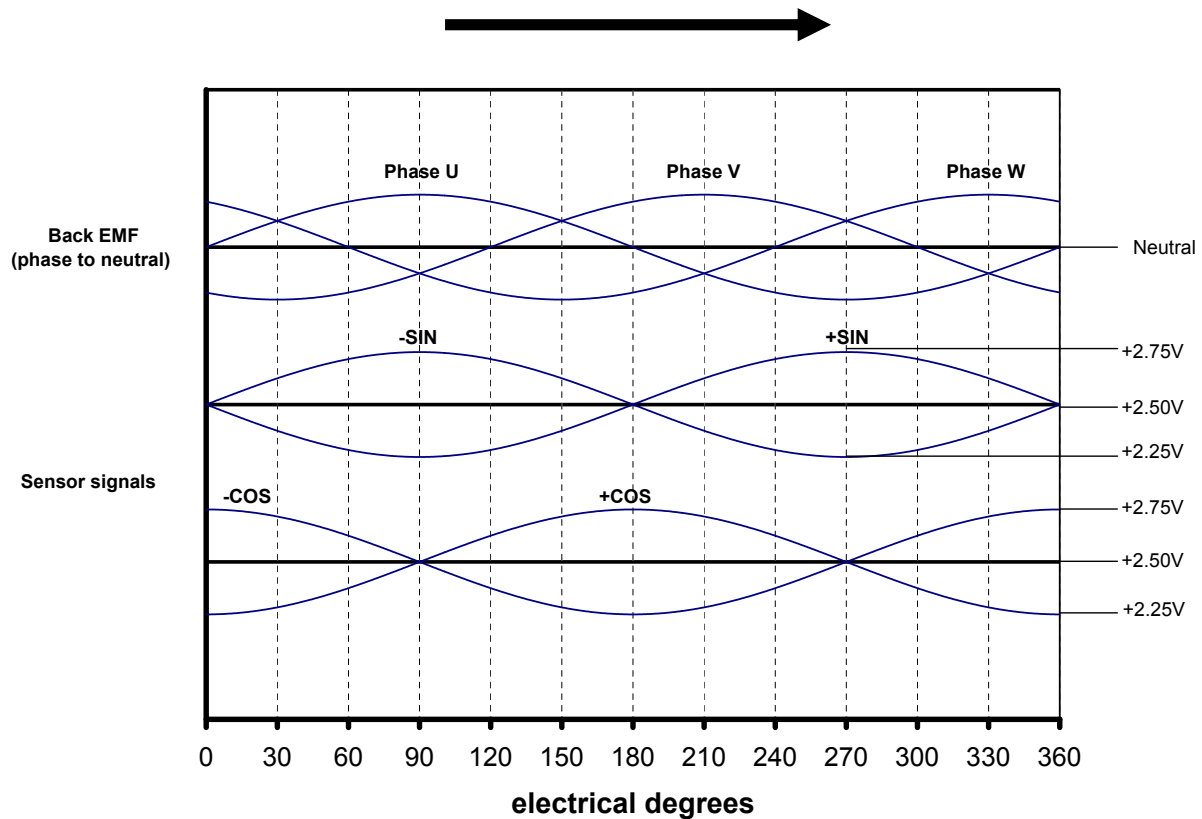


| Stroke (mm) | 3804 | 3806 | 3808 | 3810 |
|-------------|------|------|------|------|
| 33 | 350 | 421 | 493 | 564 |
| 69 | 386 | 457 | 528 | 599 |
| 104 | 421 | 493 | 564 | 635 |
| 140 | 457 | 528 | 599 | 671 |
| 176 | 493 | 564 | 635 | 706 |
| 211 | 528 | 599 | 671 | 742 |
| 247 | 564 | 635 | 706 | 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.

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.

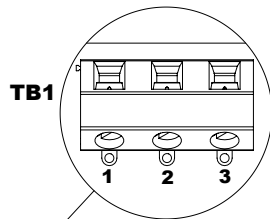
Protection is provided by three positive temperature coefficient (PTC) thermistors embedded in the forcer phases. As the forcer phase temperature approaches 100°C, the PTC thermistors exhibits a sharp increase in electrical resistance. This change in resistance can be detected by circuitry within the 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. |

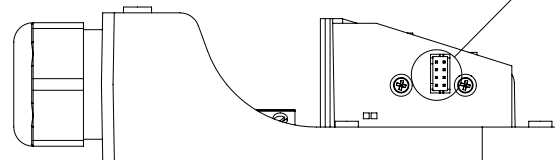
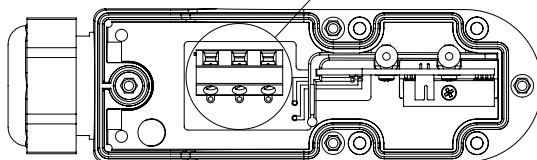
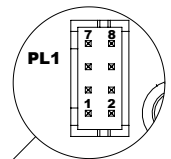
FORCER ELECTRICAL CONNECTIONS

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 | 1.5mm ² (16 AWG) | 0.14mm ² (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 |

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 <u>1</u> |
| Forcer phase V | 3 | V | Black <u>2</u> |
| Forcer phase W | 2 | W | Black <u>3</u> |
| 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.

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